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MINISTRY OF MUNITIONS.

HEALTH OF MUNITION WORKERS
COMMITTEE.

FINAL REPORT.

INDUSTRIAL HEALTH AND EFFICIENCY.

Presented to Parliament by Command of His Majesty.



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[Cd. 8187] of Session 1916. 1½d. (2d.).

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Reports on an Investigation of Industrial Fatigue by Physiological Methods.

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FINAL REPORT

OF THE

HEALTH OF MUNITION WORKERS COMMITTEE.

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HEALTH OF MUNITION WORKERS' COMMITTEE.

TERMS OF REFERENCE.

The Committee were appointed in September, 1915, by the Right Hon. David Lloyd George, M.P., with the concurrence of the Home Secretary. The Committee were invited "To consider and advise on questions of industrial fatigue, hours of labour, and other matters affecting the personal health and physical efficiency of workers in munitions factories and workshops."

The reference and appointment were subsequently approved by the succeeding Ministers of Munitions, the Right Hon. E. S. Montagu, M.P., the Right Hon. C. Addison, M.P., M.D., and the present Minister, the Right Hon. Winston S. Churchill.

CONSTITUTION OF COMMITTEE.

SIR GEORGE NEWMAN, K.C.B., M.D., F.R.C.P. (*Chairman*); Chief Medical Officer, Board of Education; Member of the Central Control Board (Liquor Traffic); Emeritus Lecturer in Preventive Medicine at St. Bartholomew's Hospital.

SIR THOMAS BARLOW, Bart., K.C.V.O., M.D., LL.D., F.R.S., Physician-Extraordinary to H.M. the King; late President of the Royal College of Physicians.

GERALD BELLHOUSE, Esq., C.B.E., H.M. Deputy Chief Inspector of Factories, Home Office.

Professor A. E. BOYCOTT, M.D., F.R.S., Director of Pathological Department, University College, London.

J. R. CLYNES, Esq., M.P., Parliamentary Secretary to the Ministry of Food.

E. L. COLLIS, Esq., M.B., H.M. Medical Inspector of Factories, Home Office; Director of Health and Welfare, Ministry of Munitions.

SIR WALTER M. FLETCHER, K.B.E., M.D., Sc.D., F.R.S., F.R.C.P., Secretary to the Medical Research Committee; Fellow of Trinity College, Cambridge.

LEONARD E. HILL, Esq., M.B., F.R.S., Director, Department of Applied Physiology and Hygiene, Medical Research Committee; Professor of Physiology, London Hospital Medical School.

SAMUEL OSBORN, Esq., J.P., Managing Director Clyde Steel Works, Sheffield.

Miss R. E. SQUIRE, O.B.E., H.M. Deputy Principal Lady Inspector of Factories, Home Office.

Mrs. H. J. TENNANT, C.H.

E. H. PELHAM, Esq. (*Secretary*); Assistant Secretary, Board of Education.

HEALTH OF MUNITION WORKERS COMMITTEE.

FINAL REPORT.

TO THE RIGHT HON. WINSTON S. CHURCHILL, M.P., MINISTER OF MUNITIONS.

SIR,

1. The Committee now beg to submit the following final Report.
2. Since their appointment the Committee have held thirty-nine meetings, and in addition sub-committees have met on numerous occasions.
3. Immediately on their appointment the Committee arranged to sit and take evidence not only in London but also in Birmingham, Sheffield, Newcastle, Glasgow, Manchester and Coventry. Special arrangements were also made for taking evidence at Woolwich. Witnesses were heard representative of employers, workers, factory inspectors and other interested persons. From time to time special witnesses have also been heard on particular questions. In addition, a number of other persons have—by the submission of memoranda or by other means—placed their special knowledge at the disposal of the Committee. The Committee have decided to content themselves with quoting extracts from the evidence, and not to publish it in full. In arriving at this decision they have been influenced not only by the urgent need for economy in paper, but also by the fact that much of the evidence was either not intended for publication or had special reference to particular conditions then existing, but now largely modified. Some persons, while allowing their statements to be made use of, have desired that their names should not be published.
4. Throughout their inquiries the Committee have found it desirable to rely for much of their information on visits paid to factories. Such visits, which were generally paid by two or three members of the Committee together, enabled them not only to interview a number of employers, foremen and workers whose evidence would hardly otherwise have been available, but also to ascertain at first hand the conditions under which munition work was being carried out. In addition individual members of the Committee, whilst discharging other duties, have collected a considerable body of information bearing on questions under consideration.
5. From the first the Committee have been strongly impressed with the importance of obtaining exact and scientific data. The Medical Research Committee not only gave permission for Dr. Leonard Hill, F.R.S., head of their Applied Physiology Department, to serve upon the Committee, but placed the experimental resources of his laboratories at the disposal of the Committee, and offered to render any other assistance in their power. The assistance thus offered has proved of the highest value. In addition to other work Dr. Leonard Hill has conducted a number of detailed inquiries in regard to the dietaries of munition workers, and also in regard to ventilation. Dr. Benjamin Moore, F.R.S., and his staff have carried out a long series of experiments and inquiries in regard to the effects of T.N.T. upon the health of workers (separately published). In conjunction with that Committee arrangements were made for Mr. P. Sargent Florence, Mr. H. M. Vernon, M.D., Fellow of Magdalen College, Oxford (with whom has been associated Mr. W. Neilson Jones), Professor Thomas Loveday, Armstrong College, University of Durham, and Captain M. Greenwood, R.A.M.C. (with whom has been associated Mr. S. H. Burchell), to collect data bearing on the relationship of output to hours of work and other industrial problems. Captain T. H. Agnew, R.A.M.C., conducted, on behalf of the Committee, a medical inspection of about 3,000 male workers. Two series of medical inspections covering together about 2,500 women and girls were organised under the supervision of Dr. Janet Campbell (a Senior Medical Officer of the Board of Education).
6. In Appendix A are set out the names of—(a) the Witnesses, other than those who desired that their names should not be published; (b) the Medical Officers, inspectors and others who assisted in the medical inspections; and (c) certain other persons who, by the submission of memoranda or by other means, placed their special knowledge at the disposal of the Committee. The Committee desire to place on record their cordial appreciation of the assistance rendered, often at much personal inconvenience, by all those who have thus enabled the Committee to collect a body of reliable information, without which it would have been impossible for them adequately to perform the duties with which they were charged. The Committee are also under a great obligation to the many munition firms and their staffs for the facilities so readily accorded for the pursuit of inquiries. Finally, the Committee desire to express their thanks to the Home Office (Factory Department), the Ministry of Munitions, the Board of Education and the National Insurance Commissioners for the assistance afforded the Committee by the loan of their officers and the supply of information.

7. In view of the urgency of many of the problems involved by their terms of reference the Committee decided that it was desirable that they should submit their views and recommendations in regard to particular matters in separate Memoranda rather than that they should defer making any report until their investigations were completed. In accordance with this decision the Committee have submitted to the Ministry the following twenty-one Memoranda :—

- No. 1.—Sunday Labour (Cd. 8132).
- No. 2.—Welfare Supervision (Cd. 8151).
- No. 3.—Industrial Canteens (Cd. 8133).
- No. 4.—Employment of Women (Cd. 8185).
- No. 5.—Hours of Work. (Cd. 8186.)
- No. 6.—Canteen Construction and Equipment. (Appendix to No. 3.) (Cd. 8199.)
- No. 7.—Industrial Fatigue and its Causes. (Cd. 8213.)
- No. 8.—Special Industrial Diseases. (Cd. 8214.)
- No. 9.—Ventilation and Lighting of Munition Factories and Workshops. (Cd. 8215.)
- No. 10.—Sickness and Injury. (Cd. 8216.)
- No. 11.—Investigation of Workers' Food and Suggestions as to Dietary. (Second Appendix to No. 3.) (Cd. 8370.)
- No. 12.—Statistical Information concerning Output in relation to Hours of Work. (Cd. 8344.)
- No. 13.—Juvenile Employment. (Cd. 8362.)
- No. 14.—Washing Facilities and Baths. (Cd. 8387.)
- No. 15.—The Effect of Industrial Conditions upon Eyesight. (Cd. 8409.)
- No. 16.—Medical Certificates for Munition Workers. (Cd. 8522.)
- No. 17.—Health and Welfare of Munition Workers outside the Factory. (*Not published.*)
- No. 18.—Further Statistical Information concerning Output in Relation to Hours of Work, with special reference to the influence of Sunday Labour. (Cd. 8628.)
- No. 19.—Investigations of Workers' Food and Suggestions as to Dietary. (Second Appendix to No. 3.) Revised edition. (Cd. 8798.)
- No. 20.—Weekly Hours of Employment (Supplementary to Memorandum No. 5.) (Cd. 8801.)
- No. 21.—Investigation of the Factors concerned in the Causation of Industrial Accidents. (Cd. 9046.)

All of these Memoranda with the exception of No. 17 (Health and welfare of munition workers outside the factory) have been published and placed on sale.

An Interim Report, entitled "Industrial Efficiency and Fatigue," was also published (Cd. 8511) in February, 1917, in which was set out the results of a number of investigations which had been made for the Committee. The studies included were :—

- (a) Industrial Fatigue and its Causes (reprint of Memorandum No. 7).
- (b) Output in relation to Hours of Work (reprint of Memorandum No. 12).
- (c) The Comparative Efficiencies of Day Work and Night Work.
- (d) The Causes and Conditions of Lost Time.
- (e) Incentives to Work, with special reference to Wages.
- (f) Report on the Health and Physical Condition of Male Munition Workers.
- (g) Inquiry into the Health of Women engaged in Munition Factories.

Finally, in December, 1917, the Committee, acting on your instructions, issued a handbook on the "Health of the Munition Worker," summarising shortly and concisely the principal suggestions contained in their earlier publications.

8. The Committee are satisfied that the procedure thus adopted has been justified by the results attained. The publication of separate Memoranda has undoubtedly rendered the Committee's recommendations more readily accessible. The demand for the Memoranda has been large and continuous; upwards of 210,000 of the Committee's Memoranda and Reports have been sold or distributed, and the recommendations contained in them have received a wide measure of acceptance both officially and unofficially.

9. The Committee consider that they have now reached a definite stage in their work. Though doubtless fresh matters for inquiry may arise from time to time, there can be no doubt that the position is now substantially different from what it was when the Committee were first appointed in September

1915. There is apparently an increased appreciation of the importance of the whole question of industrial hygiene, and there can be no doubt that the environment and conditions of employment of munition workers throughout the country are now vastly better than they were two and a-half years ago, though there is still much room and much need for improvement. The developments which have occurred may be roughly grouped under the following heads:—

- (a) The various Memoranda and Reports already prepared by the Committee may be broadly regarded as containing recommendations in regard to all the principal questions which fall within their Terms of Reference. All these recommendations have been generally accepted as reasonable, and have been widely adopted.
- (b) In January, 1916, the Ministry of Munitions established a Welfare Section under the direction of Mr. B. S. Rowntree, for the purpose of the executive work arising out of the Committee's recommendations and other necessary undertakings for promoting the health of the large body of workers for which the Ministry was responsible. The activities of the Department were at first concentrated on securing improved conditions of health and welfare within "controlled" factories by encouraging factory managers to appoint some person or persons to maintain a close personal relationship with the workers, and also to make the requisite structural provision.* Early in 1917, the pressure of other duties prevented Mr. Rowntree from continuing to direct the Department, which was about the same time entirely reorganised under the direction of Dr. E. L. Collis, a member of the Committee. The new department was made responsible for all matters concerned with the health and welfare of munition workers in national as well as in "controlled" factories, including the medical problems involved in the prevention of T.N.T. poisoning and the maintenance of the health of those employed in the manufacture of lethal gas. The sphere of the Department was at the same time extended to cover the conditions of life of munition workers outside the factory, together with the inspection of the large number of temporary hostels for munition workers that were being provided. In addition, special provision was made for research and the collection of accurate knowledge upon which administrative action could be based. More recently the Department has been taking steps to deal with the various maternity problems which arise in munition areas. The staff, in addition to the central administrative officers, includes men and women welfare officers† charged with the inspection of conditions inside the factories, the supervision of conditions outside the factories and the inspection of hostels, medical officers charged with the supervision of the Doctors appointed to individual factories and also with advising on all health questions and special research investigators.
- (c) Under Section 7 of the Police, Factories, &c. (Miscellaneous Provisions), Act, 1916, the Home Office were given power to make Orders requiring special provision to be made at a factory or workshop for securing the welfare of the workers. The matters to which the section applies include: Arrangements for preparing or heating and taking meals; the supply of drinking-water; the supply of protective clothing; ambulance and first-aid arrangements; the supply and use of seats in workrooms; facilities for washing; accommodation for clothing; arrangements for supervision of workers.

As the result of these developments the questions now at issue are concerned not so much with the determination of general policy as with the application of agreed principles to particular cases. They are, in fact, administrative rather than advisory in character. In saying this the Committee must not be regarded as in any sense under-rating the urgent necessity for the continuance and development of the various scientific inquiries which they have initiated. Other means can, however, be found for attaining this end, and the Committee concur in the propriety of the decision of the Ministry to discharge their reference and to establish in their place an Office Committee in association with the Executive.

10. It has only remained accordingly for the Committee to prepare a Final Report of their proceedings. In this report, which they now submit, they have endeavoured to survey concisely (even at the risk of some repetition), the nature and development of all the various problems covered by their Memoranda. Many of the Memoranda would, in any case, have required substantial modification in view of developments which have occurred since their publication, but what is more important, the bringing together of the various matters which have been dealt with in their various Memoranda serves to emphasise in a manner otherwise impossible the close relationship and inter-dependence which exists between the problems involved. Though it is too early yet to draw any final conclusions as to the permanent effect on the health and physical efficiency of the munition work of the abnormal conditions which have existed during the War; it is at any rate possible to set out the extent to which normal restrictions have been abandoned, to suggest some conclusions as to the results which have followed, and, finally, to indicate certain conclusions as to the steps which should be taken to maintain and promote permanently the health of industrial workers when more normal conditions are restored.

* The conditions under which such expenditure may be met out of excess profits are given in Appendix K.

† There are now probably about 800 Welfare Supervisors employed in munition factories; of these approximately 80 per cent. are for women and girls and 20 per cent. for boys.

SECTION II.

PRELIMINARY AND HISTORICAL SURVEY.

11. At the outset of their investigation and inquiry the Committee were confronted with the width and complexity of the reference with which they were charged. It had to do with the environment of the worker and the worker himself; it was concerned with immediate as well as remote problems; its issues had to be viewed in relation to present exceptional and ephemeral conditions and circumstances, and also in relation to what would be practicable and permanent after the War; it involved the consideration of the health, not only of the munition worker in the narrow sense, but of all industrial labour—for all branches of labour are inter-dependent upon each other—and of many health questions, such as housing and maternity provision, which lie outside the walls of the factory or workplace; and lastly, it raised far-reaching social and even moral questions which are not commonly thought of as appertaining to health.

The fact is that this Report of the Committee's work, though concerned primarily with the munition worker, deals also with vital principles and practical methods affecting all forms of industry. Moreover, the health of the industrial worker—man and woman—is but part, essential, plastic, living, of the health of the people as a whole, which in its turn raises manifold problems of administration, economics, social relationships and even ethics, which though apparently remote from questions of medicine, are in truth, intimately associated. The nation a century ago was wise in its generation in recognising the relation obtaining between "the health and morals of apprentices," and, a hundred years later, it is found that some of the most intricate problems of health and physical efficiency are inseparable from large issues of physiology, of social relationship or morals, and of human conduct. It is sufficient to name two examples. First, *there is the advent of the woman worker*—an advent which brings with it new issues of physique, of physiological function, of staying power, of nutrition, of maternity. The entrance into the ranks of labour of the "young person" of either sex raises many questions concerning the development of the adolescent and the effects of labour conditions upon such growth and the national results which are likely to follow. All such questions are doubly difficult in the case of the woman worker. There has been witnessed what cannot be described otherwise than as a mighty revolution in industry, and the Committee have been deputed to study some of the physiological concomitants or effects of this revolution. They do not profess to solve the problems thus presented. They are under no delusion in the matter. They can but open the door and invite other students to enter this unexplored region of science and labour. They are convinced that it offers a wide field for research, for careful experiment, for firm, frank and bold statecraft, for a large and sympathetic understanding, which shall secure the inestimable advantages of woman's skill and energy without those irremediable and far-reaching evils which will inevitably arise if her contribution be not wisely and effectually safeguarded. Secondly, *there is the old problem of the relation of the man to the machine*. During the industrial revolution in England there was a tendency, to put it no higher, for the man to be made subservient to the machine. But physically, socially and even morally, this seems to reverse the proper order. Their investigations have convinced the Committee that to secure harmony and smooth working, to secure efficiency and maximum output, the machine must be subservient to the man; it is his individual health, mental development and moral well-being which is the guarantee of effective labour. The reference here is not to the social relationships between master and man, or between man and man, though the proposition may be true in that regard also. It is only in respect of the *physiological basis* of labour and of all endeavour of whatever kind. In short, physical health is the fundamental basis. There must be a proper distribution of function of labour, a correct understanding of the part played by nutrition, by rest, by fatigue, by health conditions, if waste is to be avoided and maximum energy attained. The human being is a finely-adjusted physiological instrument, which must no longer be wasted, much less destroyed, by ignorant or wilful misuse. A working man's capital is, as a rule, his health and his capacity to perform a full day's work. Once that is impaired or damaged beyond recuperation, two things happen. First, his whole industrial outlook is jeopardised and he becomes by rapid stages a liability and even a charge on the State. Secondly, if the bodily defence is undermined by stress and strain the man falls a ready prey to disease, such as tuberculosis. Therefore, as the problems to which reference is made in this report concern the future as well as the present, so also they are concerned with the new preventive Medicine which has as its object the *removal of the occasion of disease and physical inefficiency* combined with the husbanding of the physical resources of the worker in such a way and to such a degree that he can exert his full powers unhampered, and with benefit to himself and all concerned.

12. Any account of steps which have been taken to promote the health of workers in the engineering and other trades' with which this report is immediately concerned, must inevitably deal in a large measure with the efforts that have been made generally to promote the health of all industrial workers during the century and a quarter which has elapsed since public opinion first became aroused on the subject. At first the health of children in cotton factories was the primary matter for concern. The evils of long hours of work and insanitary surroundings, though they had existed previously, had become accentuated by the aggregation of large numbers of workers in factories and by a marked increase in the demand for child labour. The children were helpless to protect themselves against the demands of the

employer for cheap labour and against the cupidity of the parents. That any action was taken was due partly, no doubt, to a fear that the conditions of employment might react, not only on the health of those immediately concerned, but on that of the nation as a whole. Action was, however, mainly due to the gradual awakening of the political and social conscience which occurred during this period. It was a time, not only of factory legislation, but of educational advancement and of prison reform. The awakening was religious as well as social, and the first Factory Act was concerned, not only with the health of apprentices, but with their "morals." It dealt with their education and religious training as well as with their physical welfare. The modern Factory Acts were only gradually evolved; legislation was directed to removing particular evils as they became recognised, rather than to the realisation of definite principles, based on a critical examination of the causes of the evils. That progress was slow was due in the main to the strength and character of the individualistic views then held and to the widespread belief that any curtailment of the liberty of action of the manufacturer must be prejudicial to the national prosperity. More than half a century passed before there was any general acceptance of the principle that the State has both a right and a duty to concern itself with the physical and moral welfare of its people.

13. The movement of reform expressed itself in two ways. First, there was the individual effort of the more enlightened pioneering employers, and secondly, there was the intervention of the State through its central Board of Health and, subsequently, the factory department of the Home Office. From the days of Robert Owen, and before his days, down to the present time, there has been a succession of benevolent employers who have made it their business to provide for the well-being of their workers, and have thus set a standard and an example to the State. Wood and Walker of Bradford, who inspired Oastler, John Fielden, who, in 1836, felt he was "the trustee of the interests" of those he employed, Robert Gardner, of Preston, and others were fore-runners in a long line of famous employers who have taken upon themselves the responsibility of the care of their workers. "We manufacturers," wrote Robert Owen, "are always perfecting our dead machinery, but of our living machinery we are taking no care." The movement began with the reduction of hours of labour, but it now comprehends the whole wide compass of "welfare." The medical examination of applicants, the provision of surgeries, convalescent homes and dental clinics; a nursing staff, prevention of accidents, supervision of sick slow or backward workers; canteen accommodation, recreation agencies, clubs, swimming baths and playing fields, libraries, allotments, educational classes; welfare supervisors; improved wage systems savings clubs, profit-sharing—make a formidable array of agencies for the benefit of the worker. "It is taken for granted," writes an employer, "that before any so-called scheme of welfare work can be of lasting good a living wage must be paid, and hours of labour and hygienic conditions must not involve the deterioration of the workers. It must be quite evident that clubs and classes, savings funds and libraries are quite thrown away upon workers who are overworked and underfed."*

14. It is important to observe that, with few exceptions, the pioneer reforms of employers were inspired by social and moral motives rather than by scientific or economic evidence. There was, indeed, all through this long period of tardy reform, little or no appeal to the actual facts of the relation between the hours and conditions of labour on the one hand and the energy and output of the workman on the other. It seems now, on looking back, an extraordinary thing that there should have been little or no scrutiny or inquiry, no experiment, no research, no investigation into the real state of the case. Men guessed, or assumed, or were guided by their own prejudice, or at best, were compelled by humane or religious ideals. One of the first control experiments on this subject made in the workshop was that initiated in 1892 by the Right Hon. Sir William Mather in the Engineering works of Messrs. Mather & Platt at Salford. As a result of negotiation between employer and employed it was arranged to make a year's trial (1st March, 1893–28th February, 1894) of a 48 hours' system, excluding the two hours of work before breakfast (7.45 to 12 noon and 1 to 5.30). The results showed—(a) that there was an increase of .4 per cent. in the ratio of the wages cost to the turnover; (b) that there was a saving in gas, electricity, fuel, wear and tear, &c., amounting, by coincidence, to .4 per cent.; (c) that there was a fall in the amount of lost time from 2.46 per cent. in the 53-hour period to .46 per cent. in the 48-hour period; (d) that though piece workers lost 1.76 per cent. at the beginning of the trial year, this fell to .78 per cent. at the end; and (e) that there was "increased cheerfulness and brightness" on the part of the workpeople. "We seem," wrote Sir William Mather in 1894, "to have been working in harmony with a natural law, instead of against it, as in the unnatural conditions of men beginning the work of the day without provision required by nature for the proper exercise of their mental faculties and physical powers. . . . Of this I am assured, that *the most economical production is obtained* by employing men only so long as they are at their best—when this stage is passed there is no true economy in their continued work." The Committee have had the advantage of discussing this admirable experiment with Sir William Mather, and they are satisfied that his experience and those of other employers who followed his enlightened example of inquiry and of reform demonstrates the value to the workman, the employer and the community as a whole, of applying to industry the scientific method and the scientific spirit.

15. Secondly, alongside the ameliorative efforts of individual employers, sometimes guiding them sometimes guided by them, there has been the ever increasing intervention of the State. For a hundred years the movement has been slowly, with tardy steps, gaining ground. To-day, in the presence of a wide interest in "welfare," it is important to remember that the foundations have been laid for many

* "Experiments in Industrial Organisation." By Edward Cadbury, 1912.

years. It is no new discovery either as need or remedy. For a proper understanding of the present situation it is necessary to take cognisance of the past. For convenience the matter may be considered under four subheadings: (i) the hours of employment; (2) factory environment; (3) personal well-being; and (4) the effect of occupation on health.

(i) *Limitation of Hours of Employment.*

16. When at the beginning of the last century public opinion first became seriously concerned with conditions of industrial employment interest was mainly concentrated on the excessive hours of employment of children and adolescents, and somewhat later of women. Though the hours of employment of men were the subject of continual agitation amongst the workers, legislation on the subject was never seriously contemplated, the action of the legislature being confined to limiting the hours of women, young persons and children, and to the provisions necessary to secure the effective enforcement of the limits decided upon. The earlier Factory Acts applied only to the textile industries, mainly because they were more highly developed, and regulations were consequently easier to enforce. It was not until limitations of hours, substantially as they exist to-day, had been established, that their extension to other industries was seriously considered.

17. The "Health and Morals of Apprentices Act," passed in 1802, was concerned solely with apprentices. Their working hours were limited to 12 a day, and their employment was forbidden between the hours of 9 p.m. and 6 a.m. Except as a statement of principle this Act was of but little effect. It did not apply to the large and increasing number of children who were employed otherwise than as apprentices, and even as regards apprentices its administration was lax. It was not, indeed, until 1819 that the agitations headed by Robert Owen,* himself a cotton manufacturer, led to the passing of a fresh Act under which the employment of all children under 9 years of age was prohibited, and the employment of young persons between 9 and 16 years of age was limited to 12 hours. No further development of importance occurred until the agitation led by Richard Oastler and Michael Sadler commenced about 1830. These agitations were in a large measure concerned with the establishment of a 10 hours day for juvenile workers, though it was anticipated that any limitation of the hours of children would result in a similar limitation in the hours of employment of all workers. The opposition during this period was primarily based on the view that any restriction of the hours of employment must seriously prejudice the prosperity of the country. Even as late as 1844 the view that "the longer the hours, the greater the profit," was still being expressed in its crudest form.

18. In 1833 Commissioners were appointed to inquire into the existing conditions and to consider the need for further legislation. They reported that children employed in the principal branches of manufacture throughout the country worked during the same hours as adults; that the effect of labour during such hours was, in a number of cases, permanent deterioration of the physical condition and the production of diseases wholly irremediable, and that at the age when children suffered injuries from the labour they underwent they were not free agents. The Commissioners were accordingly of opinion that a case was made out for the interference of the Legislature on behalf of children employed in factories.† The Factory Act, 1833, which resulted from the report of the Committee, distinguished for the first time between "children" and "young persons." Children between the ages of 9 and 13 were only to be employed for 9 hours a day and 48 hours a week, while young persons between the ages of 13 and 18 might be employed for 12 hours a day. No person under 18 years of age was to be allowed to work at night, that is to say, between 8.30 p.m. and 5.30 a.m. Owing to frequent abuses a medical certificate was required that a child was of "the ordinary strength and appearance" of a child of 9 years of age. Finally, the ineffectiveness (complained of by employers and workers alike) of earlier attempts to enforce the law through persons appointed by the local justices led to the appointment of Factory Inspectors.

19. The demand for factory reform and for a 10 hours day continued, and was gradually enforced by the reports of the Factory Inspectors as to the difficulties experienced in administering the Act of 1833. The Factory Act, 1844, which was largely supported by the employers as well as by the workers, contained numerous provisions for the better enforcement of the limitations already imposed and for preventing encroachment on meal times, but the most important innovation was the limitation of the hours of employment of all women to those permitted for young persons.‡ The struggle for a 10 hours day was practically ended by Factory Acts passed in 1847 and 1850, under which the hours of employment of women and young persons were limited to 10½ hours (with 1½ hours for meals) a day and 60 hours a

* Robert Owen stated in evidence that the reduction of hours in his own factory had not appreciably affected the output. He explained that "a larger quantity may be produced by a greater attention of the hands while the machinery is at work, in preventing breakages, and by not losing time in commencing in the morning, at meals, or when stopping at night."

† While they rejected the proposal of 10 hours a day they pointed out the fallacy underlying the arguments of the opposition. "It appears in evidence that the practice of working more than the ordinary hours a day in each branch cannot be turned to account to any such extent . . . When work is protracted beyond these hours the workmen become inefficient, the quality of the work is injured, the amount of waste augmented and moreover, additional expense for light is incurred." Reports of "Commissioners on employment of children in Factories," H.C., 1833, XX, XXI and H.C., 1834, XIX, XX.

‡ As one inspector pointed out, "12 hours daily work is more than enough for anyone; but however desirable it might be that excessive working should be prevented, there are great difficulties in the way of legislative interference with the labour of adult men. The case, however, is very different as respects women; for not only are they less free agents, but they are physically incapable of bearing a continuance of work for the same length of time as men, and deterioration of their health is attended with far more serious consequences to society."

week, while to prevent evasions of the law it was prescribed that the legal working day was to be from 6 a.m. to 6 p.m., thus coinciding in length with the legal period of employment.

20. The Children's Employment Commission, the first commission of inquiry into the general conditions of industries other than textile, was appointed in 1840 as a result of representations made by Lord Ashley. The Commission in their first report dealt with the mining industry; their second report,* which was published in 1843, showed that in the metal ware and other industries children were generally employed for as long as adults, sometimes for as much as 16 or 18 hours without intermission. Night work was also common. Though the reports of the Commission resulted in legislation in regard to coal mines and the extension of the Factory Acts to certain textile industries not hitherto included, no action was taken to remedy the abuses shown to be existing in the metal ware and other non-textile trades.

21. It was not until 1862 that the second Children's Employment Commission was appointed. The inquiries of this Commission were conducted under circumstances widely different from those which had existed 20 years earlier. The extent of the restrictions on hours of employment to be imposed by the Factory Acts was no longer a matter of dispute. It was, moreover, generally recognised that the industries affected had benefited by the imposition of these restrictions. The old opposition to the Factory Acts had largely disappeared. It is evident from the reports† that the character of the metal industries had widely changed during the 20 years which had elapsed since the previous inquiry. The increased use of machinery and the regulation of hours in other trades had tended to secure to a far larger degree regular hours of work. The phrase "overtime" is now used in something approaching the modern sense of hours of work in excess of the normal day. In continuous processes regular day and night shifts, and occasionally the three-shift system, are found established. The Commission quoted with approval the evidence of a number of witnesses who were opposed to overtime. The following, amongst others, were quoted :—

"If over-work lasts only for a short time 20 per cent. increase of hours' labour gives only about 10 per cent. increase of result in production. If overtime is continued for any length it gives no increase of result at all.

"We find that those on piece work make as much in 10½ hours as they do when they know that they have 2 hours longer. If they have been working their full time well they have not the energy left to get through much more at the end of it.

"Bad management and carelessness is the source of all overtime. When they work on till 8 p.m. they get wearied—men and boys. There is quite time enough from 6 a.m. to 6 p.m. for a man to do all he can do satisfactorily."

22. The Commission recommended the inclusion of the metal trades within the provisions of the Factory Acts, and legislation followed in 1867. Sunday work was forbidden, and also night work except to a limited extent permitted for male young persons employed in iron mills and blasting furnaces. Overtime was not allowed in the metal industries.

23. The report‡ published in 1876 of the Commissioners appointed to inquire into the working of the Factory and Workshop Acts, with a view to their consolidation and amendment, did not recommend any change in the limitation of hours of employment then imposed, and no material change has since been made. The Commission also considered in this relation the desirability of placing special restrictions upon the occupation of married women in the interests of themselves as well as of their offspring. They, however, regarded it as impracticable to place any prohibition on the employment of women immediately before or after child-birth, and confined themselves in condemning their employment and to recommending the provision of public nurseries in factory towns. And it was not until the Factory and Workshop Act, 1891, that it was provided that an occupier of a factory or workshop shall not knowingly allow a woman to be employed therein within four weeks after she has given birth to a child.

24. The Factory and Workshop Act, 1901, so far as the limitation of hours of employment was concerned, was mainly important as consolidating the law on the subject and as setting out the law as it at present exists. A summary of the principal provisions is given in Section V.

25. In 1911 a Departmental Committee was appointed on "The Night Employment of Male Young Persons in Factories and Workshops." In their report (published in 1912)§ they stated that they were strongly of opinion that the employment of boys under 18 years of age at night in factories was undesirable and ought not to be allowed to any greater extent or at an earlier age than was absolutely necessary. They considered that this applied especially to boys between 14 and 16 years of age, "when the rate of growth is most rapid and when the conditions of life ought to be rendered as favourable as possible for mental and physical development." This Committee reluctantly came to the conclusion that the adoption of a system of three eight-hour shifts was not generally practicable. They recommended the prohibition of all night employment of boys under 18 years of age in blast furnaces, and of boys under 16 years of age in iron mills. They considered it important that provision should be made for the periodical medical examination of boys employed at night until they are 18 years of age, at least once in six months. They added that records should be kept at the works of any physical defects or other matters calling for watchfulness on the part of the occupier, the examining doctor or the inspector of factories.

* House of Commons Report, 1843. XIII-XV.

† H.C., 1864, XXII; H.C., 1865, XX.

‡ H.C., 1876, XXIX and XXX.

§ Cd. 6503, 1912.

26. Such, briefly, are the outlines of the story of the struggle for a standard of working hours which should not overstrain the workman. For upwards of a century the State has accumulated indisputable evidence that it is the conditions of employment rather than its character which undermine the physical strength and endurance of the worker. Apart from exceptional occupations which are in themselves injurious, the principal of the undesirable conditions, the most radical and persistent, the commonest, is that of *long hours*. It is a significant fact that all through the history of the industrial system of this country the dominant evil is not accidents or poisoning or specific disease, but the stress and fatigue due to long and unsuitable hours of labour, entailing inadequate opportunities for rest, recreation and nourishment. In a word, it is not the work but the continuity of the work which kills.

(ii) *Factory Environment.*

27. Though in the earlier controversies of the last century public attention was primarily concerned with the limitation of hours of employment, the necessity was also recognised of attention to the environment of the worker in the factory. The Health and Morals of Apprentices Act, 1802, required that in all cotton factories in which more than 20 persons were employed (whether as apprentices or not), provision should be made for limewashing and "for a sufficient number of windows and openings in such rooms or apartments to ensure a proper supply of fresh air in and through the same." From the first, therefore, the importance of ventilation and cleanliness were recognised (unlike the limitation of hours of employment) as necessary for men as well as for women and young persons.

28. Various Commissions called attention to the matter. The Children's Employment Commission in their report, published in 1843, on the metal ware and other industries stated that—

"In the great majority of instances the places of work are very defective in drainage, ventilation and in due regard of temperature, while little or no attention is paid to cleanliness."

29. The reports of the Children's Employment Commission (1862) show that, notwithstanding the great developments which had taken place during the previous 20 years in the organisation of industry, conditions in these respects remained much as before. The Factory Acts (Extension) Acts, 1864 and 1867, contained provisions in regard to cleanliness and ventilation. As a direct result of the inquiries of Dr. Greenhow provisions for the first time appear dealing with overcrowding and with the provision of fans or other mechanical means for the prevention of the inhalation of dust. The development of opinion in regard to public health matters led to the Factory and Workshop Act, 1878, incorporating certain provisions of the Public Health Act, 1875, and requiring that the factory should be kept free from effluvia and other nuisances.

30. With the development of machinery the prevention of accidents became a question of increasing importance. The Factory Act, 1844, first provided for the fencing of machinery, though its provisions were largely confined to machinery "near to which children and young persons are liable to pass," and it was only by the Factory and Workshop Act, 1878, that requirements as to the fencing of machinery were extended to all workers. The same Act introduced for the first time restrictions as to the cleaning of machinery by women, young persons and children. Notification of accidents to the certifying surgeon, first introduced in 1844, was now extended to cover notification also to the factory inspector. The Factory Act of 1901 consolidated the measures for the improvement of the environment, and included requirements regarding cleanliness, ventilation, lighting and sanitary accommodation.

31. The enforcement of legislative requirements in regard to the environment of the worker has inevitably been a gradual process. The difficulties were greater than in the case of limitation of hours, since in the main the requirements were couched in general terms, words such as "adequate" left many loopholes for evasion, and the raising of the standard was and is largely dependent upon the exertions of the workers, the employers and the factory inspectors. Nor must it be forgotten that *pari passu* with improvement in factory environment there has been an immense advance in general sanitation outside the factory.

(iii) *Personal Well-being of the Worker.*

32. Since the earliest developments of the factory system there have always been employers who have not felt their social and moral obligations satisfied by fulfilment of the minimum requirements of the law, but have actively concerned themselves in promoting the health and welfare of their workers, not only by providing clean and well ventilated work places and moderate hours of employment, but by providing facilities for obtaining food and by other means outside the ordinary range of factory management. Thus one of the special commissioners appointed to make inquiries for the Commissioners on the Employment of Children in 1833 reported that—

"The greatest mills I have always found to be the cleanest, the machinery most securely fenced off, and the hands of the neatest and most respectable appearance . . . In Messrs. Strutt's mill at Belper each hand is allowed a pint of good tea or coffee, with sugar and milk, for $\frac{1}{4}$ d., and medical assistance gratis. A dancing room is also found for them in this establishment."

33. In one of the earliest reports of the factory inspectors it is stated—

"In some cases an active and anxious interest in the welfare of those employed has been evinced by the establishment of institutions and different regulations for the improvement of their moral and social condition which have been productive of great advantage. Some of these institutions have in view the providing of medical advice and medicines when ill, and occasionally pecuniary assistance during sickness."

Such cases were, however, exceptional, and there is no doubt that it was not usually considered a part of the duty of the employer to make any special provision in these respects.

34. The Children's Employment Commission reported in 1843 that—

"Even in those trades and manufactures in which deleterious substances are used there is in general no accommodation for the workpeople to change their clothes on leaving the place of work, or to wash themselves if they remain at meal times; and it is very uncommon for any means to be provided for workpeople to dress and warm their food."

35. In the report of the Royal Commission on Labour,* there is considerable evidence as to the need for increased interest being taken in these matters, especially as regards women—

"In ordinary employments the lady Assistant Commissioners call attention to various common causes of unhealthiness such as the absence of places for drying outer clothes when wet, absence of dining rooms and provision of hot water, or means of cooking or obtaining proper food in or near works."

36. In this gradual development of opinion as to what is needful to secure the well-being and efficiency of the worker, the factory inspectors have played an important part; though primarily concerned with the enforcement of the law, they have inevitably developed a wider view of their responsibilities. Since the first appointment of women inspectors, in itself a significant fact, this movement has been increasingly valuable, and the Annual Reports of the Chief Inspector contain constant evidence of the interest shown in such matters as the provision of washing facilities, baths, cloakrooms, overalls, canteens and messrooms. The influence of these wider views has, moreover, not been limited to individual employers and factories, but has led to the insertion, with the concurrence of the employers concerned, in Orders governing employment in certain "dangerous" trades of elaborate requirements binding upon the whole trade.

(iv) *Effect of Occupation on Health.*

37. Though individual writers had already drawn attention to the effect of different occupations upon health, it was in the beginning of the nineteenth century the common view that all occupations were equally healthy, provided that the hours of employment were not excessive and the conditions of ventilation and cleanliness were reasonable. It was only gradually that the influence of occupation upon health became more fully appreciated. The Commissioners on the Employment of Children in 1833 reported as follows:—

"That this excessive fatigue, prevention of sleep, pains in various parts of the body and swelling of feet experienced by young workers, coupled with constant standing, the peculiar attitudes of the body and the peculiar motions of the limbs required in the labour of the factory, coupled with . . . the impure atmosphere did sometimes terminate in the production of serious permanent and incurable disease."

38. About the same time Dr. Turner Thackrah† drew attention to the effects of the principal trades and professions on health and longevity. He pointed out that mortality was greater in the manufacturing districts, and called attention to the effect on health, not only of atmospheric impurities and excess of labour, but also of dust and gaseous impurities, posture, muscular effort and other conditions of employment. He pointed out that in many occupations injurious conditions existed which might be immediately removed or diminished.

39. The Children's Employment Commission (1840) which was the first Commission to make investigations into the conditions outside the textile trades, reported that—

"The work in which children and young persons are employed is seldom in itself oppressive, or even laborious; and very few indeed of the processes in the care and management of which children take any part are in their own nature injurious; but to this there are some lamentable exceptions in certain processes connected with the manufacture of metal wares, earthenware and of glass."

40. In 1853 and 1854 were published two reports by Mr. A. G. Finlaison, the Actuary of the National Debt, on the subject of sickness and mortality among members of friendly societies. He showed that the demand for sickness allowances depended, not so much on difference of locality or on the density of the aggregation of the population, as upon the amount of the expenditure of physical force.‡

41. In 1857 Dr. H. Greenhow, Lecturer on Public Health at St. Thomas's Hospital, made an elaborate investigation into the incidence of mortality from lung disease and other causes. He found that there existed no fixed relation between the prevalence of pulmonary affections and the size of towns. He suggested that various disturbing causes seemed capable of displacing the normal proportion and, of these, probably occupations and modes of life were the most influential.

"It is well ascertained that the great mortality among grinders and cutlers arises from the irritation caused by the mechanical particles produced during the process of manufacture and received into the lungs with the air in respiration."

42. This report was published by the Board of Health, with an introduction by their Medical Officer Sir John Simon. The Public Health Act passed in that year led to the transfer of powers of the Board to the Privy Council, and one of the earliest acts of Sir John Simon as the Medical Officer of the new

* H.C., 1893, XXXII—XXXIX.

† "The Effect of Arts, Trades and Professions on Health," by C. Turner Thackrah, 1832.

‡ "The only practical difference in the distribution of sickness that can be discovered was seen to turn on the amount of physical force called out by the occupation of the contributors; other features of the employment, the circumstances of the place, or of shelter or exposure under which that occupation was carried on, seeming to have but very minor influence on the question."

Central Authority was to instruct Dr. Greenhow to investigate on the spot the conditions in certain areas where lung diseases were specially prevalent.* Dr. Greenhow included amongst the conditions which his inquiry had shown to be direct causes of pulmonary disease, the inhaling of fine dust of metal and the breathing of air polluted by fumes or overheated. Other causes included habitual exposure to hot and exceedingly moist atmosphere, working in ill-ventilated and overheated factory rooms vicissitudes of temperature and strained posture.

43. The inquiries of the Children's Employment Commission (1862) showed that, in spite of the general development of industry, many of the evils revealed by the Children's Employment Commission, appointed in 1840 still existed and called for redress.† Though primarily concerned with the conditions of employment of children and young persons, the Commission necessarily dealt with many conditions, which affected all workers. The conclusions of Dr. Greenhow, which were fully confirmed by their own inquiries, were freely quoted. The Factory Acts (Extension) Acts, 1864 and 1867, which followed, marked the end of a stage. Parliament had intervened to remove certain general conditions of employment obviously prejudicial to health. Though the reports of the Registrar-General have constantly drawn attention to the influence of occupation upon mortality, public interest and scientific inquiry have since been largely diverted to questions affecting the health and welfare of the worker outside the walls of the factory.

44. The Education Acts, 1870 and 1876, placed education within the reach of every child, and established compulsory attendance. The Sanitary Act of 1866 was followed by the Public Health Act, 1875, which is still the principal measure dealing with all questions of public health. That any further general intervention by Parliament was unnecessary in the trades already under the Factory Acts was the considered opinion of the Commission on the consolidation and amendment of those Acts, which reported in 1876. For the future legislation was to be largely confined to dealing with the special conditions of particular industries. It took two forms. First, Acts were passed dealing with single industries, such as laundries; and secondly, the State was given power to confirm, or later themselves to make, codes of regulations specially designed to protect the worker against the effects upon health of "dangerous" trades or processes.

45. Under the influence of Dr. Greenhow's reports the Factory Acts (Extension) Acts, 1864, and 1867, conferred upon employers the power, with the approval of the Secretary of State, to make special rules to secure the requisite conditions of cleanliness and health. Further, where any process was carried on by which dust was generated and inhaled by the workman to an injurious extent the Inspector was given power to require the provision of a fan or other mechanical means for the prevention of inhalation. Under Section 8 of the Factory and Workshop Act, 1891, if the Secretary of State certified any machinery or process as dangerous or injurious to health, the Chief Inspector might, subject to certain safeguards, make proposals and require the adoption of special methods. These rules, like those made under the Act of 1864, only referred to single factories. Section 28 of the Factory and Workshop Act, 1895, strengthened these powers and extended them to cover rules prohibiting employment, or modifying, or limiting the period of employment for all or any class of persons.

46. Finally, the Factory and Workshop Act, 1901, consolidated previous legislation which had for its object the protection of the health of the worker. It conferred powers upon the Secretary of State to make regulations applying to all factories where particular processes injurious to health were in operation. The regulations are normally divided into two parts—the duties of the employer and the duties of persons employed. They deal with such matters as the removal of dust or fumes, method of manufacture, certificates of fitness before employment, periodic medical inspection, suspension of affected persons, costume (overalls, respirators, clogs, gloves, &c.), provision of messrooms and cloakroom, provision for the partaking of food in workplaces, and washing and bath accommodation. The Act also continued the power given by previous Acts to the inspector to require the provision of a fan or other means for preventing inhalation. A provision first included in the Factory and Workshop Act, 1895, is also continued, under which the Secretary of State may require the notification of certain diseases contracted in the factory or workshop, including those arising from lead, phosphorus, arsenic, mercury or anthrax. By special Order of 1916 this provision was extended to toxic jaundice.‡

47. In addition to dealing, as has been seen, with the hours of labour and factory sanitation, the Act of 1901 carried further previous enactments for the safeguarding of personal health. Home work was brought under special control; notification of the occurrence of industrial poisoning was extended; dangerous machinery had to be more strictly fenced, and certain dangerous employments were forbidden to young persons; and lastly, the provision of the Act of 1891 that a woman might not be employed within four weeks of giving birth to a child, received under the new Act increased administrative attention.

* Reports by Dr. Greenhow are included in the third and fourth reports of the Medical Officer of the Privy Council which were laid before Parliament in 1860 and 1861.

† Thus of one centre of the metal industry they report that—

"Considering, therefore, the early age at which the children go to work, the injurious state of their places of work, the lowering and exhausting modes of their employment, the unreasonable and excessive hours of work, irregular and undefined hours for meals, late work on Saturdays, or extra work in the earlier part of the week to make up the time granted for relaxation on Saturday afternoon, and exposure to frequent accidents of all kinds from machinery, it will be acknowledged that on physical grounds legislative interference is required as a protection to the young in this large and important department of manufacture."

‡ Under Section 8 of the Workmen's Compensation Act, 1906, the Secretary of State has power to make Orders extending the provisions of the Act to diseases contracted in the course of employment.

48. In submitting their Report the Committee desire to make certain qualifications and reservations for the consideration of those who study its pages. First, they wish to express the view that a true understanding of the questions dealt with in the report is only practicable if the facts and findings set out in these pages are considered in relation to the history of industrial hygiene in England. There is no greater mistake than to suppose that care for the health of the worker and the introduction of welfare supervision are new and untried ideas invented, or at least patented, by the Committee. In this matter, the Committee enter into other men's labours; but to them has been given the opportunity of urging the application of previous knowledge in a great national emergency, rapidly and on a considerable scale. During the last 20 years immense progress has been made under the Factory Department of the Home Office in many of the essentials of health in the workshop. The reports of the Chief Inspector of Factories have set out year by year the milestones of this advance. For several years before the European War there were not wanting signs that employers were beginning to recognise the importance of humanising the life of industrial workers and providing for them better conditions, and the Police, Factories, &c. (Miscellaneous Provisions), Act of 1916, promoted by Mr. Herbert Samuel when Home Secretary (which passed Parliament subsequent to the issue of the Committee's first reports), is evidence of the desire of the central authority in the same behalf.

Secondly, the Committee wish to point out that in spite of the great progress which had been made it remains true that up to 1914 relatively little attention had been paid by employers and others responsible to the steadily accumulating evidence of the influence of occupation upon health, and but little effort had been made scientifically to investigate its causes. Efforts to protect the health of industrial workers had been mainly based on the need of mitigating or removing admitted evils as they arose, rather than on the actual results of scientific inquiry and research. No doubt, partly as a result of the appointment of medical inspectors by the Home Office, increasing attention had in recent years been devoted to the critical examination of certain "dangerous" trades; but most trades are not "dangerous," and the vast bulk of industrial disease did not find its origin in dangerous trades. Yet there is the strongest evidence that rates of sickness and mortality amongst males had been materially affected by occupation. In spite of this well known fact much remained to be learned as to what are its causes, whether they are peculiar to individual occupations or are common to many, whether they are the same for sickness as for mortality, to what extent they depend upon variable factors, and to what extent they are removable. Then as to the injurious effects of industry upon women and young persons, reliable data may be said to have been almost wholly lacking, as they are equally lacking in respect of the relation of fatigue to disease. Again, the proper length and distribution of hours of labour—spells, pauses, overtime—in relation to output is another problem which has never yet been scientifically explored. The Committee here also found themselves without data. Once more, though attention is now being given to so-called "scientific management," evidence is still wanting to show how far the speed of working can be increased or the method modified without involving an undue physical or mental strain on the worker, which counterbalances or even destroys the advantages claimed. In the absence of reliable data on these and other problems of industrial organisation, the difficulties in the way of a wise handling of the special problems arising out of the War have been greatly increased. The Committee mention these points with a view to laying emphasis upon the imperative need of a more accurate understanding and a firmer and more comprehensive grasp of the whole problem of health and physique in relation to industry. In the Committee's view it is necessary to make arrangements, without delay, for a national scheme of industrial medical research, and to accord fuller recognition to the importance of industrial hygiene.

49. Thirdly, it is important to remember that the work of the Committee has been concerned with an emergency. The situation to be explored was continually changing and expanding. It would have been improper and impracticable to undertake any investigation which delayed output or interrupted the arrangements of the factory. Consequently the Committee have been debarred from making various experiments and inquiries which had suggested themselves as likely to contribute to the elucidation of the matters referred to them. Notwithstanding these limitations, there has been, during the period of the Committee's labours and owing to the public spirit and foresight of the Ministry and of directors, proprietors, managers, foremen and workpeople, a very remarkable advance in all that makes for industrial betterment. The munition worker is a type of all workers, and the principles of the present Report concern, in fact, all forms of industrial labour. The Committee earnestly hope that every effort will be made to secure this progress as a permanent gain to the whole nation.

50. Lastly, the Committee recognise that the various questions raised in the present report are intimately related to larger social and industrial problems, which lie outside their reference, but as to which they are deeply concerned. First and foremost there is the fundamental question of shorter hours of labour from a political and economic point of view (as well as from a health point of view); the Committee are convinced that this question lies near the root of the whole labour problem. Secondly, there is the far-reaching issue of the social and economic conditions of women's labour (over and above the issues of health with which the present Report deals), a matter of vital importance to the future of the British race, for the health conditions of women are even more inseparable from the social condition than in the case of men. Thirdly, there is the question of the solidarity of industrial society, the interdependence between employer and workman, which is closely related to the whole issue of the status, health and physical equipment of the worker. And fourthly, there is the title of the worker to an effective voice in regard to the conditions under which he works. If industry be indeed a national service, the object of those engaged in it is the good of the community as a whole, and the worker should have a fair and legitimate share in the responsibility of the transaction. The Committee are convinced that these four problems must be faced and solved if ever the State is to lay sound foundations for the health and physical efficiency of the industrial worker.

SECTION III.

RELATION OF FATIGUE AND ILL-HEALTH TO INDUSTRIAL EFFICIENCY.

INTRODUCTION.

51. The personal health and physical efficiency of the munition worker, as of all industrial workers, are measurable by two standards—first, that of fatigue, weariness and exhaustion of the healthy physical faculties and functions of the individual; and secondly, that of disease. It is not possible always to differentiate these two departures from the normal, or to say when fatigue passes beyond the confines of what is physiological to that which is pathological. It is obvious there comes a stage in the processes of fatigue where recovery in any individual falls short of the diurnal rhythm of rest and work, and its degree or character is so severe as to be, in fact, a form of disease. Indeed, the truth of this proposition is one which is necessary to a sound understanding of the problem which presents itself. It is necessary to widen the whole view and apprehension of the subject of health and disease in relation both to industry and to the personal welfare and capacity for work of each workman. The science and art of Medicine is not restricted to the diagnosis and cure of disease in its gross forms; it includes also a knowledge of how disease comes to be, of its earliest beginnings, and of its prevention. It is, in fact, the science and art of Health, of how man can learn to live a healthy life at the top of his capacity of body and mind, avoiding or removing external or internal conditions unfavourable to such a standard, able to work to the highest power, able to rest to the fullest, growing in strength and in the *joie de vivre*. The new Preventive Medicine must not be understood to consist only of sanitation, of the isolation from the community of cases of infectious disease, of disinfection and outward cleanliness, and of the registration of births, deaths and other vital statistics. These are, of course, matters of the first importance. But much more is required. The individual man as an animal—the body in all its parts, the senses and their functioning, the nutrition of the body, its growth and development, its capacity for work, its powers of resistance—must receive practical consideration. The fight against disease is something more than the closing of its channels of communication, something more than an avoidance of the ways and means of its infection and invasion, certainly much more than a registration of its effects, a record of the morbidity and mortality which follow in its train. The turning point of the battle is elsewhere. The first line of defence is a *healthy, well-nourished and resistant human body*. And to this end the whole man must be dealt with, for he is something more than animal. His body is in greater or less degree the instrument and expression of emotion, intellect and will. There is thus a psychological aspect of preventive medicine hitherto greatly neglected. Nor is the individual, taken at any one moment, the whole of the issue. There is his life history, his heredity, his family, his domestic life, his personal habits and customs, his home as well as his workshop. In short, preventive medicine to be effective must deal with the man, the whole man, as an individual as well as a member of the community. Whilst this is true of preventive medicine generally it is particularly true in regard to that portion of it which has been referred to the Committee for examination. The subject of industrial efficiency in relation to health and fatigue is thus in large degree one of preventive medicine, a question of physiology and psychology, of sociology and industrial administration. Before dealing with many of the practical questions involved the Committee think it desirable to refer briefly to some of the principles underlying present knowledge of fatigue and personal health, for upon a right understanding of fatigue, its causes and its relation to efficiency, the practical solution of the problems raised seems to depend.

DEFINITION AND CAUSATION OF FATIGUE.

52. *Fatigue is the sum of the results of activity which show themselves in a diminished capacity for doing work.*—In ordinary experience fatigue is generally associated with familiar bodily sensations and these sensations are often taken to be its measure. It is of vital importance for the proper study, of industrial fatigue, however, to recognise not only that bodily sensations are a fallacious guide to the true state of fatigue which may be present, and a wholly inadequate measure of it, but also that fatigue in its true meaning advances progressively, and must be measurable at any stage by a diminished capacity for work, before its signs appear plainly, or at all, in sensation.

53. In the animal body the performance of work depends on the activities of parts which are best considered under three groups:—

First, the complex nervous mechanisms of the brain and spinal cord, which are concerned in the initiation and distribution of impulses to action.

Second, the nerves, which conduct the impulses to muscles; and

Third, the muscles themselves, which by contracting finally perform external work.

Fatigue has been separately studied in all these parts. In its essential features the fatigue of all alike has been found, when it occurs, to depend not upon the simple using up—"exhaustion"—of the substances supplying the chemical energy which is liberated during work, but upon the accumulation within the living elements of the products of the chemical changes involved. Fatigue of the animal machine, that is to say, is not to be compared with the failure of fuel as in a steam engine, or with the running-down of a clock weight, but rather with the clogging of the wheels in some mechanism by dirt.

54. The chemical products of activity in the nervous and muscular elements are removed by the blood, in part directly by irrigation and in part indirectly through chemical changes in the tissue itself produced by constituents of the blood. Rest after activity is not a passive state, therefore, but is itself

an active process, or a series of active processes, leading to a restoration of the normal capacity for work. Time is required for these, and the time taken will be in proportion to the amount of restoration needed. There will be a definite relation accordingly between the degree of any given activity and the time necessary for the completion of the subsequent restoration process. If the activity is repeated too quickly to give time enough for restoration after each action, fatigue will become progressively more intense as the debit balance accumulates, and each repeated act in consequence will be more and more impeded, and will become smaller, until further action is impossible.

55. Of the three groups of organs just mentioned, the nervous system, the nerves, and the muscles, particular chemical and structural characters will decide in each case what time-relation must exist between action and the rest needed for complete repair. In the tired man the symptoms of fatigue are referred to the muscles; they ache, or they may appear to "give way under him," but in reality the most severe bodily activity fails to produce any close approach to complete fatigue of the muscles. The fatigue is fatigue of the nervous system, though in sensation its effects may be referred to the muscles themselves. A hunted animal may be driven to intense muscular fatigue, but in this extreme case the blood becomes charged with chemical products of activity, for the elimination of which no opportunity is given, and the muscles, with every other organ of the body, become poisoned. Even in laborious work it is doubtful whether a man by voluntary effort can cause his muscles to approach advanced fatigue. It is well known that a man apparently "run to a standstill" in a race may upon some new excitement run freshly again, under augmented stimulus from the nervous system, initiated there perhaps in part along new paths. The problems then of industrial fatigue are primarily and almost wholly problems of fatigue in the nervous system and of its direct and indirect effects.

THE RHYTHM OF ACTION AND REST.

56. The necessary time-relation between an action and the recovery from it in rest has been mentioned already. For every acting element a given rhythm of activity will allow exact recovery after each act, and will maintain the balance between action and repair throughout a long series. The heart, for instance, in alternating contraction and relaxation, may continue to beat incessantly through the life of a man without any accumulated fatigue for 70 years or more. Among the great variety of nerve centres there will be found a great variety in these time-relations. Some may allow a relatively rapid rhythm, as in the act of breathing, where the rhythm, which is a nervous rhythm, may be almost incessant for years, while at the other end of the scale there are slower rhythms like those shown in the need for diurnal sleep.

57. In connection with this natural pace of the animal machine, to and fro, from action to rest, reference must be made to the wide adaptability of the animal mechanisms, and especially to that of the nervous system, in response to training, use and habit. Complicated co-ordinations in the nervous system, at first easily fatigued, may by training, and, as it seems, by some improvement in the routes of connection due to the increase of traffic itself, become capable of maximum efficiency at a more rapid rhythm. A man will swing each leg, weighted with a heavy boot, as in walking, for 10,000 times in an unbroken march without notable fatigue, but he cannot as an impromptu exercise raise his lightly weighted finger for more than a few score times at no faster rate before the movement comes to complete standstill.

58. The problem of scientific industrial management, dealing as it must with the human machine, is fundamentally a problem in individual capacity, physical and mental, and in industrial fatigue. The rhythms of industrial conditions required by the hours of labour, the pace of machinery or that of fellow-workers, or otherwise, are imposed upon the acting bodily mechanism from outside. If these industrial rhythms are faster than the natural rhythms of the body they must produce accumulated fatigue, and cause an increasing debit, shown in a diminished capacity for work. It is therefore the problem of scientific management to discover in the interests of output and of the maintained health of the workers what are the "maximal efficiency rhythms" for the various parts and faculties of the human machine. These must be determined by the organised collection of experience or by direct experiment. They must be separately determined, moreover, not only for the performance of relatively simple muscular movements, all of which depend on the action of "lower" nervous centres, but also for the manifold faculties of the various systems of the body, and for the "higher" co-ordinating centres, and for all of these the natural rhythms must be studied for the best arrangement of industry, the hours, shifts, spells, pauses, the periods of sleep and holiday on the one hand, and the conditions of factory environment on the other.

SIGNS AND SYMPTOMS OF FATIGUE.

59. It must be repeated that the bodily sensations of fatigue are not a measure, or even an early sign, of it. Real or objective fatigue is shown, and is measurable by the diminished capacity for performing the act that caused it.

Bodily Fatigue.

60. Fatigue following muscular employment is primarily nervous fatigue, as explained already, and it has been seen that no advanced degree of muscular fatigue as such can be obtained by voluntary action, for fatigue in the nervous system outstrips in its onset fatigue in the muscles. In accustomed

actions, however, as in walking or digging, where there has been habituation, the activity may be so prolonged without great nervous fatigue as to give approaching "exhaustion"—that is, notable loss of chemical substance—in the muscles. Industrial work is habitual work, but the case in which muscular labour is so intense and prolonged as to give exhaustion in this sense need not be considered here, nor the causation of the special symptoms which arise. It must be noted, however, that practically the whole of the mechanical energy and heat yielded by the body during work comes from the chemical energy stored in the muscles. In proportion as this store is called upon, and quite apart from the question of fatigue, it must be made good by supplies from the blood and ultimately from the food. Practically the whole of the energy transformed in the muscles is derived from carbohydrate material, and the importance of this in relation to the diet of workers is well known.

61. Whilst referring to this point of muscular fatigue, the Committee wish to record the view that for work in which severe muscular effort is required it seems probable that the maximum output over the day's work and the best conditions for the workers' comfort and maintained health, will be secured by giving *short spells* of strenuous activity broken by longer spells of rest, the time ratio of rest to action being here, for maximal efficiency, greater than that for the employments in which nervous activity is more prominent or more complicated than in the processes involved during familiar muscular work.

Nervous and Mental Fatigue.

62. It is under this head, as has been seen, that the special problems of industrial fatigue arise. The signs and symptoms of the fatigue will depend upon the nature of the particular work done, whether it be general bodily work of this or that kind, carried out in fixed routine, or whether it involve mental activity of a simple or of a more complicated kind. The fatigue may spring—(a) from the maintained use of intelligence and observation with varying degrees of the muscular effort necessary in every kind of work; or (b) from the maintenance of steady concentration upon one skilled task; or (c) of distributed attention, as when several machines are to be tended or other manipulations performed; or (d) it may depend upon the continued use of special senses and sense-organs in discrimination, whether by touch or sight; or (e) upon other parts of the body acting upon the nervous system. It will be affected greatly according to whether the worker has opportunity for obeying his natural rhythms, or whether unnatural rhythm is imposed upon him by the pace of the machine with which he works or by that of his fellow-workmen. Considerations so inexplicable at present in terms of physiology as to be called "psychological" will also arise; if the work is of a "worrying" or "fussy" kind, with a multiplicity, that is to say, of imposed and irregular rhythms, fatigue will be more rapid, perhaps on account of the more numerous, and "higher," nervous centres which become implicated.

63. Monotonous work—and much industrial work is monotonous—presents some special problems. It has been seen that uniformly repeated acts tend to become in a sense "automatic," and that the nerve centres concerned become less liable to fatigue—the time ratio of necessary rest to action is diminished. But when monotonous series are repeated fatigue may appear in what may be called the psychical field, and a sense of "monotony" may diminish the capacity for work. This is analogous to, if it does not represent, a fatigue process in unrecognised nervous centres. Conversely, "interest" may improve the working capacity even for a uniform monotonous activity, and the interest may spring from monetary incentives, emotional states, or, as some think, from states of anticipatory pleasure before meal-time and rest ("end-spurt"), or, again, from a sense of patriotism eager to forward the munitions output.

64. For practical purposes in industrial management two chief characteristics of nervous fatigue must be observed. First, during the continued performance of work the objective results of nervous fatigue precede in their onset the subjective symptoms of fatigue. Without obvious sign and without his knowing it himself, a man's capacity for work may diminish owing to his unrecognised fatigue. His time beyond a certain point then begins to be uneconomically spent, and it is for scientific management to determine this point, and to determine further the arrangement of periods of rest in relation to spells of work or other body or environmental conditions that will give the best development over the day and the year of the worker's capacity. Second, the results of fatigue which advances beyond physiological limits ("over-strain") not only reduce capacity at the moment, but do physical or mental damage of a more permanent kind which will affect capacity for periods far beyond the next normal period of rest. It will plainly be uneconomical to allow this damage to be done.

65. For these reasons, chief among others, it is important to detect latent fatigue at the earliest opportunity, and since sensations of fatigue are unpunctual and untrustworthy, means must be sought of observing the onset of fatigue objectively.

TESTS OF INDUSTRIAL FATIGUE.

Output.

66. The true sign of fatigue is diminished capacity, of which measurement of output in work will give the most direct test. The output must be measured under the ordinary conditions of the work, and, in cases where from the nature of the work the output cannot be automatically measured, it must be tested by methods which do not allow the workers to be conscious at particular times of the test being made. In this way the errors due to special effort from interest or emulation will be eliminated. The results of work expressed in output must be corrected by allowance for all variable factors save that

of the worker's changing capacity; changes in supply of steam or electric power and of raw material, for instance, must be determined for correction and interpretation of the actual output returns. The output must be estimated for successive short periods (e.g., each hour) of the day's work, so that the phenomena of "beginning-spurt" and "end-spurt," and other variations complicating the course of fatigue as such, may be traced and taken into account. Isolated tests of output taken sporadically will be misleading. The records must also extend over longer periods to show the onset of fatigue over the whole day and over the whole week, and under particular seasonal or other conditions, in order to detect and measure the results of accumulating fatigue.

67. Measurements of output must obviously be recorded at so much for each individual or for each unit group. The size of total output will be meaningless of course without reference to the numbers engaged. But it will also be important for proper management to take account of the output of particular individuals. This in many factory processes is easily possible, and when it has been done the results have shown surprising variations of individual output which are independent of personal willingness and industry, and have generally been quite unsuspected by the workers and their supervisors before the test was made. Information so gained is valuable in two respects. Good individual output is often the result of escape from fatigue by conscious or unconscious adoption of particular habits of manipulation or of rhythm. Its discovery allows the propagation of good method among the other workers. In the second place, these tests of individual capacity (or its loss by fatigue) give an opportunity for a rearrangement of workers and their assignment to particular and appropriate processes of work. Astonishing results, bringing advantage both to employer and employed, have been gained in this and other countries by the careful selection of individuals for particular tasks, based not upon the impressions of foremen but upon the results of experiment.

68. In passing it may be said that if the proper adaptation to particular kinds of labour of the relations of spells or shifts of work to rest intervals and to holidays is to be determined, as it can alone be, by appeal to experiment, it will of course be an essential condition for success that the workers should co-operate with the employing management and give their highest voluntary efforts towards the maximum output during the spells of work. It is not surprising that where employers, following tradition rather than experiment, have disobeyed physiological law in the supposed interests of gain—and for a century this has been almost universal—the workers have themselves fallen very commonly into a tradition of working below their best during their spells of labour. In so far as hours of work in excess of those suitable for maximal efficiency have been imposed, during the last two or three generations of modern industry, upon the workers a tradition of slowed labour must necessarily have arisen, probably in large part automatically, as a kind of physiological self-protection. Without some conscious or unconscious slackening of effort indeed during working hours of improper length in the past, the output might have been even more unfavourable than it is known to have been for the hours of work consumed.

Accidents and Spoiled Work.

69. An important and early sign of fatigue in the nervous centres is a want of co-ordination and failure in the power of concentration. This may not be subjectively realised, but may be shown objectively in an increased frequency of trifling accidents, due to momentary loss of attention. Such accidents may result in personal damage to the worker, trifling or serious, breakages of tools or materials, or the spoiling of work. In well-managed factories the incidence of accidents of this kind is recorded for unit periods throughout the day, and these records may provide a good secondary index to fatigue, but only in so far as they are corrected by reference to the rate of work being done and other variables. The subject of Accidents will be considered subsequently.

Associated Fatigue and Laboratory Tests.

70. The primary sign of fatigue in a given function is diminished capacity. But there is evidence to show that accumulated fatigue in connection with a given act may affect adversely the condition of other parts of the nervous system not immediately employed. There is little experimental knowledge, however, as to whether this effect, shown in "associated fatigue," is more direct and definite in kind than the effect upon general health to be mentioned below. The appearance of associated fatigue will need for its detection and study the application of special tests, involving the use of suitable apparatus and laboratory accommodation.

71. It should be remembered, however, that experiments of this kind will have no validity unless the fallacies due to emotions and ideas, such as a sense of novelty, interest in the desired result, anticipation of release from experiment, unconscious suggestion by the observer, and so on, are eliminated by the most rigid attention to experimental conditions and by long series of control observations. The objects of experimentation must be trained for the purpose, and it is unlikely that tests of this kind will offer results of sufficient value to justify the special education of teams of selected workers for the prolonged studies which the method demands.

72. In view of the fact that the Committee's sphere of experiment and observation comprised actual factories and workshops in all parts of the country, they have not engaged in any laboratory tests of fatigue, mechanical methods, experiments with the ergograph, etc. They have preferred to make their investigations of fatigue under conditions actually obtaining in the industrial world and comprising many individuals instead of few.

Lost Time and "Staleness."

73. The accumulated results of fatigue are damaging to general health, and they will be reflected in the sickness returns and in the returns of lost time. Many problems arise here which cannot now be discussed in detail,* and they are complicated by the influence of other factors.

74. Reference must be made here, however, to a pronounced and common symptom of industrial fatigue, which appears to be the reflection in the workman of the results of accumulated nervous fatigue rather than a direct and measurable sign of it. In many munition factories the complaint has been made by workers, and not least by the most intelligent and willing of them, that they are feeling "done up" or "fair whacked," to use local phrases, and the evidence shows that this state of "staleness" has been common and obvious. By experienced managers and medical officers this condition of staleness is attributed almost wholly to persistent long hours and the deprivation of weekly rest. It has grave accompaniments, which paradoxically appear not only in a state of lethargy and indifference, but also in a craving for change and excitement. No doubt the restlessness of the condition must often predispose also to indulgence in the apparent alleviations given by alcohol. At all points the state is apt to set up a vicious circle in which the very need for change and rest prevents the proper use of such chances of rest as are given.

75. The Committee hold the view that proper attention early in the War to the need for a weekly rest would have prevented a large part of the diminished capacity of this kind that was allowed to appear, and would have averted much costly and wasteful expenditure upon imperfect work. But stress must be laid here on a further point. For the avoidance of staleness in conditions of strenuous labour it is not enough to treat workmen in the bulk and to regulate daily and weekly rests upon a physiological basis devised for the average. Good management will consider always the individual workman as well. The Committee have no doubt that in many cases, in which staleness is well marked or has even advanced to definite sickness, a single "day off," given occasionally at the right time, would have avoided much wasteful reduction of capacity and in the worst cases the total loss of many days of work.

The Study of Industrial Fatigue and Ill-health.

76. By studies of industrial fatigue measured by tests of individual output a large body of valuable information has already been gained in various countries, and its application wherever management is scientific has become a commonplace of administration.† It must be admitted, however, that in England, and no doubt to the detriment of both health and wealth, management based upon the experimental science of industrial fatigue is far less common than in the factories and business concerns of America and of Germany. Hitherto there has been a surprising uncertainty commonly found in this country, even where professional knowledge is to be expected, with regard to the proper solution of some of the most elementary practical problems of labour management.

77. There is the most urgent need for the application of the results of experience scientifically acquired. Upon a sudden national emergency the accumulation of fatigue and its results in workers may well be temporarily disregarded, but when the race is to be a long one, a failure to conserve the maximum efficiency of the workers must be disadvantageous. Misguided efforts to stimulate workers to feverish activity in the supposed interests of industry or national welfare are likely to be as damaging to the desired result as the cheers of partisans would be if they encouraged a long-distance runner to a futile sprint early in his race. Even during the urgent claims of a war the problem must always be to obtain the maximum output from the individual worker which is compatible with the maintenance of his health, strength and capacity. Life itself must not be sacrificed to output. In war time the workmen will be willing, as they have shown in so many directions, to forego comfort and to work nearer the margin of accumulating fatigue than in time of peace, but the country cannot afford the extravagance of paying for work done during incapacity from fatigue just because so many hours are spent upon it,‡ or the further extravagance of urging armies of workmen towards relative incapacity by neglect of physiological law.

78. The Committee have found an increasing number of instances in which the onset of industrial fatigue has been avoided—

- (i) by intelligent observation of the output;
- (ii) by regular study of the returns of sickness and of lost time;
- (iii) by prompt initiative in adapting the hours and conditions of work to physiological need;
- (iv) by providing proper facilities for the feeding, resting and recreation of the worker.

These cases are, however, still far from universal. Taking the country as a whole, the Committee are bound to record their conviction that conditions of reduced efficiency and lowered health have often been allowed to arise which might have been avoided without reduction of output by attention to the details

* Further reference is made to this subject below and in the chapter on Sickness and Injury.

† References to published work may be found conveniently in "Fatigue and Efficiency," by Josephine Goldmark, New York, 1913 (3rd edit.), and in the Interim Report to the British Association (Manchester, 1915) by the Committee upon the Question of Fatigue from the Economic Standpoint.

‡ On the question of Sunday work by exhausted men, one foreman said he did not believe in "a holiday on double pay." Another remarked that Sunday work gave "six days' output for seven days' work on eight days' pay."

of daily and weekly rests and other similar means of welfare and favouring conditions. The signs of fatigue are even more noticeable in the case of the managers and foremen, and their practical results are probably more serious than in the case of the workmen.

80. Finally, it must be remembered that when fatigue passes beyond physiological limits ("over strain") it becomes ill-health, which leads not only to reduced output but to more or less serious damage of body or mind. There is also, of course, much industrial sickness and disease which bears no exact relation to fatigue, though it may follow or precede it. Subsequent sections of the present Report are concerned with general and special diseases associated with factory life and an account of means for their amelioration. Here it is only necessary to draw attention to the primary and fundamental importance of maintaining a high standard of health in the industrial worker. For without health there is no energy, and without energy there is no output. *The actual conduct of business is thus primarily dependent upon physical health.* Moreover, health bears a direct relation to contentment, alertness, and the absence of lassitude and boredom, conditions bearing directly upon industrial efficiency. In this matter the interests of the employer and the workmen are identical. Nor are their respective responsibilities separable. The employer must provide a sanitary factory and suitable conditions of labour. The workplace must be clean and wholesome, properly heated and ventilated; there must be suitable and sufficient sanitary accommodation; dangerous machinery and injurious processes must be safeguarded; circumstances necessitate in many factories the establishment of industrial canteens, the provision of seats, suitable overalls, lavatories and baths, rest-rooms, and first aid appliances. Owing to the factory employment of many workers for the first time, and of increased numbers of women, often at a distance from home, arrangements must be made for individual supervision and the maintenance of their health. The employment of boys also calls for special vigilance and attention.

Further, it has been recognised for many years that the wise employer considers the personal well-being of his workpeople. He cannot be only satisfied with external betterment. He will have regard to the individual worker. Their nutrition, their rest and recreation, their habits of life, are all of interest and importance in relation to their health and efficiency.

81. The problems of industrial fatigue and ill-health, already soluble in part by reference to an available body of knowledge well known and used in other countries, have become acute during the great recent development of the munitions industries of Great Britain. It is not too much perhaps to hope that the study of industrial fatigue and the science of management based upon it, which is now being forced into notice by immediate need, may leave lasting results to benefit the industries of the country during succeeding years of peace.

82. The national experience in modern industry is longer than that of any other people. It has shown clearly enough that false ideas of economic gain, blind to physiological law, must lead, as they led through the nineteenth century, to vast national loss and suffering. It is certain that unless industrial life is to be guided in the future—(i) by the application of physiological science to the details of its management, and (ii) by a proper and practical regard for the health and well-being of our workpeople in the form both of humanising industry and improving the environment, the nation cannot hope to maintain its position hereafter among some of its foreign rivals, who already in that respect have gained a present advantage.

SECTION IV.

THE INDUSTRIAL EMPLOYMENT OF WOMEN.

83. In considering the conditions of employment of women workers as compared with those of men, the Committee have recognised that account must be taken not only of physiological differences but also of those contributions which women alone can make to the welfare of the community. Upon the womanhood of the country most largely rests the privilege first of creating and maintaining a wholesome family life, and secondly, of developing the higher influences of social life—both matters of primary and vital importance to the future of the nation. In modern times, however, many of the ideals of womanhood must find outward expression in industry, and in recent years hundreds and thousands of women have secured employment within the factory system. The problems thus raised are numerous, but broadly they may be considered as chiefly concerned with the wise and effective organisation of women's industry, in such a way as to protect and safeguard their unique contribution to the State. The engagement of women in the manufacture of munitions in the present war presents many features of interest. Probably the most striking is the universal character of their response to the country's call for their help. Of equal social and industrial significance is the extension of the employment of married women, the increased occupation of young girls, and the revival of the employment of women at night. The munition workers of to-day include dressmakers, laundry workers, textile workers, domestic servants, clerical workers, shop assistants, university and art students, women and girls of every social grade and of no previous wage-earning experience; also, in large numbers, wives and widows of soldiers, many married women who had retired altogether from industrial life, and many again who had never entered it. In the character of the response lies largely the secret of its industrial success, which is remarkable. The fact that women and girls of all types and ages pressed into industry, on account of the war, showed a spirit of patriotism which was as finely maintained as it was quickly shown. Conditions of work have been accepted without question and without complaint which, immediately detrimental to output, would, if continued, be ultimately disastrous to health. It is for the State to safeguard the devotion of its workers by its foresight and watchfulness lest irreparable harm be done to body and mind both in this generation and the next. More than ever in the past

should consideration now be given to the well-being of young girls fresh from school, of the prospective mother, and of the working mother whose care is especially claimed by her infant during the first months of its life; for more than ever is their welfare of importance to the nation, and much more than ordinarily is it threatened by conditions of employment.

84. Speaking generally, there are five principal matters which, apart from the question of wages, concern the health and industrial output of the woman worker, and which demand the careful and continuous attention of employers in regard to the employment of women in factories on any large scale, viz.: (a) the physical condition and capacity of the woman worker, including the far-reaching issue of maternity; (b) the period of employment (including night work, length of hours, overtime, &c.), and its relation to home duties; (c) the necessity of rest-pauses and the convenient provision of meals; (d) the sanitary condition of the factory and the hygiene of the worker; (e) questions of management and supervision. The Committee recognise that certain collateral issues, such as housing, transit and the means of recreation, are also intimately concerned in the welfare of women workers, although they may be somewhat outside the immediate sphere of the employer. The Committee have given careful consideration to the subjects enumerated above, and they desire to offer some observations under each heading. They appreciate the exceptional importance of women's labour in the present emergency, and in the future, and they do not desire to suggest the imposition of conditions which are likely to embarrass employers or restrict the usefulness of women. They confine themselves, therefore, to matters which in their view are both necessary and urgent in the interest of the women themselves, and the industrial output of which they are capable.

The Physical Condition of Women Workers.

85. In considering the physical ability of a woman successfully to withstand the fatigue consequent upon continued heavy work in a factory it should be remembered that her body is physiologically different from, and less strongly built than, that of a man; that her muscular system is less developed; and that she may have lived a sedentary or domestic life without contracting the habit of taking active and regular exercise. The nature of her work should therefore be determined with due regard to its effect on her immediate and future health. Certain ailments and forms of physical disability to which women are liable are readily caused, or at least accentuated, by inattention to these matters. Among such conditions are: (a) disturbances of digestion, due to unsuitable food, irregular and hurried meals or fatigue; (b) anaemia, with possibly associated disease of the heart and circulatory system; (c) headache; (d) nervous exhaustion; (e) muscular pain and weakness, flat-foot, &c.; and (f) derangement of special physiological functions. Though these conditions may not in all cases be immediately incapacitating, they frequently have a tendency to become chronic in nature and far-reaching in effect; they lead directly to mal-nutrition and a reduction of body energy; if allowed to persist they inevitably lay the foundations of ill-health and disease in later years; and in some cases they may exert an injurious effect on maternal functions. With a view to the adequate consideration of this subject the Committee made arrangements in 1915-16 and in 1917 for two medical inquiries to be carried out in various factories where women were employed. The Committee were fortunate in securing the services of Miss Janet M. Campbell, M.D., M.S. (one of the senior medical officers of the Board of Education), in this behalf, and they have received from her most valuable assistance not only in the clear and comprehensive reports of these particular inquiries but in all their consideration of health questions in relation to the employment of women. The report of the first medical inquiry, in which 1,326 women and girls were examined, will be found in the Interim Report (published 1917), pp. 110-121; the second inquiry, in which 1,183 women were examined, is reported in Appendix B to the present volume. The medical examination of these women workers could not be made as complete or exhaustive as might well have been wished, partly because suitable accommodation for the examination was not always available, partly because the time at disposal was limited (women being summoned from their work), but chiefly because presumably healthy women are naturally shy and hesitant of all medical examination. In estimating the physical condition and the amount of fatigue, reliance had to be placed to a large extent by the doctor on statements and descriptions of symptoms given by the women. The heart, lungs and abdomen could not be fully examined as a routine in all cases. (For particulars of medical inquiry, see Appendix B.) As in the previous inquiry the workers were classified into three groups: (A) normal and apparently free from fatigue; (B) suffering from some fatigue; and (C) suffering from well-marked fatigue. The results in regard to fatigue in the second inquiry were as follows:—

England.	Number of workers examined.	A (healthy).		B (slight fatigue).		C (marked fatigue).	
		Number.	Percentage.	Number.	Percentage.	Number.	Percentage.
Factory No. 1 ...	193	110	56.9	70	36.2	13	6.7
" 2 ...	264	199	75.3	53	20.07	12	4.5
" 3 ...	116	63	54.3	46	39.6	7	6.03
" 4 ...	157	112	71.3	41	26.1	4	2.5
" 5 ...	199	77	38.6	114	57.2	8	4.02
" 6 ...	73	45	61.6	19	26.02	9	12.3
" 7 ...	67	35	52.2	30	44.7	2	2.9
" 8 ...	114	51	44.7	52	45.6	11	9.6
Total ...	1,183	692	58.4	425	35.8	66	5.5

86. It is interesting to observe in the following table the results of the two inquiries which, in spite of different conditions of the examination, are surprisingly similar:—

—	Number of workers examined.	Class A (healthy).	Class B (some fatigue or ill-health).	Class C (marked fatigue or ill-health).
Inquiry No. 1 ...	1,326	763 = 57.5 per cent.	451 = 34.0 per cent.	112 = 8.5 per cent.
„ 2 ...	1,183	692 = 58.5 „	425 = 35.8 „	66 = 5.7 „

87. These tables indicate generally the amount and degree of fatigue observed among typical women workers chosen at random. The following points clearly emerge:—

- The proportion of serious fatigue amounting to marked ill-health and incapacity for work is relatively small, approximately 5 per cent. to 6 per cent. of the cases examined;
- There is a considerable amount of slight fatigue which varies from 20 to 57 per cent.
- The total proportion of women exhibiting definite signs of fatigue is about 40 per cent. of all cases. But this percentage does not represent the full burden of fatigue, for the following reasons: (a) much early fatigue is latent and objectively unrecognisable; (b) the women most seriously affected tend to drop out of factory life before they have served for any long period, and therefore are not included; (c) women knowing themselves to be fatigued were not willing in all cases to subject themselves to examination; and (d) the examination was necessarily superficial and incomplete, and only such as could detect definite and obvious fatigue, amounting almost to sickness.

88. It might have been anticipated that the findings of the second series of examinations would indicate an increase of fatigue, over-strain or sickness owing to the longer period of work undertaken (nine months or more). On the other hand, the hours of work had been shortened, there had been less overtime and no Sunday labour, and there had been an immense improvement in the conditions of factory life. Dr. Janet Campbell discusses in her report the relation to the health of the woman worker of: (a) the character of the work; (b) the length of hours of work; (c) her nutrition and physical health; (d) the tax imposed upon her by bad housing conditions and inconvenient means of transit; and (e) the "welfare" conditions surrounding her at the factory. The Committee concur in Miss Campbell's view of the relative importance of these matters. In spite of long hours and arduous labour there is no doubt that much fatigue is reduced or removed by active incentives to labour, such as interest, a sense of patriotism, higher wages, and a great improvement in the conditions of labour.

89. It is evident that whilst, physiologically, fatigue may be measured by a diminution in the capacity for doing work, it may easily increase to such a degree that it affects the health of the worker. And to this point Dr. Janet Campbell and her colleagues turned their attention. The ailments most frequently observed were indigestion, serious dental decay, nervous irritability, headache, anæmia, and disorders of menstruation. Something like a quarter of the women workers examined failed in one respect or another; 7 per cent. had throat trouble; 8 per cent. suffered from eye-strain; and 9 per cent. from swollen feet (see Appendix B). The report states that:—

The commonest causes of indigestion among women are dietetic, e.g., unsuitable or improperly prepared food, the persistent use of certain unwholesome articles of diet, such as unduly rich substances or food containing excess of carbohydrates. Alcohol may be a cause, especially in older women, but this was not observed in the present examination.

Headache was fairly common. It could often be attributed to one or more causes, such as fatigue in transit, noise in the factory, eye-strain, general tiredness, and was often associated with anæmia, indigestion or carious teeth. "Neuralgia" was complained of by a number of workers evidently suffering from nervous fatigue. Sleeplessness, especially among women on night shift, was frequently accompanied by headache.

Anæmia is most common among ill-fed, overworked girls in industrial districts, who have to work in badly ventilated and badly lighted rooms, under conditions which prevent proper exercise, especially in the open air and sunshine. A large number of the workers classed C showed signs of more or less severe anæmia, frequently accompanied by hæmic murmurs. A higher percentage was noted in one or two factories where it was mainly due to pre-war rather than post-war conditions, such as chronic malnutrition or work in artificial light. The improved diet and the usually healthy factory environment have no doubt acted as preventives of anæmia, and as far as can be judged on general grounds, munition workers compare favourably in this respect with young women workers in other trades and industries. Indigestion, constipation, anæmia and headache are so closely associated that it is often difficult to say which is primary and which secondary. That all depend in considerable degree upon environment and habits of life, and they are remedied less by drugs or direct medical treatment than by improved hygiene and nutrition. Sunshine, fresh air, exercise, good food and sufficient sleep are the most potent factors in the restoration to health.

Muscular pains, including aching or stiffness of the neck or limbs, are naturally common during the early weeks at the factory until the workers become habituated to unaccustomed muscular exercise. Among more experienced workers muscular pains may be complained of towards the end of a shift or attributed to a particular operation. They may indicate the commencement of fatigue in the worker or that the work is unduly heavy or otherwise unsuitable.

Nervous symptoms, such as neuralgia, irritability, nervousness, sleeplessness, or an undue tendency to worry were complained of by many women who were beginning to feel tired and worn. The symptoms were dependent on the general state of health rather than upon any organic defect.

90. The Committee are relieved to find that the results of these inquiries indicate that, although for the reasons given in paragraph 87 (c) above, the amount of existing fatigue and sickness probably exceeds in considerable degree that discovered by the investigators, the women and girls employed at these factories are as a whole bearing the strain of their munition work remarkably well. The Committee concur in the conclusions stated by Dr. Janet Campbell, viz. :—

- (1) That there is a definite burden of fatigue, which though relatively small in amount as regards severe fatigue is considerable as regards that of a less severe character ;
- (2) That the fatigue and ill-health are less than might have been anticipated having regard to the hours of work and the nature of the employment, and that this is due, broadly speaking, to the greatly improved attention to the health and welfare of the workers ;
- (3) That fatigue and sickness are greatest where heavy work is combined with long hours at the factory and associated with onerous domestic duties after factory hours ;
- (4) That unless brought under control, the considerable amount of moderate weariness and ill-health now present is likely to reduce immediate efficiency and also exercise in many cases an injurious effect on subsequent health and on capacity for maternity ;
- (5) That although there has been substantial improvement in the conditions and circumstances of women's work in factories further action is necessary if the amount of fatigue is to be diminished rather than increased. In particular the findings of this inquiry seem to indicate the necessity—
 - (a) for further shortening of the hours of labour for women ;
 - (b) for restricting women's work in the heavier branches of industry to those who are young, physically fit and capable and who have not arduous home duties to perform ;
 - (c) for the continuation and development, wherever women are employed in factories, of hygienic conditions and especially "welfare" arrangements (including industrial canteens) ; and
 - (d) for making appropriate provision for effective medical supervision, both on entrance to the factory (in heavy and exceptional occupations) and subsequently, by means of the services of medical officers (women preferred) and nurses, and in the form of suitable accommodation as to rest rooms, first-aid appliances and well-equipped surgeries.

91. *Maternity.*—The employment of large numbers of women of child-bearing age has also raised the problem of maternity and owing to causes associated directly with the making of munitions it is apt to become acute and urgent in an unusual degree. The overcrowded condition of many munition areas and the abnormal influx of women into these areas naturally strain to the breaking point the always inadequate provision for maternity which exists locally. The impression the Committee have gained from inquiries at numerous factories and among many of those responsible for the supervision and welfare of the workers is that though the problem in an acute form is limited to a relatively small proportion of women workers, there is somewhat urgent need for immediate action in regard to the care of those expectant mothers, married and single, who are unable to make suitable arrangements for themselves.

92. The care of the mother naturally falls into three stages—pre-natal, natal, and post-natal. *Pre-natal.*—The married woman with a home of her own usually leaves the factory in the early months of pregnancy, or at least as soon as her condition becomes obvious. No special provision is required for her apart from the provision for women as a whole. A certain number of women, however, are obliged to work almost until their confinement as they have no other means of livelihood. In Filling Factories it is usual, on account of the danger due to explosion or the handling of poisonous materials, to discharge a woman as soon as she is known to be pregnant. In engineering factories the practice varies. Where the work is heavy and it is not possible to transfer women to lighter processes they may be discharged as soon as their condition is recognised. Where lighter work is available and the general environment suitable they may be retained until, say, the 7th or 8th month. There is the further difficulty of suitable accommodation for the pregnant woman awaiting confinement. *Natal.*—Again, the number of lying-in homes and hospitals is notoriously inadequate to the needs of the country as a whole. In many overcrowded munition areas the workhouse is the only institution to which women can go for their confinements, an arrangement naturally repugnant to most women. Nor is there always available sufficient or skilled midwifery and nursing attendance. *Post-Natal.*—Thirdly, the post-natal care of the mother's own health is complicated by the need for suitable arrangements for her child. Practical questions, as Dr. Campbell points out, soon present themselves : "Where is she to live ? How is she to support herself until fit to resume factory work ? What is to become of the child whilst she is absent night or day. The only statutory provision which relates to the employment of pregnant women or nursing mothers is Section 61 of the Factory and Workshops Act, which states that a woman must not be employed within four weeks of giving birth to a child. It is obvious that the mother's first duty is to her young infant and that in the interests of its health she should not return to the factory until the expiration of a much longer period than four weeks. But she may have to choose between remaining with her baby without adequate means of support or returning to well-paid work as soon as possible, even though this entails virtual separation from the child. A breast-fed infant is more likely to thrive than one which is brought up by hand, but an ill-nourished mother is either unable to nurse her baby or continues to do so only at undue cost to herself. Until the State is prepared to recognise the claims of nursing mothers to assistance and financial aid the lesser of the two evils may be for the mother to go back to work as soon as she is physically fit to do so, provided that she can ensure the care of the baby during her absence.

93. It appears that the practice in regard to the employment of mothers with young infants varies in different factories. In some, with a view to encouraging breast feeding, no woman is supposed to be

employed who has a child under 9 to 12 months of age. In others, no general rule exists and cases are judged on their merits. In some, no attention is paid to the age of the child. It is of course impossible to investigate all cases fully, and a woman who is badly in need of employment has often little difficulty in evading inquiries. Children are thus commonly left with relatives or "mindors," or sent to a day nursery when there is one.

94. Dr. Janet Campbell has submitted for our consideration the following *Maternity Scheme* for the assistance of munition workers:—

"(a) *Skilled supervision of pregnant women* is necessary, both factory and domiciliary, by a qualified and competent officer, in order to ensure that suitable arrangements are made for the confinement at home or in lodgings (engagement of the midwife or doctor, ante-natal care, post-natal care, &c.) and for the care of the infant after birth. Such an officer would be able to bring the woman into touch with local agencies for assistance. She would also encourage thrift and proper preparation for the confinement. This supervision might be arranged by the welfare staff of the factory, though in large factories an extra officer with midwifery qualifications might be desirable for home visitation, &c.

"(b) *The provision of light employment* may be made available inside or outside the factory during the later months of pregnancy, say from the 4th or 5th to the 8th or 9th month, and also after the birth of the child. In some factories this might be arranged as part of the general organisation, in other factories all the work is too heavy or the general conditions too unsatisfactory to admit of pregnant women being employed at least after the early months. In such cases separate workrooms would be necessary, which might serve more than one factory, where lighter work such as sewing and mending might be undertaken (e.g., the sewing of exploder bags, the making of light boxes, the manufacture of overalls, &c.). Such small separate departments might also be used by other women temporarily ailing from one cause or another.

"(c) *Favourable welfare conditions* are essential for all pregnant women, including the abolition of night work and where possible, reduction in the length of the day shift. Arrangements for an adequate supply of suitable food, including milk, through the canteen or otherwise, is also advisable.

"(d) *Maternity Homes* should be established for women who cannot be confined at home or in their lodgings. These institutions should also provide, where necessary, for pre-confinement residence and lying-in accommodation. Maternity homes might be organised—(i) As a branch of an existing lying-in hospital available for normal and abnormal cases; or (ii) as an *ad hoc* maternity home of six or a dozen beds in charge of a competent midwife.

"In connection with these Homes, but not necessarily under the same roof, there should be accommodation for women before and, if necessary, after confinement. Arrangements should be available for married or unmarried women, and as far as possible the schemes should be self-supporting. Exchequer grants would be necessary for the establishment of such Homes and also to make good deficits in the cost of working and maintenance, but the greater part of the maintenance expenses should be met by payments from the women themselves.

"(e) Lastly, in many districts a *crèche* or *day nursery* is necessary for the children where they may be cared for during absence of the mother. The number of available 'mindors' to whom children would ordinarily have been sent has steadily diminished, largely because these women have themselves sought regular employment. Mothers working long shifts are physically unable to devote as much attention as they would wish to the care of their homes and children. There is thus a substantial case for an increased provision of nurseries which would take charge of children under school age by day and, if necessary, by night."

95. Sympathetic administration is essential to the success of such a scheme, the aim and intention of which is to encourage the women to report their condition at an early stage and to afford them such advice and assistance as are needed without exercising a burdensome or inquisitorial supervision.

96. The Committee consider this scheme valuable and suggestive. They are glad to know that in many munition works successful effort has been made on these lines, and they are satisfied that a similar scheme is feasible for industrial women workers generally.*

* A woman Welfare Supervisor in a National Ordnance Factory has written to the Committee as follows:—"A pregnant woman in this factory is expected and encouraged to see me that I may assure myself that her work is not harmful to her in any way. She is questioned as to her home circumstances, and permission to put her in touch with the Medical Officer of Health is asked. This, if granted, ensures her a visit from the Inspector of Midwives Staff, who sees that a suitable Midwife is, or will be, engaged. Provided that the work on which the woman is engaged is not injurious to her, she is retained as long as possible. In many cases a woman has worked on her lathe until the eighth month of pregnancy. Others require to be transferred quite early to lighter employment such as disc oiling and cleaning, hammer-head crane driving, or in the Overall Department.

"During enforced absence before confinement, if the worker's income is insufficient, her case is brought before a small sub-committee of the Hospital and Benevolent Fund, and a grant made to her of 7s. 6d. or 10s. weekly. After the birth of the child in the case of a married woman, in consideration of the Health Insurance benefit of 60s., the allowance from the fund stops for four weeks and is resumed until the child is three months old, when the mother is reinstated at her old work. I have fixed that period of absence as I find that once nursing is established during those months, it is possible it may be partially continued with good results to both mother and child. If not continued, the three months' nursing is of inestimable value to the child. Another reason I advocate these three months' absence is, that the work is heavy for a recently confined woman.

"The case of the unmarried mother presents greater difficulties, and more individual study and care is required. It is a great anxiety to me to obtain the necessary knowledge early enough to be able to assure the girl that care will be taken of her during her pregnancy and help given her in her trouble. My experience convinces me that serious consequences to the health of many girls have arisen from their fear of facing the situation. I have found that once her confidence is gained and the girl understands that for her child's sake she is entitled to every care, a much happier and healthier state of mind and body exists. Should there be no home care available for the girl during her confinement, the only place for her in this town is the Workhouse Infirmary. Under these circumstances we generally manage to keep her at quiet work until very close to her confinement, and she is admitted to the Infirmary immediately on application.

"I have never deviated from my rule regarding the three months' absence from the factory after confinement, even in the case of the homeless girl, but some arrangement has always been made for her care and well-being. Friends have been found for her and she has had a weekly grant from the Hospital and Benevolent Fund, also advice and help given her as to putting her in the way of receiving maintenance from the father of her child. I have, at different times, brought in a girl, whose case has been difficult to deal with, to work as cleaner in the Canteen on days only. The baby comes with its mother and lies (in summer) in a cot on the verandah. This works very well. The baby thrives and is a source of interest and joy to the factory girls. I have always found that the help given to a girl in her trouble has a wonderful result in improving her character and deepening her sense of maternal responsibility.

"The problems in work such as this are many and all different and have each to be considered under no very hard and fast lines, but I hope I have outlined the main points sufficiently clearly to show our aims and ideals."

97. The Ministry of Munitions decided, in 1916, to make special grants in aid of the establishment and maintenance of nurseries for the children of munition workers as follows:—

(a) A grant of 75 per cent. of the approved expenditure on the initial provision and equipment of the nursery.

(b) A grant of 7d. for each day or night attendance made by the child of a munition worker. It has been arranged that the Board of Education, as the Department charged with the administration of grants in aid of ordinary day nurseries, should be responsible for the inspection of munition nurseries and for advising the Ministry in regard to the provision of schemes and payment of grant. The number of munition nurseries wholly or partly occupied by the children of munition workers is now 31. In most cases the nurseries are open by night as well as by day for the benefit of women working on night shifts.

98. It is sometimes suggested that the nurseries should be in or close to the factory, so that a mother may be able to nurse her baby during the dinner interval. On the whole the Committee think that it is not usually desirable to have the nursery in close association with the factory, however, partly because this entails bringing babies and little children night or morning in trains or trams which are often already overcrowded. Further, the usual interval of an hour is scarcely sufficient for the mother to get her own meal and feed her baby unless a dinner can be provided for her at the nursery. Though arrangements have been made for a few individual cases nothing has been attempted in a general way. Probably in certain exceptional cases some provision is also needed for the younger children who are able to attend school but are too young to look after themselves during school hours while the mother is at work. A few children's "hostels" have been established through voluntary enterprise, to which such children may go for all meals and for play and recreation, small payments being made by the mothers to cover the cost of the food.

99. In this connection the Committee consider it is desirable that the lifting and carrying of heavy weights* and all sudden, violent, or physically unsuitable movements in the operating of machines should, as far as practicable, be avoided. Often a simple appliance, or the alteration of a movement, modifies an objectionable feature when it does not altogether remove it. By similar thought and care much may be done to mitigate the strain of prolonged standing, which should be restricted to work from which it is inseparable.† Prolonged standing has been found a highly provocative cause of trouble to women and girls. When standing is absolutely unavoidable, the hours and spells of employment should be proportionately short, and seats should be available for use during the brief pauses which occasionally occur while waiting for material, or for the adjustment of a tool. Where so much depends upon the character of a movement, upon the angle and position at which a weight is lifted or carried, it is not advisable to lay down a standard of prohibited weights. But serious accidents and injuries to health have been caused in factories in the past by the excessive carrying of weights, and it is trusted that employers will give this matter their earnest consideration, especially in view of the heavy work which now devolves upon women in factories.‡

Periods of Employment and Home Duties.

100. *Night Work.*—The imperative necessity of war has revived, after almost a century of disuse, the night employment of women in factories, with its associated economic, physical and moral disabilities. In a working-class home, however, the difficulty in obtaining rest by day is great; quiet cannot be easily secured; and the mother of a family cannot sleep while the claims of children and home are pressing upon her; the younger unmarried women are tempted to take the daylight hours for amusement or shopping; moreover, sleep is often interrupted in order that the mid-day meal may be shared. The employment of women at night is, without question, undesirable, yet now it is for a time inevitable; and the Committee have, therefore, directed their efforts to the consideration of those safeguards which would reduce its risks to a minimum.

101. In practically all factories where night shifts are worked it is customary to change the shifts weekly or fortnightly. The frequent change of shift has proved more convenient and acceptable to the women than more prolonged periods of night or day duty. The importance of adequate pauses for rest and meals during the night is now fully realised; arrangements for the comfort of the women have steadily improved and most women have learned the advantage of suitable and substantial food when on night work.

102. While the urgent necessity for women's work remains, and while the mother's time, and the time of the elder girls, is largely given to the making of munitions, the home and the younger children must inevitably suffer. Where home conditions are bad, as they are frequently, where a long working day is aggravated by long hours of travelling, and where, in addition, housing accommodation is inadequate, family life is defaced beyond recognition. If the home is to be preserved from such processes of destruction reasonably satisfactory conditions of transit and housing must be secured, as well as the best possible hours of work by night and day. It has been far from uncommon to find some two or three

* For further observation on weights, see paragraphs 418-424.

† See medical evidence on the grave effects of long hours of standing on the health of women given before the Select Committee on Shops, 1895 (page 219, answers 5401 to 5406), and the effects of industrial strain on the working woman (Trans. Fifteenth International Congress on Hygiene and Demography, Washington, 1912, vol. iii., part 2, page 933).

‡ Report of Departmental Committee on Accidents, 1911 (Cd. 5535).

hours spent on the journey each way, generally under the fatiguing conditions of an overcrowded train or tram, often with long waits, and a severe struggle before even standing room could be obtained. Often far from offering a rest from the fatigue of the day, the home conditions have offered but fresh aggravation. A day begun at 4 or even 3.30 a.m., for work at 6 a.m., followed by 14 hours in the factory, and another two or two and a half hours on the journey back, may end at 10 or 10.30 p.m., in a home or lodging where the prevailing degree of overcrowding precludes all possibility of comfortable rest. Beds are never empty and rooms are never aired, for in a badly crowded district, the beds, like the occupants, are organised in day and night shifts. In such conditions of confusion, pressure and overcrowding, home has had no existence.

103. Though much has been now done to remedy these conditions, there is still great need for improvement in means of transit, and this alone would help to relieve the unsatisfactory conditions of housing; but, however great the increased facilities of service, the journey between home and factory must still add, in many cases, a couple of hours to the working day. When considering hours in relation to efficiency and fatigue this influence upon the total length of day should be remembered; the factory day cannot always stand by itself as the only contribution towards fatigue.

104. Happily there should be in the matter of hours of labour for women little conflict between the interests of the home and the interests of munitions, for the hours which conduce most to a satisfactory home life and to health conduce most to output. Long hours, particularly when they are worked during the night, are among the chief factors in fatigue, and the Committee are of opinion that in the interest of output and health alike they should be restricted within proper limits; that there should be suitable pauses for rest during the working period; and that there should be adequate cessation from work at each week-end in addition to periodic holidays. It may be stated broadly that conditions which press hardly upon the average man press, because of her different constitutional development, with greater severity upon the average woman; while similarly, though conditions of mental fatigue are probably equally injurious to boys and girls, conditions of muscular strain well borne by the ordinary boy may be highly detrimental to the girl of corresponding vigour and physique. It is therefore especially important that women and young girls should be relieved from those conditions of overstrain to which they have been so widely exposed.

105. Since the early days of the war the tendency has been towards the reduction of the weekly total of hours worked and the length of the shifts. The overtime system which was then common has now been practically abolished and the weekly hours for women limited to 60 or less. In order to avoid undue fatigue an increasing number of firms have three eight-hour shifts in the place of two of twelve hours. Though not always easy to organise from the factory point of view, when accompanied by an adequate minimum wage the system of eight-hour shifts appears to yield the best results in the long run. On the one hand the machinery is used for the maximum part of the 24 hours and effort is better sustained throughout the shift. On the other hand less strain is put upon the worker, with a resulting reduction in the amount of ill health, disability and lost time. The special strain of night work is imposed less frequently, and, partly for this reason, a class of labour is attracted which would otherwise be unrecruited. It has been suggested that in certain districts, and for certain industrial processes, it may be possible, during the stress of the war, to employ married women on half time, in two or more shifts daily of four or five hours each. The Committee recognise that such a system possesses its own inherent difficulties, which may, however, not prove insurmountable.

Arrangements for Rest and Meals.

106. Pauses, well distributed and adapted in length to the needs of women workers, are of the highest value in averting breakdown and in giving an impetus to output. The Factory Acts permit in textile factories a maximum of four and a-half hours continuous work; in non-textile the limit is five, but many managers believe that four hours is the longest period during which a woman can maintain continuous work at full vigour. Within this period a pause of ten minutes has been found to give excellent results, and where the spell is continued for five hours some such pause should certainly be made for a cup of tea or cocoa. It is particularly valuable in the morning spell in those numerous cases where breakfast has been hurried or omitted altogether. The proper arrangement of intervals for food needs special consideration in Filling Factories, where work on some of the high explosives seems to create a special feeling of hunger. Here there is the added reason that a well-fed person is the better able to resist the influence of poisonous materials. Facilities should be provided, especially during the night shift, for rest in cases of fainting or other temporary illness. Rest-rooms are now frequently found in well-equipped works; they usually consist of a few comfortable chairs and a camp bed for the more serious cases, placed in the surgery or rest-room now being provided by many employers. A nurse is generally in attendance, whose assistance may be claimed by men and women alike.

107. The week-end rest has been found to be a factor of such importance in maintaining health and vigour that it has been reinstated by employers who had taken it for work at the beginning of the war. The Committee are strongly of opinion that for women and girls a portion of Saturday and the whole of Sunday should be available for rest, and that the periodic factory holidays should not, on any account, be omitted. Where women are employed on eight-hour shifts an interval of half an hour for a meal may be regarded as normally sufficient, but where longer hours are worked, it is important that they

should be allowed an hour for dinner and for the principal meal during the night. Indigestion cannot easily be avoided if a substantial meal is followed immediately by work without an intervening period for rest. Half an hour, especially in large factories, and in Filling Factories where the actual consumption of food in the danger area is prohibited, provides but scant time even for the eating of the meal. Ten minutes are easily spent in reaching the mess room and returning to work, certainly another five are occupied in washing the hands and the service of the dinner; and so but fifteen remain for the meal. The provision of well-managed and suitably equipped canteens in convenient proximity to the workrooms has now been made in a large number of factories and the mess-room accommodation and arrangements for heating the workers' own food have been much improved. These are available both night and day at suitable hours. The Committee desire once more to emphasise the importance of providing seats with backs and similar amenities with a view to securing the comfort and relaxation of the workers.

The Sanitary Condition of the Factory.

108. The effect upon the health and energy of women and girls which results from clean, bright, and airy workrooms, well warmed in winter, can hardly be exaggerated. The Factory Act secures a minimum of these essential things, but the highest standard attained in the best factories is not too high. Women desire these things in their working hours, and appreciate and respond to a good environment. Cleanliness and good order contribute to increased output as well as to the discipline and *morale* of the factory. The provision of washing accommodation has become increasingly important. The refreshing effect of washing and its influence on self-respect, especially where women are heated by their work, have been dwelt upon by many witnesses who have given their evidence before the Committee. For those processes in which poisonous substances are used, such for example, as the filling of shells and fuses with high explosives, special regulations for washing have been framed.* It is a great convenience when the lavatories and cloakrooms can be grouped with the canteens. The lavatories should be of sufficient size to accommodate all those workers from a room or department who cease work at the same time, and must be properly equipped and maintained. If suitable facilities are easily accessible and are sufficient to enable the workers to wash without undue encroachment upon their meal times, experience shows that they are much appreciated and fully used.

109. Cloakrooms should also be provided, and wherever possible should be near the canteens and lavatories. It is of importance that they should afford facilities for changing clothes and boots, and for drying clothes. The cloakrooms should be kept scrupulously clean.†

110. The provision of adequate and suitable sanitary accommodation is a matter of special importance. The necessity for proper equipment and maintenance of cleanliness, privacy and convenience of access should be borne in mind. It is the more necessary to call attention to this matter since in many instances women are now employed in factories where, until recently, there have been male workers only. The conveniences for women should be so situated as to be readily accessible at all times, with due regard to the privacy of the approach; they should be adequate in number, suitably planned, and of sound sanitary construction. A high standard of cleanliness must be maintained, and it is desirable that an attendant shall be in charge of the conveniences throughout the period of employment.‡

Management and Supervision.

111. The Committee have received abundant evidence of the necessity of wise and suitable arrangements for the management and supervision of women's labour. Their personal visits to large and small works where women and girls are employed, as well as the evidence placed before them, have led them to the opinion that there is hardly any condition of greater importance than this, in respect both of smooth working and of maximum output. The modern development of commercial undertakings, not to speak of the vast size of many factories, precludes the personal oversight and interest of the responsible employer and makes it all the more necessary to appoint efficient substitutes. This is particularly important in regard to the occupation of women unaccustomed to the organised factory life, business methods, and discipline of large engineering shops (often with unsuitable accommodation for women, difficulties of discipline, and long hours). Briefly the Committee recommend that in all cases where women are employed consideration should be given by the management to the appointment of forewomen, nurses and welfare supervisors, whose position and status should be properly assured and whose duties should be prescribed. In this way provision is made for each woman worker to have ready access to an officer of her own sex in case of difficulties occurring in regard to her work, her health or the conditions of her employment. Surgeries for the treatment of minor as well as serious accidents, rest-rooms for workers temporarily incapacitated, are of special importance where women are employed. "Welfare supervision," in its broadest sense, which has abundantly proved its value to both management and workers, is essential for women workers if their well-being is to be fully safeguarded.

112. The ultimate purpose of wise supervision is twofold. First, there is the purpose of securing sound and helpful conditions of labour, under which the employer obtains diligence and skill from those in his employ, and the worker is occupied, healthily and not unreasonably, to his own satisfaction and to the best of his capacity. Here, without doubt, the highest interest of employer and worker is one and the same. There is, or should be, satisfaction and advantage on both sides. A second purpose of supervision is economical management and the accurate adjustment of energy applied to the end in view. The Committee have been interested to observe the diverse operation of these purposes in

* For further consideration of the provision of washing facilities see paragraphs 392-404.

† For further suggestions as to cloakroom accommodation see paragraphs 411-412.

‡ For further suggestions as to sanitary accommodation see paragraphs 388-391.

connection with the health of women workers, and have decided that it was desirable to investigate further a point which had much impressed them, namely, the apparently large amount of "wastage" of women workers in munition factories. It was reported to them that large numbers of women were drifting in and out of factories without sufficient reason, and they sought the aid of Captain M. Greenwood, the statistician, in endeavouring to find an explanation of this phenomenon. Accordingly he made investigations* in 16 factories, or parts of factories, employing altogether some 40,000 women workers. An abstract of his report will be found in Appendix D. Briefly his conclusions are:

- (a) that of 37,000 women workers, under observation for at least a month, illness or physical unfitness or incapacity was given as a cause of leaving work in 1,651 cases, the lost workers owing to ill-health being practically the same at all ages in "light" factories, but increasing at the age of 22 years in "heavy" factories. In other words girls over 23 years of age have fewer sickness losses in "heavy" than in "light" factories;
- (b) that in sum total the "wastage" is substantial and such discontinuance of employment appreciably reduces output;
- (c) that much of this "wastage" is inexplicable; of 11,000 women who left work as many as 6,700 gave no adequate reason for so doing;
- (d) that, whilst prevention appears obscure, the remedy is organised welfare work including intelligent and sympathetic following up of absentees.

The Committee concur with Captain Greenwood's recommendations that wherever any factory loses more than 20 per cent. of its entrants within three months a special inquiry should be instituted, and that older women (who more usually have home duties) should be put on lighter work in order to reduce the double demand made upon them.

113. Clearly, everything possible should be done to reconcile the woman's conflict of interests between her duties to her home or children and her work in the factory. Wherever other labour is available, the employment of mothers with infants is to be deprecated, as is also that of the mother of any young family, for it must be remembered that the mother's work is certainly not ended with her factory day. Her children make many claims upon her time and energy, more especially, of course, at the period of the mid-day meal and at bed-time. In some factories the majority of the women employed at night are married, and many of them express a preference for their work, because it leaves them free for domestic work during the day. In thus undertaking double duties their zeal may easily outrun their strength, and factory and home equally may suffer. Where married women are indispensable, every effort should be made to give them the preferential treatment common, in normal times, in some factory districts, and also in France. It is the experience of managers that concessions such as half an hour's grace on leaving and arriving, or occasional "time off," is not injurious to output, as the lost time is made good by increased activity, and under the system of eight-hour shifts it might be arranged without industrial dislocation of any kind that married women are employed only in that shift which would cause least dislocation in their home. For organisation of this kind, as well as for the care of young girls, individually during the first few months of their employment, the Welfare Supervisor has proved herself to be invaluable; she can secure short periods of rest, or such interchange of occupation as tends to lessen either the spell of muscular fatigue or the continued exposure to an injurious process. Her supervision possesses particular value during night shifts when ordinary supervision tends to become relaxed.

Conclusion.

114. Finally, the Committee desire to state their considered opinion that, if the maximum output of which women are undoubtedly capable is to be secured and maintained for an extended period, the following essentials must be provided for:—

- (a) Short hours of work with suitable shifts, pauses and intervals;
- (b) Adequate and suitable medical supervision, including the provision of rest-rooms, surgeries and first aid appliances, properly staffed;
- (c) The careful selection of women for work within their capacity, the heavier work being allocated to the younger women;
- (d) Good and sufficient food obtainable at convenient times: women appear to require food and refreshment more frequently than men and always before commencing work in the morning.
- (e) A suitable factory environment: women are probably more susceptible than men to the benefits of effective ventilation (including ample fresh moving air), sanitary accommodation and convenient washing facilities.
- (f) Sympathetic management and tactful supervision.

115. The Committee recognise that emergency conditions must obtain in many cases, but they are satisfied that every effort should be made to organise women's labour effectively and promptly. The Committee take the view that to use up or damage its women by over-strain in factory work is one of the most serious and far-reaching forms of human waste which a nation can practise or permit. It

* Dr. Greenwood's Memorandum on "The Causes of Wastage of Labour in Munition Factories employing Women" is being published, as a Special Report, by the Medical Research Committee.

may be that in the entanglement of problems new and old the coming of the new and their imperative claim for solution will help the solving of the old. There is impulse now as there was impulse long ago when the cause of the children in the cotton mills of Lancashire won the early Factory Acts for the generations that followed. There is need now as there was need then. There is need for the work of women in industry; there is need also for safeguarding that service. Happily there is manifest a public spirit and a devotion able to overcome difficulties and solve problems. There is also a fuller recognition of the claims of women and of their children and of their vital importance to the State, which is reward for the sacrifice and courage of those women now working steadfastly in the ranks of labour.

SECTION V.

HOURS OF LABOUR.

LEGAL RESTRICTIONS ON HOURS OF LABOUR.

116. The Factory and Workshop Act, 1901, imposes certain restrictions on the hours of employment of protected persons, that is of women and young persons (i.e., boys and girls between 13 and 18 years of age who are legally exempt from attendance at school). The following are the principal provisions bearing on employment in non-textile factories :—

- (a) The hours of employment of protected persons on the first five days of the week are not to exceed a fixed daily period of 12 (including $1\frac{1}{2}$ hours for meals), and on Saturday 8 hours (including $\frac{1}{2}$ hour for meals). The period of work may commence at 6 a.m., 7 a.m. or 8 a.m. That is to say, the maximum weekly hours of employment, exclusive of meal times, are 60. (Section 26 (i), (ii), (iii).)
- (b) Sunday labour is forbidden. (Section 34.)
- (c) Protected persons may not be employed continuously for more than 5 hours without an interval of at least $\frac{1}{2}$ hour for a meal. (Section 26 (iv).)
- (d) Women may be employed in certain industries for two hours overtime in addition to the ordinary hours on any day except Saturday, provided that an additional $\frac{1}{2}$ hour is allowed for meals after 5 p.m.; that no woman is so employed for more than three days in any one week, and that the number of days in the year on which any woman is employed on overtime shall not exceed 30. (Section 49.) No similar exception is allowed for young persons.
- (e) Night work is not allowed for women and girls, but is allowed for boys over 14 if employed in certain specified trades, e.g., blast furnaces and iron mills. (Section 54.)

No restrictions are placed upon the hours of employment of men.

117. Section 150 of the Act provides that :—

"In cases of any public emergency the Secretary of State may, by Order to the extent and during the period named by him, exempt from this Act any factory or workshop belonging to the Crown, or any factory or workshop in respect of work which is being done on behalf of the Crown under a contract specified in the Order."*

118. Under this provision Orders have been made by the Home Office allowing relaxations of the limitations set out above. These Orders are of two kinds—(a) General Orders setting out the conditions under which women and young persons may ordinarily be employed in munition works (the last General Order was issued in September, 1916); (b) Special Orders authorising variations of the General Order in particular cases.

119. Under Section 6 (i) of the Munitions of War (Amendment) Act, 1916 :—

"The Minister of Munitions shall have power by Order to give directions . . . (subject, so far as the matter is one which is dealt with by the Factory and Workshops Acts 1901 to 1911, to the concurrence of the Secretary of State) as to hours of labour or conditions of employment of the female workers so employed."

120. No Order has as yet been issued under this section, hours of employment continuing to be dealt with under the Factory Acts. A committee, including representatives of the Ministry of Munitions, of the Home Office, and of other Departments concerned, has been established at the Ministry to consider special applications for permission to work on Sundays or for exceptional hours.

WEEKLY HOURS OF EMPLOYMENT.

121. Prior to the war the weekly hours of employment of women and young persons were as a rule substantially below the limits imposed by the Factory and Workshop Act. This was due, partly to the action of employers who believed that shorter hours were desirable from the point of view of health and output, and partly to the action of the Trades Unions in regard to the hours of adult male workers. In the Engineering Trades the normal weekly hours of adult male workers were, as a rule, about 52-54 though in a few instances they were as low as 48. These normal hours were generally liable to extension

* By Regulations made under the Defence of the Realm Act, and dated June 10th, 1915, and October 3rd, 1916, the power of the Secretary of State is extended to any factory or workshop in which he is satisfied that by reason of the loss of men through enlistment or transference to Government Service, or of any other circumstances arising out of the present war, exemption is necessary to secure the carrying on of work and that it can be granted without detriment to the national interests.

(" Overtime ") to meet special emergencies. Since if overtime were to become a regular practice the value of the normal day would largely be lost, it was usual to restrict overtime by requiring wages at a higher rate for the additional hours, and by limiting the additional hours which might be worked in a given period. Thus the agreement existing at the outbreak of war between the Engineering Employers' Federation and the Engineering Trades Unions concerned provided that overtime should not exceed 30 hours a month.

The establishment of the normal working day for Engineering Trades is not entirely a modern development. As early as 1836 the London Engineers secured the normal 60-hour week with additional wages for overtime, and more than 50 years ago the principle of a normal day and overtime was already widely recognised.

122. At a very early stage of the war the ordinary restrictions on hours of employment were widely relaxed. Sunday labour, previously forbidden for women and young persons, and practically unknown for men except in a few continuous processes, became common. Night employment, which for 50 years had been abolished entirely for women and in the main for boys, became regular. The strain of these hours, in itself severe, was increased through large numbers of men and women taken into employment being unaccustomed to such labour, or being physically less able to bear the strain than the selected body of workers previously employed. The difficulties of housing and transit became accentuated and the conditions of employment were frequently makeshift and inconvenient. The employment of men for 70 to 90 hours a week was common, for over 90 hours was not infrequent, and there were even cases of hours in excess of 100. The highly skilled workers (tool and gauge-makers, tool-setters, &c.) were generally the most difficult to obtain and were thus most frequently employed for long hours. These hours were defended on the ground that:—

- (a) the dearth of workers and other causes prevented any general adoption of the shift system;
- (b) the demand for output was urgent and immediate, and had to be met even at some risk of future breakdown;
- (c) patriotism introduced a new incentive which rendered unreliable all previous experience as to the number of hours which could be successfully worked;
- (d) even though the rate of output might be reduced, and the cost of working increased, these long hours did result in a larger output than short hours would have done.

123. The evidence, however, showed that the long hours are open to certain serious objections:—

- (a) they are liable to impose too severe a strain on the workers;
- (b) at any rate, after a period, the rate of production tends to decrease, and the extra hours produce proportionately little or no additional output; moreover, the quality of the output may be adversely affected during the whole period of work, and not only during the hours of overtime;
- (c) a large proportion of the hours gained may be lost through broken time; the workers become exhausted, and take a rest; sickness tends to increase, at any rate among the older men and those of weak constitution;
- (d) they lead to an undue curtailment of the periods of rest and sleep available for those who have to travel long distances to and from their work;
- (e) the fatigue entailed increases the temptation of men to indulge in the consumption of alcohol; they are too tired to eat, and therefore seek a "stimulant."
- (f) a very serious strain was imposed upon the management, the executive staff, and the foremen, both on account of the actual length of the hours worked, and of the increased anxiety over the maintenance of the output and quality of the work; the staff cannot take days off like ordinary workers.

124. Whatever may have been the justification for the long hours worked, they undoubtedly imposed a severe strain on the workers, as evidenced by the following statements made by Trades Union Representatives:—

"Some of his men had been working from 6 a.m. to 9 p.m. These hours were undoubtedly a severe strain, and some men were just at the limit of their powers. They stayed away for a day or two to rest, but did not see a doctor, if they could help it."

"The men were reaching the 'fed-up' stage. They were getting nervous and irritated, through working long hours. They could not keep up their physical efficiency, he could see it in their faces. Men on overtime were more tired. They were liable to have time for only about five hours' sleep."

"The excessive hours now being worked were too much for the men. They led to a diminished output per hour. Men were continually having to stop working; they were obliged to rest, it was not a question of slackness. For fear of being called slackers, they hesitated to get a doctor's certificate."

125. Though as stated the long hours thus undoubtedly placed severe strain upon the workers, the Committee did not find that they had caused any serious breakdown among workers. This was in some measure due to the tendency, after a time, to reduce hours. Further, there was good reason for believing that the increased pay and better food which workers were able to enjoy, helped to counteract the strain of long hours. There is little doubt, too, that workers were stimulated to make special effort by an appreciation of the national importance of their work. These influences have been thus summarised by a Trades Union Official:—

"(1) Will power. Men have continued at work in a condition that under ordinary circumstances would have put them off for a week or two. Even when a man comes off for a time he is anxious to get back

again as quickly as possible. I have had one or two cases of serious breakdown. The main factor is that practically all the men want to do their best ;

"(2) Better wages mean better food for a large number of men with families, and they mean a little better provision for those families, which again reacts upon the man's health and his work. In these cases it is not so much the saving or possibility of saving money, but the satisfactory spending of it which is the factor of importance ;

"(3) The possibility of getting more money has also its effect. You read much about the slacker. There is quite a large proportion of workmen really too anxious for overtime—employers will corroborate—even under normal conditions."

126. It would, however, have been a mistake to depend too largely on the operation of influences of these kinds, or to hope that they could continue indefinitely to be effective against fatigue. The Committee were satisfied that if workers were to be asked to work for anything approaching 15 hours a day for weeks and months on end, one of two results must follow, either the health of the worker would break down, or they would not work at full pressure.

127. While the Committee, at an early stage of their inquiries, were convinced as to the urgency of recommending some limitation of hours, it was a matter of serious difficulty to determine what limitations to recommend. Not only was there an almost complete absence of any scientific data as to the relation of hours of employment to output, but the evidence of witnesses differed widely as to the limits which might properly be imposed.

128. *Men.*—This conflict of opinion was specially marked as regards hours of adult male workers. On the one hand, those who had been employing their workers for 15 hours a day, sometimes with Sunday work in addition, stated with confidence that such hours were not excessive, that they had been worked in times of peace, and that they could not be reduced without loss of output. Amongst those who favoured the longer hours were to be found some of the largest employers of labour, and whatever their views might be as to the ultimate gain from the reduction of hours, they hesitated to incur the responsibility for any reduction of output, since such reduction, even though temporary in character, might, owing to the large number of workers involved, prove serious in bulk while it lasted. As a representative of one of the largest firms in the country said :—

"Once a reduction was made it was impossible to go back to the previous position. In consequence one must be sure of the ground before making experiments. Previous experience is not a complete guide on this occasion, because patriotism is a new and important factor."

129. On the other hand witnesses, many of whom had devoted a close study to questions of industrial fatigue and scientific management, were emphatically opposed to overtime, except for quite short periods.

"As regards overtime, he did not consider it efficient, nor was it profitable if paid for at $1\frac{1}{2}$ rates. It did not induce any increased output, except when working for a short spell to attain a definite object. If continued for a long period, the tendency of overtime is to reduce rather than to increase output. The strain caused by the work is a mental rather than a physical one. The monotony of always being at one job was also productive of fatigue."

"In his opinion, the greatest economical efficiency of engineering labour is obtained with a week of 48 to 55 hours. Longer hours, in the long run, meant a diminished output, inferior quality of work, and much greater cost of production. Though attending to heavy machinery might involve periods of rest from physical strain, it involved mental strain, owing to the amount of damage caused if anything went wrong."

130. Between these two extreme views a middle course was also advocated. It allowed a maximum of 10 to 12 hours of overtime a week. Thus a large employer of labour, who was also engaged in organising National Factories, expressed the view :—

"Definite restrictions should be placed on overtime. No workman ought to work for more than 80 hours in any one week, or to maintain an average of more than 65 hours a week."

131. Similar views were expressed by Trades Union Representatives :—

"Where there is overtime beyond two hours daily there is evidence of fatigue and men cannot be employed economically, from health and production point of view, on continuous overtime of three and four hours daily. Fatigue is rarely reaching the point of breakdown, but does affect health and production, and in my opinion will manifest itself later. In some cases where such overtime is worked, apart from night shifts, men are allowed one early night per week, and I think this is wise and economically sound."

"The witnesses were inclined to think that, to meet the present abnormal circumstances, men should be able to work as much as 60 to 65 hours a week over a long period. The exact length of hours would necessarily depend on the character of the work. Thus 65 would certainly be too high for gauge makers. The hours at night involve greater strain and should not exceed 60. Even these hours were justified only by the present crisis, and were no criterion of what was reasonable and proper in ordinary times."

132. In the agreement between the Engineering Employers' Federation and the Engineering Trades Unions already referred to a similar limit was adopted.

133. *Boys.*—In the case of boys the evidence showed that the hours of employment were largely determined by the fact that they frequently worked with men. The Home Office had found it necessary to sanction the employment of boys for $67\frac{1}{2}$ hours a week, and for even longer periods in special cases, the period of the working day being extended to 14 or even 15 hours as compared with the 12 hours allowed by the Factory and Workshop Act. Though as in the case of men no substantial breakdown occurred there was no doubt that the hours worked in many cases involved a serious strain. Dr. Agnew as a result of a medical examination of 1,500 boys employed in all parts of the country and under varying conditions of employment reported as follows :—

"My general impression is that hours tend to be too long for the proper preservation of health and efficiency. Large numbers of boys are working a net average of $68\frac{1}{2}$ hours per week. Under certain conditions the effect

upon their health is not so deleterious as in others, but, whatever the conditions, where more than one hour has to be spent in going to and from the factories, in my opinion, 68½ hours are too many. Many of these boys are just over 14 years old, and they spend considerably more than two hours per day in travelling, thus having very little time for recreation or for rest. The natural bent of most of us is to revolt against a yoke of any kind in modern times. This is just what happens. The boys have found from experience that they cannot comfortably work over 60 hours per week, and as evidence of this—in one shop where 600 boys worked, 500 of them on a Saturday afternoon did not return to work.

"The same state of affairs, with a few exceptions, is found up and down the country. On the night shifts, boys do not tolerate well long hours, and in one factory a very large percentage of the boys complained of sleepiness and disinclination for work. It has to be borne in mind that the average age of the boys examined would certainly not exceed 15 years, and it makes one consider very seriously the future of the rising generation."

134. A social worker with considerable experience of boy labour in munition works informed the Committee that:—

So far as he knew, there had been no general breakdown, but then he did not expect to see immediate effects, notwithstanding the long distances that some boys had to travel. He suggested, however, that the boys are drawing on their strength, and pointed to the fact that the boys fall asleep in the trains and trams, and often travel on beyond their stations. They have no leisure, no recreation, and no classes, and he was very anxious as to what would become of the boys after the war. He suggested that too big a price was being paid for output. Even the hours allowed under the Factory Acts were very lenient. The granting of relief at the week-end was a great boon.

135. In considering what hours of employment are reasonable for boys, it is necessary to distinguish between boys under 16 years of age and those over. A witness with wide experience expressed the view that:—

"Boys between 16 and 18 were quite different from boys under 16, they were much stronger. Boys under 16, on the other hand, were probably more delicate than girls of the same age, and more likely to break themselves up. The essential safeguards were the reduction of hours and welfare work. Apart from the strain on the health involved, long hours had disastrous effects upon the characters of boys. They also might make an adequate amount of sleep difficult and, perhaps most important, they prevented adequate facilities for recreation. Such facilities were of primary importance both for the physical and the moral welfare of the boys. This latter danger was accentuated by the monotonous character of their work, which afforded no intellectual interest. In the absence of healthy recreation the boys' minds and conversation were likely to become unhealthy and to lead to a general deterioration in character. Eight hours of sleep at least were essential, nine hours would be better. Unfortunately many boys got only six or seven hours."

136. *Women.*—Important as it is that the hours of work for men should be kept within reasonable limits, it is essential that hours of work for women and girls should be even more closely safeguarded. Admittedly women and girls are unable to bear the strain of long hours as well as men. Conditions which press hardly on the average man, press, because of difference in constitutional development, with greater severity upon the average woman. Under the General Order issued by the Home Office in September, 1915, women and girls over 16 years of age were allowed to be employed up to 67½ hours a week. While this Order applied to the great majority of munition works, permission was granted in special cases for between 70 and 80 hours a week. The maximum hours of daily employment was extended to 14 hours as compared with 12 hours allowed under the Factory Acts.

137. Though, as in the case of men and boys, no serious breakdown of health can be pointed to, the Committee were left in no doubt as to the strain involved.

A medical examination* which was conducted of over 1,300 women selected from varying types of work in different parts of the country showed that though for various reasons no general breakdown had then occurred, there undoubtedly existed a serious amount of strain. Only 57 per cent. were classified as healthy as compared with 78 per cent. in the case of a similar examination of men; even if full allowance is made for variations in the standard adopted by different medical officers, the difference between these two percentages is still significant. In one factory where the women were employed for 77 hours weekly, 15.5 per cent. of the workers showed evidence of marked fatigue and it was reported that the workers were practically unanimous that the hours should be shortened.

138. Many witnesses expressed the opinion that the hard work was telling on the women though they were keen to work, feeling that they were performing a patriotic duty. Though some employers sought for permission and used to the full power to employ women for more than 65 hours a week, the majority limited their application to that figure. Moreover inquiries showed that in many factories the maximum hours were not worked continuously. Employers sought permission for a wider limit of hours than was ordinarily necessary or desirable in order that they might have latitude for dealing with special emergencies.

139. The nature of the evidence available made it clear to the Committee that any recommendations they put forward in regard to the limitation of weekly hours of employment must necessarily be tentative and provisional in character. Moreover, if the recommendations were to be of practical value, and secure any wide measure of acceptance, it was necessary that they should satisfy two essential conditions. First, they had to be such as would be regarded as reasonable and moderate by the great mass of employers and workers, and secondly, while taking account of the probable duration of the war they had to have regard to the immediate urgency of output at that time. Any recommendations which might involve even a temporary diminution of output would have been doomed to failure. It was evident in fact that any reduction of hours proposed must be gradual, and the Committee accordingly based their recommendations on what appeared to be immediately practicable, rather than on what was ultimately desirable, or might be defensible on a physiological basis. Further, they found it necessary

* See Committee's Interim Report (Cd. 8511), pages 110-121.

to confine themselves to suggestions as to the maximum limits within which weekly hours of employment should be restricted, and they did not endeavour to set out the extent to which, in their opinion, it was necessary or desirable to reduce these limits to meet varying industrial conditions.

140. The limits of the weekly hours of employment provisionally suggested in their memorandum No. 5 ("Hours of Work"), which was prepared in January, 1916, were :—

- (a) For *men*, that the average weekly hours of employment should not exceed 65–67 (exclusive of meal times), i.e., a 13–14 hours working day.
- (b) That *boys* under 18 should be allowed to work the same hours as men, provided that :—
 - (i) The hours of boys under 16 should be limited to 60 so far as possible ;
 - (ii) Substantial relief at the week ends should be insisted on ;
 - (iii) Night work should be limited as far as possible to boys over 16.
- (c) That for *women and girls* employment should be restricted within the normal legal limit of 60, i.e., a 12-hour working day, though within these limits moderate daily overtime might be allowed, and that the employment of girls under 18 at night should be limited as far as possible.

141. These recommendations were generally accepted as fair and reasonable and were widely adopted. In September, 1916, the Home Office, after consultation with the Ministry of Munitions, issued a new General Order reducing the maximum hours of work for women and young persons which had been allowed in the previous General Order. Under this Order which was based upon the recommendations of the Committee—

- (a) The employment of women was limited to the 60 hours a week permitted under the Factory and Workshop Act, though within this limit night work was allowed and work for not more than 14 hours (including meal times) instead of 12 on any one day. The employment at night of girls between 16 and 18 was only allowed in special circumstances where the Superintending Inspector of Factories was satisfied that the work was suitable and of a specially urgent character. The employment of girls under 16 at night was not permitted at all.
- (b) The hours of employment of boys over 16 were limited to 65 by day (excluding meal times) and 63 by night. Night work for boys under 16 and their employment for 65 hours by day was only permitted where the Superintending Inspector of Factories was satisfied that the urgency of the work and other circumstances made it imperative that they should do so.

142. The Order made the relaxation of the requirements of the Factory Act subject to the fulfilment of the following general conditions :—

- (a) Employment on night shifts shall be subject to the provision, to the satisfaction of the Factory Inspector, of proper facilities for taking and cooking meals, and in the case of female workers, for their supervision by a welfare worker or a responsible forewoman.
- (b) No woman or young person shall be employed continuously at any time for more than five hours without an interval of at least half an hour, except that where not less than one hour is allowed for dinner, an afternoon spell of six hours may be worked, with an interval of quarter of an hour only for tea, if the Factory Inspector is satisfied that adequate provision is made for the workers to obtain tea in the works and for tea to be actually ready for them as soon as they stop work.
- (c) If work commences before 8 a.m. and no interval is allowed for breakfast, an opportunity shall be given to take refreshment during the morning.
- (d) A woman or young person shall not be allowed to lift, carry or move anything so heavy as to be likely to cause injury to the woman or young person.
- (e) Different schemes of employment may be adopted and different intervals for meals fixed for different sets of workers.

143. In a covering Circular the Home Office stated that :—

"The Order which fixes maximum limits of hours, does not discriminate between the various forms of work carried on in munition factories, and subject to these limits it is for the occupier to decide, having regard to the nature of the work, the time taken by the workers in getting to and from the factory, and other circumstances, what are the best hours to be adopted at his particular works in order to secure the maximum efficiency and output over a long period ; and he is empowered by the Order to fix different schemes of hours for different sets of workers. Further, it will be necessary for occupiers to instruct managers and foremen to watch closely how each scheme works in practice. Experience shows that some slight alteration or adjustment in the hours of work, such as, for example, the rearrangement or extension of the meal intervals or, in cases where overtime is worked, a short cessation occasionally from overtime, may be sufficient to check staleness or fatigue and cause a marked improvement in the workers' efficiency."

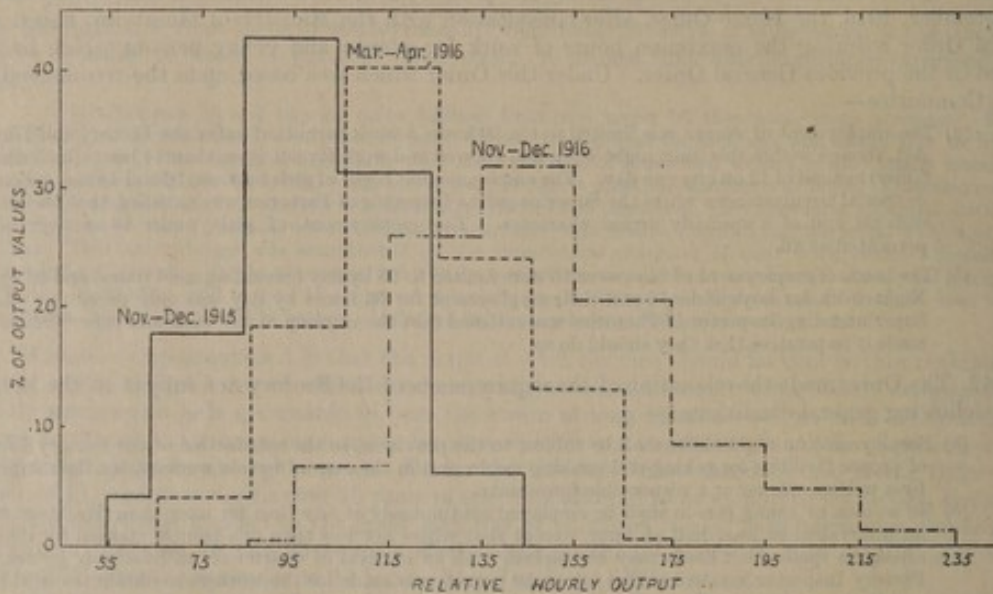
144. Since the issue of the Order the Home Office and the Ministry have taken other steps to reduce hours. Special concessions have been withdrawn notably as regards the employment of women for more than 60 hours a week and the employment at night of girls between 14 and 16. In addition action is being taken which is resulting in the steady abolition of the employment at night of girls between 16 and 18. Special concessions as to the employment at night of boys between 14 and 16 are also being reduced.

145. As already stated the recommendations originally put forward were only provisional and the evidence which has since accumulated has shown the necessity for their revision. From the commencement of their work the Committee have attached the highest importance to the collection of exact data affecting the problems at issue. The field to be covered is a very wide one, while the process of collection has been slow and laborious. The Committee, however, consider that the data which have already been collected on their behalf by Dr. Vernon and others are of great practical value and demand the most serious attention. The results of these investigations are the more valuable in that they have been undertaken in the workshop and not in the laboratory, solely in a spirit of scientific investigation and with

no preconceived opinions. The selection of factories for enquiry was based entirely on the likelihood of reliable data being forthcoming. Further, in none of the operations studied was there any change in the nature of the operation or the type of machinery during the period under review. The data were so chosen as to eliminate any possible disturbance due to increasing skill. There is no reason to suppose that the data were vitiated by any artificial restriction of output. On this last point Dr. Vernon reports:—

"When the hourly outputs of individuals are plotted on a diagram, the distribution in the majority of operations is roughly symmetrical, persons who exceed the value reached by the largest group being about as numerous as those who fall short of it. In certain operations ("drawing" and "rectifying" cartridge cases) where the machine itself places an upper limit upon the possible speed of production, the shape of the diagram was different, the number that exceeded the output most frequently attained—what may be termed the fashionable or "modal" value—being much smaller than that which fell short of it. A corresponding result was obtained for women sorting cartridge cases, when paid at time rates, but for similar operatives when paid at piece rates the symmetrical distribution was once more observed. It is accordingly contended that the form of distribution, whether approximately symmetrical or asymmetrical, may be a useful test as to the existence of limitation of output, and that in the majority of the operations here studied no such limitation occurred."

The following diagram was prepared by Dr. Vernon to show the variation in Output of Women Turning Fuze Bodies:—



146. The result of Dr. Vernon's investigations, which covered a period of over a year, are set out in Memoranda Nos. 12 and 18,* but it appears desirable shortly to set out again the principal results of his investigations in so far as they concern the relation of weekly hours of employment to output. The following are the four sets of data which bear on this subject:—

* Cd. 8344 and Cd. 8628.

TABLE I.—95 or 80 Women Turning Aluminium Fuze Bodies.

Week ending	Nominal hours of work per week.	Per cent. of time lost per week as—				Actual hours of work per week.	Relative output per working hour.	Hours of work $\times$ relative output.	Remarks concerning output.
		Broken time.	Short weeks.	Absent weeks.	Total.				
November 14—December 19	74.8	8.2	2.1	1.3	11.6	66.2	100	6,620 (= 100)	Total output only 1 per cent. less than in pre-Christmas period, though weekly hours of work are 12.8 less.
February 27—April 16	64.3	5.9	6.0	5.1	17.0	53.4	123	6,568 (= 99)	
May 14	58.5	5.4	2.6	3.0	11.0	55.8	130	7,343 (= 111)	
" 21	66.5					128			
" 28	66.5					132			
June 4	66.5					136			
" 11	58.5	4.6	3.9	1.1	9.6	51.0	137	—	Total output reaches a maximum, 11 per cent. greater than that of pre-Christmas period, though weekly hours of work are 11.4 less.
" 18	58.5					142			
" 25	58.5					133			
July 2	58.5					133			
" 9	62.5	7.1	7.1	3.3	17.5	54.2	126	—	Workers went on to night shift for three weeks.
" 16	52.5					134			
" 23	51.0					135			
" 30	66.5					122			
August 6	62.5	—	—	—	—	47.0	124	6,737 (= 102)	Fall of output may be due to slackness resultant on deprivation of usual holiday. No more Sunday labour after August 6th.
" 12	49.5					126			
" 19	49.5					121			
" 26	—					—			
September 2	58.5	5.8	5.5	2.6	13.9	48.6	136	—	Holiday for a week (to compensate for loss of Whitsuntide and August holidays).
" 9	58.5					133			
" 16	58.5					128			
" 23	56.5					143			
" 30	29.5	6.0	7.5	2.8	16.3	47.2	135	6,955 (= 105)	Hourly output rises again to that of the May-June period, but abolition of Sunday labour has not yet had any obvious effect.
October 7	58.5					136			
" 14	58.5					137			
" 21	58.5					146			
" 28	54.5	6.5	8.3	2.0	16.8	48.3	153	7,205 (= 109)	Further four days' holiday (general holiday, by Government order).
November 4	58.5					132			
" 11	53.5					152			
" 18	58.5					143			
" 25	50.0	—	—	—	—	44.1	141	—	Further rise of hourly output due to holiday and to abolition of Sunday labour.
December 2	49.5					148.8	156		
" 9	58.5					41.8	152		
" 16	58.5					41.6	174		
" 23	29.5	—	—	—	—	48.8	179	—	Influence of shorter hours and of abolition of Sunday labour now well established. Total output 9 per cent. greater than it was a year ago, though weekly hours of work are 20.6 less.
"						48.8	149		

147. During the period November 14 to December 19 Sunday work (eight hours) was done on five out of six Sundays; during the eight weeks ending on July 2 on three Sundays, the nominal weekly hours in these three weeks being 66.5 instead of 58.5, an average of 61.5. During the period ending December 16 the time-keeping was bad, the normal weekly hours of work averaging about 55. Dr. Vernon accordingly suggests that with good time-keeping a nominal 50-hour week ought to yield the same actual hours of work (namely, 45.6), that is to say, that for women engaged in moderately heavy lathe work a 50-hour week yields as good an output as a 66-hour week, and a considerably better one than a 75-hour week.

TABLE II.—Forty Women Milling a Screw Thread.

Week ending	Nominal hours of work per week.	Per cent. of time lost per week as—			Actual hours of work per week.	Relative output per working hour.	Hours of work $\times$ relative output.	Remarks concerning output.
		Broken time.	Short weeks.	Absent weeks.				
November 21—December 19	71.8	5.9	1.3	2.4	9.6	100	6,490 (= 100)	
February 27—April 16	62.9	5.9	4.1	1.7	11.7	109	6,039 (= 93)	
May 28	66.5					113		
June 4	66.5					111		
" 11	66.5					118		
" 18	55.0	4.9	4.3	1.6	10.8	113		
" 25	56.5					118		
July 2	66.5					114		
" 9	62.0					109		
" 16	66.5					118		
" 23	66.5	7.1	5.5	2.6	15.2	122		Total output reaches its maximum, 2 per cent. more than in November—December period, though weekly hours of work are 10.1 less.
" 30	59.0					127		
August 6						123		
" 12	33.5					122		
" 19	44.5					122		
" 26						121		
September 2	57.0					121		
" 9	51.0	5.2	3.5	0.7	9.4	126		
" 16	44.5					117		
" 23	48.5					121		
" 30	29.5					119		
October 7	54.5					110		
" 14	54.5					132		
" 21	58.5					132		
" 28	55.5					132		
November 4	58.5	6.2	7.9	2.0	16.1	139		
" 11	58.5					130		
" 18	58.5					134		
						129		
							6,397 (= 99)	Total output only 1 per cent. less than in November—December period, though weekly hours of work are 16.8 less.

148. Dr. Vernon explains that the reason why a reduction of hours did not lead to an improvement of total output similar to that in the fuze-body turning operation is that for four-fifths of the total time required to mill the screw thread on the fuze body the operative had no opportunity of quickening her working speed since she had merely to stand idly watching her machine, whereas the lathe worker had to apply seven different cutting and boring tools in succession to each fuze body, and could quicken up her speed of work at almost every stage.

TABLE III.—56 Men Sizing Fuze Bodies.

Week ending	Nominal hours of work per week.	Per cent. of time lost per week as—				Actual hours of work per week.	Relative output per working hour.	Hours of work × relative output.
		Broken time.	Short weeks.	Absent weeks.	Total.			
Nov. 14—Dec. 19 ...	66.7	4.4	5.6	2.8	12.8	58.2	100	5,820 (= 100)
Feb. 27—Apr. 16 ...	62.8	5.2	8.6	5.8	19.6	50.5	122	6,161 (= 106)
May 28 ...	66.5	5.2	8.3	0.9	14.4	54.9	117	6,200 (= 107)
June 4... ..	63.5					55.8	122	
„ 11... ..	58.5					49.9	118	
„ 18... ..	53.5					46.0	119	
„ 25... ..	58.5					51.2	122	
July 2... ..	58.5	5.2	9.0	2.7	16.9	48.3	118	6,426 (= 110)
„ 9... ..	61.0					51.7	112	
„ 16... ..	66.5					59.1	120	
„ 22... ..	55.5					47.6	119	
„ 29... ..	58.5					45.9	124	
Aug. 5... ..	53.2	5.6	4.8	1.1	11.5	45.3	126	7,028 (= 121)
„ 12... ..	31.0					27.8	130	
„ 19... ..	39.5					33.0	136	
„ 26... ..	58.5					51.6	131	
Sept. 2... ..	58.5					49.2	135	
„ 9... ..	44.5	4.1	1.6	0.9	6.6	40.1	133	7,117 (= 122)
„ 16... ..	53.5					49.4	139	
„ 23... ..	29.5					28.2	135	
Oct. 7... ..	54.5					51.3	133	
„ 14... ..	54.5					51.4	142	
„ 21... ..	55.3	4.2	5.0	0.7	9.9	50.2	138	7,250 (= 100)
„ 28... ..	51.8					47.7	133	
Nov. 4... ..	58.5					55.7	138	
„ 11... ..	58.5					53.3	138	
„ 18... ..	56.0					50.6	136	
„ 25... ..	55.2	4.2	5.0	0.7	9.9	50.7	135	7,325 (= 101)
Dec. 2... ..	54.5					49.1	140	
„ 9... ..	58.5					50.6	141	
„ 16... ..	58.5					53.0	146	
„ 23... ..	29.5					27.1	136	

149. During the period ending December 16, the nominal weekly hours were substantially less than during the period ending April 16, but owing to the cessation of Sunday labour the time-keeping was so much improved that the actual hours of work were greater than during the earlier period.

TABLE IV.—15 Youths Boring Top Caps.

Statistical period.	Weeks in which Sunday labour was performed.	Nominal hours of work per week.	Per cent. of time lost as—				Actual hours of work per week.	Relative output per working hour.	Hours of work. × relative output.
			Broken time.	Short weeks.	Absent weeks.	Total.			
Nov. 15—Dec. 19	5 out of 5	78.5	3.6	0.0	4.0	7.6	72.5	100	7,250 (= 100)
Jan. 3—Feb. 13...	4 „ 6	75.5	5.8	1.7	1.0	8.5	69.1	106	7,325 (= 101)
Feb. 21—Apr. 16	6 „ 8	63.4	5.4	5.8	2.3	13.5	54.8	108	
May 1—May 28	2 „ 4	61.5	5.8	2.3	3.0	11.1	54.7	117	6,400 (= 88)
May 29—July 2...	0 „ 5	51.1	1.9	5.3	0.0	7.2	47.4	124	
July 3—Sept. 23 (day shift).	2 „ 6	59.7	5.5	3.9	2.2	11.6	52.8	129	7,030 (= 97)
July 2—Sept. 23 (night shift).	0 „ 6	61.6	2.6	4.8	1.4	8.8	56.2	128	
Sept. 25—Dec. 16 (day shift).	0 „ 6	54.8	3.7	7.3	0.0	11.0	48.7	126	6,514 (= 90)
Sept. 24—Dec. 16 (night shift).	0 „ 6	58.2	2.7	0.0	3.3	6.0	54.7	126	

150. This process is largely automatic; increase of output could only be attained by a more continuous feeding of the machines throughout working hours.

151. Speaking generally, the above data show that a reduction in the weekly hours of actual work, varying from 7 to 20 hours per week, in no case resulted in more than an insignificant diminution of total output, while on the average it produced a substantial increase. As Dr. Vernon points out, the classification of the operations according to the possibility they offer for speeding-up production demonstrates anew the self-evident fact that the alterations of hours may have very different effects in different operations. The exact measure of such alterations cannot be predicted: it can only be ascertained by observation and experiment. It appears evident, however, that for processes similar to those examined by Dr. Vernon the weekly hours can advantageously be reduced to a total of from 50 to 55 hours, and he suggests that even lower limits might give an equally good output.

152. Two further points of importance emerge from consideration of these data. In the first place the rate of production changed gradually, and frequently four months elapsed before an equilibrium value was reached. This gradual change appears to nullify the suggestion that the effect upon output of the change of hours was a mere consequence of the desire to earn the same weekly wages as before the hours were shortened. The explanation is rather to be traced to the worker finding unconsciously and gradually by experience that he can work more strenuously and quickly for a short-hour week than for a long-hour week. In the second place the evidence suggests that a considerable increase in the average hourly output is possible, quite apart from any increased rapidity of working. Thus, as the result of special investigations, Dr. Vernon found that in the case of the first body of workers mentioned above the time lost in commencing and stopping work during the first period averaged 37 minutes as compared with only 26½ minutes during the third period. (See Cd. 8628.)

153. Professor Loveday, in his Memorandum on the "Causes and Conditions of Lost Time," which is included in the Committee's Interim Report on "Industrial Efficiency and Fatigue,"* also supplies valuable data, though of a somewhat different character. In the first place, he points out that the proportion of lost time that is due to sickness and other unavoidable causes is, as a rule, greatly underestimated in factory records, and the proportion due to slackness consequently over-estimated. In the second place, he expresses the view that long hours, much overtime, and especially Sunday labour exert a pernicious effect upon health, particularly of persons occupied in heavy trades. In paragraph 33 (5) of that Memorandum he gives two tables, the first dealing with a body of about 180 men, and the second with between three and four hundred men employed on heavy work, their normal hours being from 65 to 70. In both these cases, when comparison is made with the figures of lost time for June, 1915, and for a year later, the fact emerges that there was a material increase in the amount of lost time, and that by far the larger portion of the increase was due to recorded sickness. In both cases, throughout, recorded sickness represented a noticeably high proportion of the total amount of time lost.

154. Professor Loveday also devoted considerable study to the examination of figures concerning the amount of time lost before breakfast. He concludes:—

- (a) That if early hours be worked, the loss is likely to decrease if the start be later than 6 a.m.
- (b) That when the total hours of the day-shift week are the same, there are likely to be more hours actually worked without than with work before breakfast, other conditions being similar.
- (c) That a reduction of hours may be compensated for or even outweighed by the abolition of early hours, partly owing to reduced absences, partly owing to reduced waste of time, and partly to the greater vigour of work after taking food.

155. He quotes figures for a number of different factories which confirm these conclusions. He strongly presses the view that food should precede work. He points out the undesirability of hunger work, its bad effect upon health and the temptation to lose time in the short early spells.

156. There can be little doubt that there is an increasing recognition on the part of both employers and workers of the broad fact which emerges from the investigations of Dr. Vernon and Professor Loveday, namely, *that substantial reduction of hours can be effected without any reduction of output*. Whereas at the beginning of the War there was a general belief that longer hours necessarily produced larger output, it has now become widely recognised that a 13 or 14 hours' day for men and a 12 hours' day for women, excepting for quite brief periods, are not profitable from any point of view. Few, probably, would disagree with the statement contained in the Summary prepared by the Right Hon. G. N. Barnes, M.P., of the recent Reports of the Commissions on Industrial Unrest† that—

"There is a general consensus of opinion that Sunday and overtime labour should be reduced to a minimum, that holidays should not be curtailed, and that hours of work should not be such as to exclude opportunities for recreation and amusement."

157. It must be recognised that the conditions are not the same now as they were in the early days of the War; not only have large numbers of the youngest and strongest workers been withdrawn for military service, but those who remain have undergone the strain inseparable from a continuous period of long hours of employment. To this must be added the strain caused by family and other anxieties arising out of the War. While much has been done to improve conditions of employment they are still in many cases far from ideal, notably as regards housing and transit. Further, large numbers of women are now employed on heavy work and on skilled operations which were considered two years ago to be quite beyond their capacity. It may be true that no serious breakdown of health has as yet

* Cd. 8511.

† These Reports (eight in number) have been published and can be purchased through the usual channels.

been observed among the great mass of the workers, but it cannot be assumed that this condition will continue indefinitely. The effects of the strain may even have been already more serious than appears on the surface, for while it is possible to judge roughly the general condition of those working in the factory to-day, little information is available concerning the large number of workers who, for one reason or another, and often because they find the work too arduous, are continually giving up their employment. This is an important point which is liable to be overlooked, since the supply of labour has hitherto been adequate to fill their places. The irritability and nervousness mentioned by the Commission on Industrial Unrest are moreover well recognised symptoms of fatigue, while it must not be forgotten that the effects of fatigue are accumulative. How great is the burden imposed upon women by a 12 hours' shift is shown by the following extract from a report recently prepared for the Committee upon an enquiry amongst individual women as to the conditions of employment in a factory, where much of the work was heavy in character :—

"It appears that out of 140 women 99 were having under eight hours' sleep to fit them for a night of 12 hours shift plus travelling time. Moreover out of 146 women only 16 felt that they were able to go out at all during the week. Where replies were not given it was in general because of the obvious absurdity of asking the women what they did in their spare time, after having heard their account of domestic responsibility.

"It may therefore be very strongly urged that these hours of work coupled with the distances to be travelled are such as to preclude the women taking any outside interests if they are to get sufficient rest. It is obvious that the majority of the women recognise this and are content to save themselves only for their work. Such a sacrifice may be with justice demanded for a short period through the exigency of a great and unexpected emergency, but should certainly not be enforced for a longer duration than is absolutely necessary. It may again be noted that already many of these women have worked on these long hours for 16 months."

158. After careful consideration of all the circumstances, the Committee are convinced that the maximum limits of weekly employment provisionally suggested are too high except for quite short periods, or perhaps in cases where the work is light and the conditions of employment exceptionally good. In the great majority of cases, however, the hours of work *should now be restricted within limits lower than those quoted in paragraph 140 above.* It is impossible to lay down a single rule as to the best hours in all cases; the best scheme can only be determined after a careful consideration of a number of different factors, e.g.—

- (a) The strain involved in the work, its character (heavy or light, continuous or intermittent), the mental demand which it makes upon the worker, and the length of process.
- (b) The extent to which the pace of the work is governed by the machine.
- (c) The factory environment—temperature, ventilation, &c.
- (d) The individual physical capacity of the workers, and their age, sex and experience.
- (e) The organisation of the factory (including welfare supervision).
- (f) The sufficiency and suitability of the workers' food, canteen accommodation, &c.
- (g) The arrangements of the hours of work (spells, breaks and pauses).
- (h) Conditions outside the factory—e.g., housing and transit.

159. In arranging the hours of work for a factory allowance should be made, as far as discipline and organisation permit, for the fact that the best hours of employment will not be the same for all processes, even in the same factory.

160. Though no exact statement is possible as to how far the reduction of hours can advantageously be carried out, either now or in the near future, it is not without significance that so experienced an employer as Lord Leverhulme should be now advocating the establishment of a six-hours' day. Though many will not be prepared at the present time to agree as to the feasibility of so radical a proposal the grounds on which the proposal is advocated, as stated in a memorandum submitted to the Committee, appear worthy of quotation :—

"But under the present system of hours of work, the thorough education of our children is practically impossible. An absolutely essential step in the direction of a more efficient Educational System is the shortening of the hours of labour and the improving of the conditions of living for the worker

"We are only just beginning to make a considered study of the inefficiency and resulting waste that is produced by fatigue. We cannot claim even yet that we have any very profound knowledge on the subject, but the wastefulness of fatigue has been abundantly proved by the researches already made. Therefore it is essential that work in the factory, the workshop, and the office should be so arranged as to avoid fatigue, and by maintaining the general health of the workers, to prolong their activity and increase their skill and efficiency.

"Moreover, modern conditions of production requiring costly plant, machinery and factory buildings make it obvious that such division of the 24 hours must be made as will (whilst utilising the mechanical utilities to their utmost capacity so as to get as large an output from plant, machinery, and mechanical utilities as possible) tend to relieve the human element from fatigue. Only by so doing can we reduce to a minimum all overhead charges for interest, depreciation, and rent, &c., &c.

"It is obvious from the above that when our modern industries are run on a less fatiguing system of say two shifts each of six and a half hours with half an hour off for meals (making six working hours in all per day), the efficiency of the worker by thus avoiding fatigue can be increased by at least 33 per cent., and consequently that as much work can readily be done in six working hours as under present conditions is done in eight. But in addition to the ability of the employee to produce as big an output in six hours as is now produced in eight, there would be the added advantage that the plant, machinery, &c., would be running for 50 per cent. longer time, viz., 12 hours instead of eight, which running of machinery would reduce the overhead charges proportionately and increase the output enormously.

"At the close of the war we shall be in a unique position to try this experiment as a nation. We shall want all the output of manufactured goods we can produce. We shall not have immediately the power largely

to increase our plant and machinery. We shall have the return of our heroes from the field of battle; therefore we shall have ample supply of labour to test the experiment. The world's demand for manufactured articles after the war will be overwhelming and unprecedented.

"The six-hours working day does not mean some hours gained for loafing. It is not intended to produce a loafer's paradise within the United Kingdom, and I say, without hesitation, that there is not a single man or woman of those who would be benefited by a six-hours working day, who would not feel themselves to be insulted if he or she were thought capable of viewing the proposal in that light."

161. Though the extent to which hours of labour can be advantageously reduced must necessarily vary, the Committee desire strongly to emphasise their opinion that the time is now ripe for a further substantial reduction in the hours of work. If this be effected with due regard to the varying conditions prevailing in different branches of industry, they are satisfied that reductions can be made with benefit to health and without injury to output. It is highly significant in this connection that the Government should have recently announced their decision to introduce an experiment in some Government National Factories of a week of 50 hours. It is to be hoped that the experiment will be closely watched and its results accurately recorded.

162. It must be obvious that any reduction of hours which can be accomplished without loss of output is profitable not only to the employer, in that it reduces running expenses, but to the worker since even if his or her daily measure of work involves the same amount of fatigue a longer period is left for recovery, for the enjoyment of adequate sleep and rest, and for the necessary opportunity for recreation, exercise and the discharge of the ordinary duties of citizenship and domestic life.

SECTION VI.

SHIFTS, BREAKS, SPELLS, PAUSES, AND HOLIDAYS.

SHIFTS AND DAILY HOURS OF EMPLOYMENT.

163. If weekly hours of employment are limited, as suggested in the last section, it necessarily follows that average daily hours of employment will also be confined within moderate limits. The special questions which arise in regard to them can therefore be dealt with briefly.

164. The daily employment of workers is organised in single shifts, in double shifts, or in three shifts. From the point of view of output single shifts are open to objection owing to the large number of hours out of the 24 during which the machinery lies idle. In the earliest stages of the war, when it was frequently found impossible to organise a second shift owing to the dearth of workers, and especially of skilled operatives, an endeavour was made to secure larger output by prolonging the hours of employment, men, and even women, being employed over long periods for 14 or even 15 hours a day. For reasons already explained it is now generally recognised that these long hours are unprofitable, and that much shorter hours can be worked without any loss of output. Many munition employers, as a result of recent experience, now take the view that for women and young persons a 12-hour day is too long, and hours are now frequently limited to a 10-hour or even a shorter day, longer hours being only worked occasionally to meet special emergencies.

165. Double shifts are the form of employment now most commonly adopted. Though for reasons to be stated in a later section, night work is in itself open to serious objections as a permanent part of the industrial organisation of the country—at least, so far as women are concerned—it must for the present be regarded as inevitable, at any rate, for adult workers, since it enables the machinery to be employed for the greater part of the 24 hours; and so long as the hours of work are not unduly long, and due attention is paid to the environment of the worker, it is undoubtedly productive of increased output.

166. For men the two shifts are most commonly each of 12 hours' duration, though occasionally to meet local conditions the night shift is of 13 hours, as compared to 11 hours of the day shift. Such an arrangement can hardly be economical, in view of the greater strain involved by night work, and the arrangement should certainly be avoided wherever possible. Where the nature of the work does not render it essential that the end of one shift should coincide with the commencement of the next, it is unquestionably advantageous to leave an interval between the two shifts. The shorter hours thus rendered possible are beneficial from the point of view of both the health of the workers and of output. Apart from this, opportunity is afforded for cleaning and ventilating the shops—a matter of much importance. This point was emphasised in the circular issued by the Home Office with their General Order of September, 1916. They stated:—

"The Secretary of State desires to emphasise the desirability of allowing an interval of half an hour or more, between the two shifts unless the process is one which must necessarily be carried on continuously. Such an interval is of great value in affording an opportunity for cleaning and ventilating the shops."

167. Men are occasionally employed on a system of three eight-hour shifts. Of the operation of this system in certain steel works a prominent trades unionist spoke as follows:—

"While it is too early to make any definite statement as to the effect of the change upon the health of the workers, employers had borne testimony to the great success of the change; bad men had become good and good men better. Under the old system a worker was completely worn out by his work, under the new system he was able to take up hobbies such as allotments, bowling or fishing which kept him out of the public-house."

Thus at one place it was reported that amongst a population of over 30,000 people there had not been during the last year a single conviction for drunkenness, the shorter hours enabled the worker to get home and get dressed and generally encouraged self-respect."

168. If only on account of the dearth of male workers the system, whatever its advantages, is not capable of general adoption at the present time.

169. The three-shift system, especially for women, has much to commend it where it can be organised. It imposes little or no strain upon the workers, while the periods for which the machinery stands idle are much reduced. Difficulties, in regard to an alternative supply of labour, do not arise to the same extent as in the case of men, and there is no doubt that the three-shift system yields the best results where it can be arranged for. The strain of night work, indeed, the strain of work generally, is sensibly diminished. Greater vigour of work is maintained throughout the shift; less time is lost by unpunctuality or illness. In the 8-hour shift each hour has a sustained value in contrast to the diminishing value of the later hours in a longer shift. The night shift, which is the most trying, recurs every third, instead of every other, week.

170. On the other hand there are certain difficulties of organisation which have to be surmounted:—

- (a) Male tool-setters have ordinarily to be employed on two 12-hour shifts. Difficulties consequently arise in combining the hours of men and women workers, notably as regards meal hours and the supervision of work.
- (b) The break for meals being limited to half an hour may afford an inadequate time for refreshment, especially at night.
- (c) Time may be lost at the change of shifts.
- (d) Workers may object through fear that shorter hours will mean smaller wages.
- (e) The benefit of shorter hours of employment in the factory may be lost through misuse of leisure time, or by its devotion to household duties. Difficulties are also sometimes experienced in the home and in lodgings through meals being required at times inconvenient for other workers.

171. Experience shows that these difficulties, though substantial in particular cases, are seldom insurmountable; there are numerous instances throughout the country where the three-shift system has been successfully organised. Thus it was reported of one firm:—

"The firm believe the three-shift system to be the best for output and health. They are satisfied that the difficulties are not substantial and that they can all be met by re-organisation and shop management. They consider there should never be a shortage of material, loss of time, friction in taking over shifts, or any of the other difficulties alleged against the three-shift system. In their opinion all the alleged difficulties can be overcome."

BREAKS.

172. The ordinary daily hours of work are organised under the "two-break" system or the "one-break" system. Under the former work usually commences at 6 a.m., and the ordinary breaks are half-an-hour for breakfast and one hour for dinner. Under the "one-break" system work commences after breakfast at 7 or 8 a.m., and there is generally only a single break of one hour for dinner though a break for tea is provided where it is necessitated by the hours of working. This break is generally of half-an-hour's duration but is sometimes reduced to 15 or 20 minutes in order to permit the workers to return home earlier. In the case of women and young persons this limitation of the interval for tea is only allowed where adequate provision is made for the workers to obtain tea in the works and for tea to be actually ready for them as soon as they stop work.

173. Professor Loveday has devoted considerable attention to investigating the conditions of the "one-break" system, and the results of his inquiries are set out in his Memorandum on "The Causes and Conditions of Lost Time" which is included in the Committee's Interim Report on "Industrial Efficiency and Fatigue." He suggests that the system has the following advantages:—

- (a) A large number of "quarters" are lost before breakfast. To some extent this loss is no doubt unavoidable and due to the workers being fagged, to minor ailments (colds and rheumatism) or to transit difficulties; but much of the loss is avoidable. In his opinion the shortness of the spell before breakfast increases the temptation to miss it. He says:—

"The regularity with which a greater number of quarters is lost on certain days indicates deliberate choice of those days, and the preference for 'sleeping in' on Monday even when there has been no Sunday shift disproves any direct connection between overtime and much of the loss of early hours."

- (b) The amount of time lost before breakfast is often sufficiently large to cause serious disorganisation.
- (c) It is only a minority of workers who can put in their best work before having a proper meal in the morning.
- (d) There is less interruption of work. Dr. Vernon in his first Report (see Memorandum No. 12) has called attention to the large amount of time which is lost in starting and finishing work.

174. Professor Loveday, in paragraphs 51-54 of his Report, gives particulars of a number of factories in which work before breakfast has been abandoned with good results. Even where the change has

involved a small reduction in the number of weekly hours this reduction has frequently been more than compensated for by the reduction in the amount of time lost. Apart from a conservative feeling against any change objection has been made to the adoption of the "one-break" system on the ground that—

- (i) where a reduction of hours is involved a loss of wages is feared.
- (ii) domestic inconvenience may be caused through the worker requiring his breakfast before he leaves home.
- (iii) a later start may involve a later hour of finishing work.
- (iv) the workers do not in fact always get a good breakfast before they start. On this point a representative trades unionist stated that:—

"In some cases the 'single break' system is in force under which work generally starts at 7. This arrangement is based on the assumption that the worker will have had breakfast before he comes. Where, as is frequently the case, workers have to travel an hour or more to reach the works, this involves a very long period without food, in addition to the fact that an early start frequently involves at any rate a hurried breakfast and, in some cases, none at all. Even the men get a sinking feeling and cannot work properly. It is worse for women."

175. Professor Loveday is doubtful as to the force of the first three of these objections. As regards the last he suggests that, where the workers live far from home, work should commence at 8 a.m. rather than at 7 a.m. Where the earlier hour is adopted it is generally desirable that a short break for refreshment should be provided in the middle of the morning, and the Home Office General Order of September, 1916, requires in the case of women and young persons that—

"When work commences before 8 a.m. and no interval is allowed for breakfast an opportunity shall be given to the workers to take refreshment during the morning."

176. Professor Loveday's view that the "one-break" system is preferable to the "two-break" system is confirmed by the evidence of employers who have practical experience of it. Thus Sir William Mather, as a result of his great experience, informed the Committee that—

"The two hours before breakfast were practically wasted owing to the long walk to the works, the absence of breakfast or the temptation to get a drink on the way to work in order to keep warm. Both morally and physically the worker was a better man if he had a good breakfast with his family before leaving for work. His firm tried the experiment for a whole year and the results were such as to leave them no hesitation in adopting the system permanently and nothing had since occurred to modify their views. The change had proved salutary as well as profitable. Thrift and sobriety had been encouraged. The worker was a better individual. Even now that owing to the war they were working two 12-hour shifts they still attached great importance to the day shift only starting work after breakfast."

177. Dr. Vernon, in his Memorandum (see Appendix C) on "A comparison of the systems employed for dividing up working hours into spells and breaks," gives the results of enquiries into the output of workers before breakfast; he thus summarises his conclusions:—

"Day shift workers on the one-break system were found to work up to their maximum output each morning rather more quickly than the night shift worked up to their maximum; but day shift workers on the two-break system, in which work was begun at 6 a.m., and was followed by a breakfast interval at 9 a.m., had 7 per cent. to 18 per cent. less output in these three pre-breakfast hours than the night shift workers had in their first three working hours. This was presumably due to the night shift having had a good meal before starting work."

SPELLS AND PAUSES.

178. Attention has already been drawn to the importance of the proper distribution of rest pauses in providing against fatigue. In America, much attention has been devoted to the proper length and distribution of pauses, and this is one of the most important aspects of "scientific management." In this country, as yet, the subject has received but little attention. Experience has indeed proved that under present circumstances many women and young persons cannot profitably be employed for the full spell of five hours on continuous work as allowed by the Factory Act, and even where the spell is somewhat less than five hours, there is a general tendency amongst employers to allow short intervals for refreshment in the afternoon, and frequently in the morning also. These pauses not only provide an opportunity for refreshment, but a period of rest and recovery from fatigue, and a break in the monotony of the work.

179. Dr. Vernon, in paragraph 31 of his Report on "Statistical Information concerning output in relation to hours of work" (Memorandum No. 12), draws attention to the importance of this subject. He says:—

"The custom in many munition works is for the operatives to work for a spell of five hours, and then, after an hour's interval, for another spell of four and a-half to five hours. Such spells are undoubtedly too long in many types of munition work, but if a second break is introduced in the working day much extra time is lost in starting and stopping work. If the operatives are left to themselves, they take rests at irregular and often unsuitable times. Hence it would be much better if the rest pauses were chosen for them. For instance, a 10-minute break in the middle of the morning and afternoon spells, during which the operatives remain at their machines, but take tea or other nutriment brought them by boys or by travelling canteens, has been found a valuable aid to output in some munition works. Some types of work need longer and more frequent rest pauses than others, and the best times can be determined only by experiment. After being fixed they should be made compulsory, and rest pauses at other times be checked so far as possible."

180. In his Memorandum on "A comparison of the systems employed for dividing up working hours into spells and breaks," Dr. Vernon records the results of certain inquiries into the output on five hours' spells; he concludes that:—

"Five-hour spells of work are too long, for it appeared that by cutting up the 10-hour day into three spells of, e.g., 4, 3 and 3 hours, separated by two breaks (the first of which is too late to function as a breakfast break) the output might be increased 5 per cent. to 12 per cent. above that experienced when two 5-hour spells were worked. What is probably a better system still of avoiding 5-hour spells is to stop work for a quarter of an hour in the middle of each spell, and provide the workers with refreshment by means of travelling canteens. The introduction of one such extra $\frac{1}{4}$ -hour break in a cartridge factory, together with the abolition of the breakfast interval, increased the hourly output 5 per cent."

181. In the same Memorandum Dr. Vernon also records certain data he collected as to rests voluntarily taken by workers. In the case of some men engaged on hand-tapping fuses he found that:—

"On an average they took 7 to 9 minutes of voluntary rest pauses in all except the first full hour of work and as they were all of them men who had been engaged for many months on the operation and were paid at piece rates, there can be no doubt that they found by experience that such pauses improved their total output. It was curious to note, however, that they worked on no sort of system, but often took rests in a most irregular manner."

182. Dr. Vernon expresses the opinion that rest pauses are essential in active work for both men and women, though as might be anticipated he found that the extent of these voluntary rests varied greatly according to the extent to which the nature of the work involved enforced periods of inactivity.

183. So far as the Committee are aware, but few firms have made any endeavour to investigate scientifically the particular distribution of rest pauses needed to secure the best output in their own works. The following case of the advantage of such pauses may be quoted from the Memorandum on "Incentives to Work" included in the Committee's Interim Report:—

"A group of workers, men and women, paid on a time wage, were found employed from 6 a.m. to 6 p.m. with two half-hour meal intervals at the process of emptying and filling a series of presses. Each press, after being filled, has to be left under hydraulic pressure for 35 minutes, during which time other presses in the series are emptied and filled. The management calculated the number of presses to each series, which would allow the work to be done in 35 minutes at a reasonable pace; but the workers on their own initiative have adopted a different method. They work with a rapidity so organised that the series of presses is emptied and filled in less than 25 minutes, after which they rest for 10 or 12 minutes until the time comes to begin again. The work entails the expenditure of a fair amount of physical energy; and it was interesting to watch these operatives swing into their labour in order to obtain their rest pause."

HOLIDAYS.

184. The Committee consider it most important that the ordinary factory holidays should be maintained. As a Trade Unionist put it—

"If once in every two or three months a man could have two or three days off it would prove the finest medicine, much better than a bonus or extra pay."

185. The evidence leaves no doubt as to the beneficial effect of such holidays both on health and output. Dr. Vernon, in his further report on output in relation to hours of work (Memorandum No. 18), thus describes one case which he investigated:—

"In the February-April period . . . the hourly output had risen to 123. . . . Though the hourly output during the February-April period was fairly steady the workers had not become completely adapted to the reduction of hours from a normal 12-hour to a normal 10-hour day which had been effected four weeks previously. After Easter, when they had a full week's holiday, their relative hourly output went up to 134 on the average and remained fairly steady for the next eight weeks although the actual hours of work were slightly greater than before Easter"

"After a week's holiday at the end of August the hourly output went up again to its May-June level, but it was not until October or after another holiday (the four days ordered by Government) that a marked rise of hourly output set in. This rise continued in subsequent weeks until, in the fortnight before Christmas week, it reached the astonishing figure of 177."

186. In commenting on these figures Dr. Vernon points out that

"The workers, refreshed and more vigorous, unconsciously start work on a higher level of speed and maintain that level permanently, whereas a reduction of hours unaccompanied by a holiday, i.e., by a chance of breaking through settled habits of work, is generally very much slower in conducing to the desired reaction."

187. Professor Loveday, in his Memorandum on "The Causes and Conditions of Lost Time" (see the Committee's interim report, pages 52-53), draws attention to the beneficial effect of a holiday in reducing the amount of broken time due to sickness. He quotes an instance in which the sickness rate for the three weeks immediately following a considerable holiday at the end of August and beginning of September, 1916, was 4.2 per cent. as against 5.4 per cent. in the week immediately preceding the holiday, and 8.6 per cent. in the week before that. The rate had not been so low for many months previously.

188. Another aspect of the question of holidays is that they afford much needed opportunities for carrying out repairs to plant and machinery; in the absence of such opportunities the defective conditions may become so serious as materially to affect output.

189. The Committee desire specially to emphasise the need for giving periodic holidays to members of the management and to foremen. They cannot take odd days off like the ordinary worker, and cases of temporary breakdown have been regrettably common.

SECTION VII.

SUNDAY LABOUR AND NIGHT WORK.

SUNDAY LABOUR.

"Man, man is the great instrument that produces wealth. The natural difference between Campania and Spitzbergen is trifling when compared with the difference between a country inhabited by men full of bodily and mental vigour, and a country inhabited by men sunk in bodily and mental decrepitude. Therefore it is that we are not poorer but richer, because we have, through many ages, rested from our labour one day in seven. That day is not lost. While industry is suspended, while the plough lies in the furrow, while the Exchange is silent, while no smoke ascends from the factory, a process is going on quite as important to the wealth of nations as any process which is performed on more busy days. Man, the machine of machines, the machine compared with which all the contrivances of the Watts and the Arkwrights are worthless, is repairing and winding up, so that he returns to his labours on the Monday with clearer intellect, with livelier spirits, with renewed corporal vigour. Never will I believe that what makes a population stronger, and healthier, and wiser, and better, can ultimately make it poorer." (*Macaulay, Speech on the Ten Hours Bill, House of Commons, 22nd May, 1846.*)

190. The most urgent problem awaiting the consideration of the Committee at the time of their appointment was that of Sunday labour. Partly on account of the heavy demand for output and partly through the attraction of the higher rate of wages payable, Sunday labour for men was common. Sometimes the hours were the same as on week days; sometimes they were shorter, work commencing later or finishing earlier. Elsewhere they were longer than on ordinary days as when the transfer from the 12 hour day shift to a 12 hour night shift was made by working for a continuous period of 18 hours, one shift working (say) from 6 p.m. on Saturday to 12 noon on Sunday, and the other from noon on Sunday to 6 a.m. on Monday.

191. The employment on Sundays of women and boys was much more restricted and was only allowed on special application to the Home Office. In October, 1915, for the whole of the United Kingdom there were in operation about 50 Orders allowing the employment on Sundays of women, girls and boys, and also about another 30 for boys only. As a rule such employment was only sanctioned when hours of work on other days of the week were limited, and even when it was allowed it was usual to impose restrictions such as:—

- (a) that women and young persons should not be employed on two consecutive Sundays;
- (b) that they should have time off on Saturday;
- (c) that they should only be employed on Sunday in cases of emergency;
- (d) that they should be employed for a portion of Sunday only.

192. *Sunday labour is in itself unpopular.* There exists a large body of opinion that the seventh day, as a period of rest, is good for body and mind. Employers object to it on the ground that supervision is difficult, and that it imposes a severe strain on foremen, substitutes being difficult to obtain. In the early days of the war high rates of pay made Sunday labour popular with many workers, but this popularity has steadily decreased and any difficulties involved have generally proved capable of adjustment. High rates of pay on the other hand have been another objection raised by employers who have also complained of increased cost of running their works. Sunday labour is in fact only defensible if it can be shown to be productive of greater output over a longer or shorter period.

193. *But Sunday labour is uneconomical.* As has already been pointed out, fatigue may be mental as well as physical. Account has to be taken not only of the hours of labour, factory environment, and the physical strain involved but also of monotony, which may prove as serious an obstacle to good output as physical fatigue. The cure for fatigue, whether physical or mental, lies in adequate periods of rest, and the problem of Sunday labour is primarily one of the extent to which the worker requires weekly or periodic rests if he is to retain his health and energy over long periods.

194. The evidence is conclusive that Sunday labour by depriving the worker of his weekly rest offers him no sufficient opportunity for recovering from fatigue, and is not productive of greater output except for quite short and isolated periods. Employers stated in evidence, that though attendance on Sunday is generally good it is not always accompanied by a satisfactory individual output; not infrequently a holiday spirit is apparent. Moreover, attendance at work on Sunday is often accompanied by bad time keeping on other days of the week. Statements have been made that seven days' labour only produces six days' output, and that reductions in Sunday work have not in fact involved any appreciable loss of output. Trades' Union Officials have complained that their members were getting tired and needed more rest. In several instances they pressed for the reduction of Sunday work.

195. Evidence in the form of statistics of output in regard to Sunday labour is not easily obtainable. Even when the output of work has been such as would in normal circumstances permit of the collection of exact data, the rapid growth in the number of persons employed, the greater employment of women, the increasing efficiency of inexperienced workers, and other similar causes have generally rendered comparisons difficult, unreliable and impossible. Even where the data was available the management have not generally found it possible to arrange for its collection and tabulation. The representative of one important firm, however, informed the Committee that in one of their shops where heavy machine work was done by men of good average Trade Union type they had by extending the relief at the

week-end reduced the average weekly hours from 78½ to 65½. Though the normal hours were thus reduced by 13, the average number of hours (60) actually worked during the three months succeeding the change exceeded the average number of hours (59½) worked during the six months preceding the change. Moreover, in his opinion the output per hour was improved.

196. Professor Loveday, who conducted certain inquiries into Lost Time, states in paragraph 11 of his Memorandum (see the Committee's Interim Report on "Industrial Efficiency and Fatigue"):-

"In so far as long hours lead to loss of time by fatigue and sickness, insistence on them is most deplorable. The keenest men are not always the most robust, and it is the keenest who have most strain to bear. The hours gained are more costly than the hours lost. . . . The effects of Sunday labour are, as has now been recognised, still worse than those of overtime hours in the evening or on Saturday afternoon."

197. Dr. Vernon, in the course of his investigation* concerning output in relation to hours of work has shown that in the case of a body of 80 to 100 women that the reduction of the hours of employment by the stoppage of Sunday work involved no reduction of output, though the full effect of the change took a few months to operate. A similar investigation in regard to a body of 56 men, sizing and fuze bodies, showed that though the number of nominal hours of work were by the cessation of Sunday labour reduced by six, the time-keeping was so much improved that the actual hours of work remained the same. The withdrawal of Sunday labour seems to have led the men to observe much more regular hours, and during their regular hours to increase their ordinary output some 16 per cent. above its previous level. The abolition of Sunday labour has sometimes been demurred to on account of the low Monday output, which frequently follows a week-end rest. Dr. Vernon, however, pointed out that in the cases quoted, though the Monday output was low compared to other days of the week, it reached a considerably higher level than was ever obtained in the absence of a week-end rest.

198. The Committee, in their Memorandum No. 1 submitted in November, 1915, to the Ministry on "Sunday Labour," expressed their conviction that if the maximum output was to be secured and maintained for any length of time a weekly period of rest must be allowed. Except for quite short periods, continuous work in their view is a profound mistake and does not pay. Output is not increased. On economical and social grounds alike this weekly period of rest is best provided on Sunday. Speaking generally, the relief from work on Sunday is more urgent for women and young persons than for adult men, and for men on overtime than for those on double shifts. The need may also vary somewhat according to the number of hours worked during the week and the environment and character of the work, but the Committee consider that the discontinuance of Sunday labour should be of universal application and should extend to all classes of workers, except that where the work must necessarily be continuous special arrangements will be necessary.

199. Acting on the recommendations of the Committee, the Ministry in December, 1915, issued a circular on Sunday labour to all Controlled Establishments, in which the following opinions were expressed:-

"The Minister is of opinion that it is necessary in the interests both of the workers and of production that a weekly rest period—preferably Sunday—should be secured to all workers.

"This recommendation applies equally to all classes of labour, male and female, adult and juvenile, though there must be certain necessary exceptions in the case of labour such as that employed upon furnaces which could not be discontinued without grave dislocation. Even in these cases, though it may not be possible to arrange for a general rest on any particular day in the week, it would still be desirable so to arrange the work that all persons engaged upon the work had, if on different days, a regular period of rest.

"It is in the opinion of the Minister preferable to work a moderate amount of overtime in the week, allowing a break on Sunday, rather than work continuously from day to day. It is still more strongly his view that where overtime is worked in the week Sunday labour is not desirable."

200. The Ministry subsequently appointed in consultation with the Home Office a Committee to consider demands for Sunday labour and to secure its discontinuance wherever possible. In April, 1917, a further letter was issued by the Ministry, in which it was stated that—

"the Minister, after further consultation with the various Departments concerned, is of opinion that it is advisable that Sunday labour, with the exception of shifts beginning on Sunday night or ending on Sunday morning, or of work in connection with the necessary repair of plant machinery, should be discontinued as far as possible from the beginning of May, and would be glad if you would make arrangements in your establishment to that end."

201. During the past two years there has been a steady and continuous reduction of Sunday labour. From reports of the various Commissions appointed in July, 1917, to inquire into the Causes of Industrial Unrest it is evident that what Sunday labour still remains is unpopular and more than one Commission urged its discontinuance:-

"The temptation to engage on Sunday labour so as to earn higher rates of pay has been pointed out to us as being conducive to overstrain, and we believe that it will be generally recognised that Sunday labour (which still prevails to some extent) should be discontinued except to meet absolute emergencies." (North East area.)

"We consider that overtime and Sunday work should be reduced as much as possible. We do not believe that they increase production in the long run. We recognise that things are much better in this respect than they were, but there is still room for improvement." (West Midlands area.)

"The amount of overtime and week-end and Sunday work should be reduced to a minimum, subject to the exigencies of the National requirements." (London and South Eastern area.)

202. The Committee recognise that the amount of Sunday labour at any moment must necessarily vary to some extent according to the nature and degree of the urgent demands for the immediate

* See paragraphs 146-150 above.

delivery of particular types of munitions. Figures, however, collected by the Ministry of Munitions show that in Controlled Establishments engaged on non-continuous processes the numbers of men and women employed on Sunday were, in January, 1918, very substantially smaller than they had been twelve months earlier.

203. As regards Orders made by the Home Office authorising the employment on Sunday of women and young persons (other than volunteer workers not employed during the week), the position on January 31st, 1918, was shortly as follows:—

General Orders.—(i) The General Order (Munitions of War) allows the Sunday employment of workers employed on the three-shift system, and also (where authority is granted by the Superintending Inspector of Factories) of workers on the two-shift system, if a day off is given in lieu of Sunday. No information is available as to the number of firms taking advantage of these concessions.

(ii) An Order for National Filling Factories authorises the employment of women and young persons over 16 years on alternate Sundays, with a weekly limit of 60 hours (excluding meal times). Little use is made of this alternative.

Special Orders for individual works.—Particulars of these Orders are set out in the following table:—

Extent of Sunday work.	Total Number of Factories.	Number of Orders affecting—		
		Women (over 18).	Girls† (14 to 18).	Boys (14 to 18).
A.—Every Sunday	1*	1	—	—
B.—In special emergency	6	5	3	5
C.—Cases in which a day off is allowed in lieu ...	33	29	4	8
D.—Cases under 8-hour shift systems... ..	17	16	4	6
E.—Other cases—				
Two Sundays in three	1	—	—	1
One Sunday in two	9	7	2	4
" " three	5	5	—	—
" " four	6	6	2	3
Total	73†			

* In this case the women work not more than six hours on Sunday, and only three hours on two Mondays in three—the third Monday being free from employment.

† In five instances the same factory is represented twice under the headings A to E.

‡ Only one of these allows the employment of girls under 16 on Sunday.

N.B.—The above statements take no account of course of cases where night work ends on Sunday morning or begins on Sunday night.

204. Subsequent experience has fully confirmed the original recommendation of the Committee that it is essential for health and output alike that Sunday labour should be confined to:—

- Sudden emergencies, including the making up of arrears in particular sections; and
- Repairs, tending furnaces, &c. (the men so employed being given a corresponding period of rest during some other period of the week).

205. Such temporary concessions as may be unavoidable should be confined within narrow limits and terminated as soon as practicable.

NIGHT WORK.

206. There is no legal restriction upon night work for men. It is only legal for boys in certain specified continuous processes. The employment of women at night has been prohibited for more than 70 years in the textile trades, and has never been allowed in non-textile trades since they were brought under the provisions of the Factory Acts 50 years ago. It was finally abolished by international agreement from 12 European countries which signed a Convention drawn up at the International Conference held at Berne in 1906. These countries included, in addition to Great Britain, Austria and France, Germany, Belgium, Italy, Portugal, Spain and Switzerland. The agreement was based upon the results of inquiries into the effects—economical, physical and moral—of night work for women.

The objections to night work may be shortly summarised as follows:—

- It is uneconomical owing to the higher cost of wages, lighting and heating.
- Supervision at night is not always so good as by day owing to less effective lighting or to the employment of fewer or less experienced foremen.
- The inferiority of lighting may make work and especially fine work more difficult.
- The workers may be unable to obtain adequate sleep by day. This may be the result of the dislocation of the ordinary habits of life or of social causes, e.g., noises and disturbances, or the care of children. Workers are tempted to curtail their period of sleep through rising to join the family mid-day meal or to obtain some recreation and amusement.

- (e) Social intercourse, recreation and amusement may be seriously interfered with. Suitable opportunities for attendance at instruction are impossible, unless special facilities are allowed.
- (f) Finally it is not natural to turn the night into day and to deprive the body of the beneficial effects of sunlight.

207. Under existing conditions night work at any rate for men and women is inevitable. It is the means by which the machinery is employed for the greatest proportion of the 24 hours and so long as the hours of work are not unduly long and due attention is paid to the environment of the worker, it is undoubtedly productive of increased output. Night work must therefore continue for men and women while the present emergency lasts, however conclusive may be the arguments against its introduction as a permanent part of the industrial organisation of the country.

208. The Committee are not satisfied that there is the same justification for the employment at night of girls and boys. The objections to night work for women are greatly accentuated in the case of growing girls and the Committee are strongly of opinion that all night work for girls under 18 should be terminated. As already stated in paragraph 144 steps have already been taken by the Home Office and the Ministry of Munitions to terminate all night employment of girls under 16 and to restrict within very narrow limits the employment of girls between 16 and 18. For boys also, and especially those under 16, night work is highly undesirable, and the Committee fully endorse the recommendation contained in the Report of the Departmental Committee* on "The Night Employment of Male Young Persons" that—

"We are strongly of opinion that the employment of boys under 18 years of age at night in factories is undesirable and ought not to be allowed to any greater extent, or at an earlier age, than is absolutely necessary. This applies specially to boys between 14 and 16 years of age, when the rate of growth is most rapid, and when the conditions of life ought to be rendered as favourable as possible for mental and physical development."

209. A question of considerable importance in connection with the shift system is how long the workers should remain on night shift at any one time. A week is the most common period. Changes are sometimes made fortnightly or monthly and in some instances there is no alternation at all, the workers remaining continuously on day or night work, except for occasional changes amongst individuals carried out for the convenience of the persons concerned. On physiological grounds infrequent changes are to be preferred. The question is, however, one that is largely influenced by the social conditions under which the worker lives and works. In the Home Office General Order of Sept., 1916, no requirement is made as to periodical changes. The matter is left to the individual employers to settle with their work-people.

210. In view of its importance the Committee directed their Investigators to pay special attention to this subject. The data collected by them has been brought together in the Memorandum on "The Comparative Efficiencies of Day Work and Night Work" included in the Committee's Interim Report. An examination of the data suggests the following conclusions:—

"Women.—(i) In monotonous processes which call for little physical effort, such as those concerned with cartridge-making, discontinuous night work of women gives an output which rarely falls much more than 10 per cent. below, and usually approximates closely to that obtained by day.

"(ii) Continuous night work is productive of definitely less output than is the discontinuous system; and the Committee have failed to obtain evidence that the output of the continuous day shift balances this inferiority.

"(iii) The timekeeping of girls and of women of 19 years of age and upwards, working for alternate weeks of day and night shifts, is even better maintained than when they work on permanent day shifts.

"(iv) Timekeeping of girls of 14 to 18 is practically the same whether they work on permanent day shifts or on day and night shifts.

"The Committee, basing their opinion upon these conclusions, consider it undesirable to adopt for women continuous night shifts in any factory not at present so working or not yet open, and suggest that wherever practicable this system should be discontinued."

"Men.—The conclusions arrived at with respect to women are true, with slight modifications, for men.

"(i) There is no significant difference between the rate of output in night and day shifts managed on the discontinuous system.

"(ii) With men, as well as with women, the discontinuous system is preferable to continuous night work."

211. The inferiority of continuous night work can probably be referred to a failure to secure proper rest and sleep in the day time. Women on continuous night work are likely to perform domestic duties, which when they work alternately in the two shifts, is impracticable. Evidence, indeed, exists of women employed in permanent night shifts who still carry on their ordinary day-time avocations, though it is not sufficiently extensive (statistically) to be offered as a proof of the suggestion just made.

* Cd. 6503, 1912.

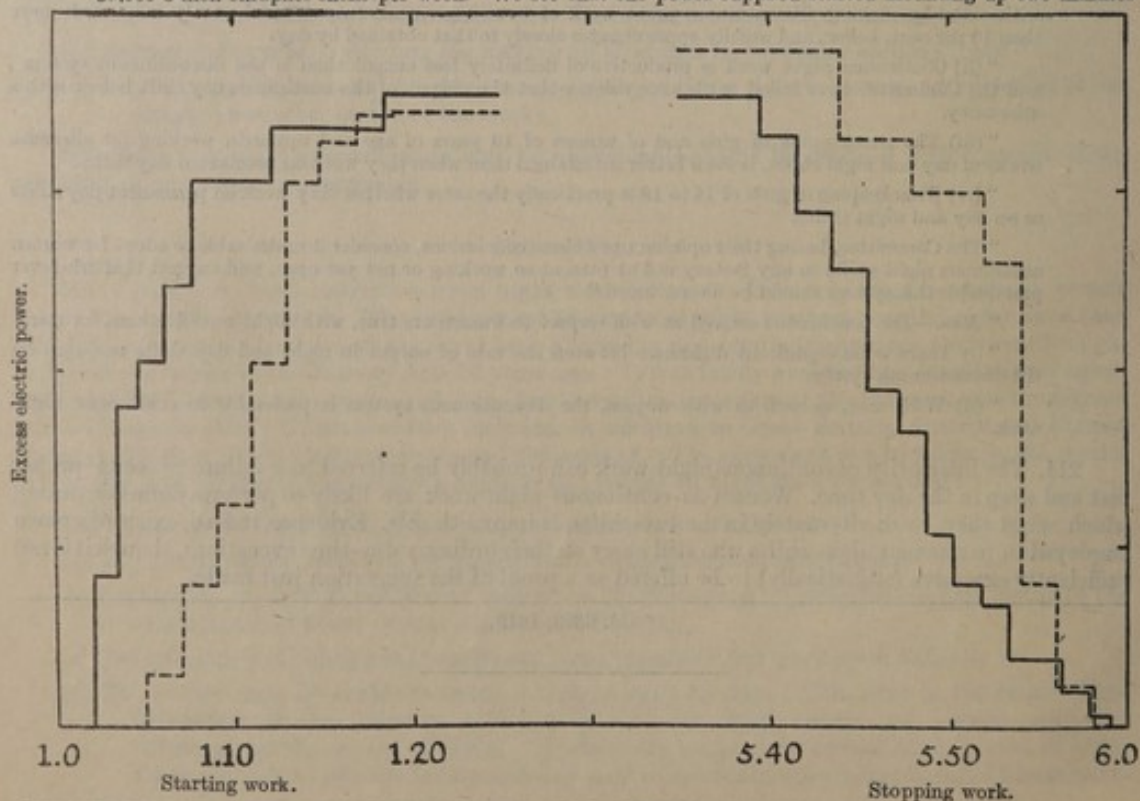
SECTION VIII.

LOST TIME AND INCENTIVE.

212. The amount of time lost in industry varies widely in different forms and processes, and in accordance with varying conditions and circumstances of labour, environmental and personal. It rises in the bulk often to as much as half a day per week, though it varies in occurrence both in the day and in the week, being greatest as a rule at the two ends of the day and the two ends of the week, varying in relation to the length of the working day. It is for this reason that it is necessary, in the consideration of lost time, first to ascertain the time worked. It is of no value to determine the time lost unless it be co-related with the time worked, whether normal or overtime. The mere record of so many hours lost or such and such a percentage of lost time is valueless and even misleading.

213. Speaking generally the Committee have found that the whole subject of lost time calls for much more careful consideration and determination than it has hitherto received. The term is one which covers varying conditions. First, there is what may be described as gross lost time, namely, actual absence from work, for whole days or weeks, or substantial portions of days or weeks, a degree of broken time which gravely interferes with the management of a factory, and which is due to various dominant factors, social or industrial. Secondly, there is what is known as loss of "quarters," and particularly of the "morning quarter." In his investigations for the Committee, Professor Loveday examined this point in fourteen classes of work—light, medium and heavy (including approximately 17,000 persons)—working a normal day shift of 53 hours, commencing at 6 a.m. or between 6 and 7 a.m., with the result that he found that the percentage of lost time before breakfast varied from 20 to 58. Without deciding whether this loss was "avoidable" or not, the fact is that it occurred, and it occurred in the morning quarter, and was greatly in excess of any similar loss in factories which started work later than 6 a.m. All over the country munition works have had this experience of lost time in the "morning quarter" under the two-break system (which begins before breakfast and so involves two meal breaks during the day). The magnitude of this common experience, the actual number of absences, the futility of working before having had a morning meal, and the waste of time incurred in two breaks daily, have led many employers to the view that the two-break system might well be abolished. Thirdly, there is time lost in starting work, even by the good time-keeper, and similarly time lost in ending work. A statement* made to the Committee by Dr. Vernon may be quoted:—

"In most works the motive power is electric, and in some the power supplied to each section is registered by a separate watt-meter. The machinery is started running shortly before work begins, and as the operatives get going, one after another, the power consumption steadily rises to a maximum, which is attained when all the operatives have started. By means of these power records the rate of starting and stopping work can readily be ascertained in many instances, though not in factories where time is spent in a preliminary collection of necessary tools and material, and in their adjustment. The accompanying figure records the increments of electric power over that required to drive the free-running machinery, on starting and stopping the afternoon spell of work. The continuous line represents the power supplied to a large shell shop which turned out 30,000 3-inch shrapnel shells per week. We see that the power supplied started mounting up two minutes



* See Memorandum No. 12 (Cd. 8344).

after starting time, and reached half its full value in four minutes. The dotted-line curve, representing the power supplied to a section of 200 women turning fuze bodies, did not begin to rise till five minutes after starting time, and did not attain half its maximum value until 11 minutes after starting time. In other words, the operatives wasted about seven minutes more in starting than did the operatives in the shell shop most of whom were men. On the other hand, the fuze-turners finished more strongly than the shell shop operatives, as can be seen by comparing the two curves given on the right side of the figure, and it was found that both sets of operatives lost, on an average, about the same aggregate of time in starting and finishing during the course of the whole day, viz., 34 minutes. The shell shop operatives did not start much more promptly than the fuze-turners in the morning, partly because there was more delay in the arrival of their material, but in spite of this, if the operatives of both shops had started equally promptly, and finished equally strongly, nine minutes out of the 34 would have been saved. There was no inherent reason why work should have been started promptly in one shop and not in the other. It was merely a custom of the particular shop, and even then the custom was not a fixed one. A series of meter readings of the women's section were taken for several days before and after the Easter holiday, and nine days before the holiday the average amount of time wasted in starting after dinner was found to be 11 minutes; two days before it was 14 minutes. Two days after the holiday it was 16 minutes; three days after it was 15 minutes; and five days after it was 12 minutes. That is to say, it increased with the slackness of the operatives caused by the immediate approach of the holiday, and still more with their post-holiday lassitude.

"There can be no necessity for the waste even of 25 minutes in starting and finishing work. Ten or 15 minutes should be an ample allowance, and the 20 minutes thereby saved could be deducted from working hours without any reduction of output. At one large works the manager informed me that he made a point of going into the various shops at starting time, and seeing that the operatives began work promptly. In this way a considerable amount of time was saved."

214. Subsequently* Dr. Vernon was able to report a further investigation in regard to women turning aluminium fuze bodies. The machinery was started up a few minutes before normal starting time, the power (recorded by watt meter) required for this purpose being deducted from subsequent readings. The results were:—

Time Lost in Starting and Stopping Work.

Time of year at which power records were taken.	Average number of minutes lost when—				Total number minutes lost.	Relative hourly output.
	Starting work in morning.	Finishing work in morning.	Starting work in afternoon.	Finishing work in afternoon.		
April 13–May 1, 1916	14.0	1.5	12.3	9.3	37.1	126
June 6–7, 1916	12.5	2.5	10.0	8.0	33.0	137
January 10–18, 1917	10.0	0.5	7.0	9.0	26.5	158

In an adjoining section, consisting mostly of women turning small brass time fuzes and primers, but including also the women engaged in milling a screw thread, the total times lost in starting and stopping were 34.7, 33.5 and 28.3 min. in the April, June and January periods respectively. In the next two sections, occupied by men engaged in tool making and in controlling automatic machines, the average times lost were nearly the same throughout, but this may have been due to the fact that most of the workers were paid at a time rate and not at a piece rate. However, in two other sections of lathe workers, mostly women, which were situated in a different part of the factory, there was likewise no appreciable reduction in the time lost, though these workers were paid at a piece rate and must have had a bigger hourly output in January, 1917, than in April, 1916. It is very likely that they wasted less time by taking fewer and shorter rest pauses during the progress of their work, but on this point I made no observations.

215. It is of interest to note in passing that Dr. Vernon claims that the increased hourly output resultant on a reduction of hours is dependent, as a rule, on two factors. First, a speeding up of many or all of the actual movements required in the mechanical process; and secondly, the avoidance of lost time by starting work promptly, by taking few pauses during the progress of the work, and by continuing the work more nearly to the nominal stopping time. This observation leads up to a fourth kind of lost time, namely, that due to unregulated rest pauses, absence of pauses, too long spells and other similar points in factory organisation of hours. The custom in many works is for operatives to work for a spell of five hours, and then after an hour's meal interval for another spell of four and a-half to five hours. Such spells, in the view of the Committee, are too long for most workers, and yet, if a second or third interval were introduced, extra time would be lost in starting and stopping. Under present circumstances, however, much time is often lost by the operatives taking rest at irregular or unsuitable times. The Committee recommend a properly recognised system of rest pauses. A definitely fixed ten-minute break in the middle of the morning and afternoon spells, during which operatives remain at their machines (and possibly take light refreshment conveyed to them), has been found in practice a valuable aid to the reduction of lost time and increase in output. Some types of work need longer and more frequent rest pauses than others, and the best times and occasions can be determined only by experiment. Lastly, there is the lost time due to too long hours of work and excessive overtime. "Overtime may act," writes Professor Loveday, "either as final or efficient cause of lost time." Employees may deliberately miss normal hours, or work slack, in order to make the better paid hours of overtime more expedient or even necessary. Or, again, overtime or too long hours, by their exhausting effect, result in lost time as a consequence. The prolonged hours and the Sunday labour during the early period of the war pressure on industry actually resulted after a time in many cases in reducing staying power and increasing lost time, owing to increase of fatigue and sickness, of decreased briskness and resilience among the workers. "There can be no doubt," according to Professor Loveday, "that for the average man high wages earned by long hours are too dearly earned."

* See Memorandum No. 18 (Cd. 8628).

The Causes of Lost Time.

216. A consideration of the character of lost time makes manifest its principal causes. Some of them are inherent in the circumstances of the present time, arising out of the war or the exceptional conditions of industry; others are relatively more "avoidable." The more, however, that the causes are examined or considered in relation to the varying local or other circumstances, the less is it possible to classify with any degree of precision, or say of any given cause that it is inherent and uncontrollable, or that it is controllable and avoidable. It will be found in practice to be sometimes one and sometimes the other. It should be understood therefore that the following classification is merely made for convenience.

(i) *Causes mainly inherent.*

- (a) Necessity of employing persons of inferior physique, irregular habits, and without experience of factory life or discipline;
- (b) In many districts inadequate housing accommodation and insufficient transport facilities, both conditions made more acute by abnormal congestion of industrial population;
- (c) Wintry weather, darkened streets and inequalities of food supply;
- (d) Insufficiency or irregularity of supply of raw material, machinery or tools coming to the factory;
- (e) Domestic duties of married women and war pre-occupations and exigencies of all workers;
- (f) Sickness and disease caused by conditions external to the factory.

(ii) *Causes mainly controllable.*

- (a) Fatigue, sickness, and accident of factory origin;
- (b) Insufficient wage incentive;
- (c) Faulty internal organisation, leaving the employee without work, leading to temporary and sporadic breakdown or delay in management, or failing to provide for the reasonably comfortable conditions (lighting, heating, rest, feeding, &c.) for maximum and sustained effort;
- (d) Indifference, slackness, laziness, discontent;
- (e) The practice of early morning "quarters" or dislocation between shifts;
- (f) Prolonged hours, overtime, insufficient rest periods or holidays;
- (g) Excessive consumption of alcoholic beverages.

217. Other causes of less importance undoubtedly occur, and even those mentioned differ considerably, both in effect and in locality. Whilst the Committee decline to generalise or draw final conclusions, they are satisfied that the loss of time, directly and indirectly, due to fatigue and ill-health, is substantial, and is, as a rule, greatly under-estimated. On the other hand, there would seem to be a tendency to over-estimate that due to slackness, laziness or wilful idling. On the whole, evidence from all parts of the country shows, beyond question or dispute, that a very remarkable and entirely exceptional effort has been made by all grades of workers to meet the industrial demands of the national emergency. This long sustained will to serve the commonweal has played, in the Committee's view, a prominent part in the maintenance of output under difficult circumstances, and has contributed to reduce the lost time due to ill-health. In spite of the prolonged and heavy strain, the Committee's medical investigators have found an unexpectedly large measure of good health among both men and women, due as far as the evidence goes to the powerful impetus of a sense of patriotism, to increased sobriety, to high wages and their resultant home comfort, to the restriction of hours adopted none too soon, to division of labour, and to a vast improvement in the conditions of factory life, especially the arrangements for "welfare" supervision and the provision of canteen facilities. Without the operation of these favouring contributory factors the Committee believe that there would have been much heavier loss of time and widespread breakdown of health. Even as it is the Committee cannot escape the conclusion that the immense industrial effort of the war is likely to leave behind many serious physical disabilities.

218. The causes and conditions of lost time are matters of national importance for the future, and the Committee hold strongly that the past neglect of this subject should be removed, once and for all. They advocate shorter hours, improved conditions of labour and a higher standard of efficient workmanship, if industry is to come into its own, and workers of all grades are to obtain their full reward, without let, hindrance or impairment. To this end the Committee recommend that managers and other responsible authorities in factories should keep careful records—

- (a) of lost and broken time;
- (b) of absence or broken time due to sickness; and
- (c) where practicable, of the output per worker per hour.

The regular study of these records cannot fail to prove valuable as a guide to the causes and conditions of lost time, and the means of its reduction or removal in individual workers. It is important to remember that the man or woman is not a machine, and should not be treated as such. What is needed is not a cast-iron system of employment, but a sympathetic and correct understanding of the physical and mental capacities of each worker, and their most satisfactory and economical application.

Incentives to Work.

219. Closely related to the question of lost time is that of incentive to work, and in the course of their investigations the Committee have observed a relation existing between such incentives and the health of the worker. Indeed, they are disposed to place *the health and physical fitness of the individual worker as the first necessary condition of output*, and to that end they desire to lay emphasis upon the extreme value of all factory conditions which contribute to such health—good lighting, effective ventilation, sufficient heating, cleanliness, rest rooms, proper canteen accommodation, protection from industrial poisoning and dangerous machinery, surgeries, suitable welfare work within and outside the factory—all these are conditions of first and fundamental importance from the point of view of health and incentive to work. A hygienic environment at home and in the workshop is indeed the first necessity for securing a healthy population of wage earners to whom a wage system may appeal as an incentive to work. Secondly, the Committee would place *a properly organised factory*, good order and discipline, and suitable hours of work (combined with proper rests and pauses, and a minimum of night employment) as conducive to efficient workmanship. "When once industrial life has been entered upon," writes Professor Loveday, "the ordered and systematic routine of a modern factory is a direct stimulus during every 24 hours to the rhythm of activity and rest; the better the organisation, and the better the hygienic environment the greater is the stimulus to activity." The third incentive, though probably the only one thought of by many employers, is that of *wage*. To be an incentive in actual practice, however, the wage system adopted must be equitable, well adjusted and clearly understood. The Committee have been the witnesses of not a few misunderstandings leading to lost time, reduced output and discontent, which arose not on the amount of wage, but on the system or manner of its payment. Fourthly, under conditions of repetition work, especially if monotonous, *piece rates* appear to provide better incentive than time wages, and time wages with a bonus than a flat time rate. Finally, in relation to incentives to labour, it is necessary to remember the serious effect upon time-keeping and output of hours of labour which preclude attention to health and recreation and domestic life, and of a scale of wages which places the wage-earner above or beyond the ordinary and customary requirements of his *standard of comfort*. The Committee have seen lost time directly resulting from both of these conditions, and they have no doubt that much of the present labour unrest is due to the inter-relationship obtaining between wages and the standard of comfort. It is, of course, obvious that such conditions raise far-reaching and complex social issues which lie outside the scope of the present Report. But they are matters which must be borne in mind in contriving schemes for reducing lost time and encouraging steady work.

SECTION IX.

FOOD AND CANTEENS.

220. There is now an overwhelming body of experience which proves that productive output in regard to quality, amount and speed is largely dependent upon the physical efficiency and health of the worker. In its turn such physical fitness is dependent upon Nutrition. The purpose of nutrition is to secure the health, the proper development and growth, the repair and vital energy, of the human body. Food energy is spent in maintaining the tissues of the body and the body heat and in doing work. Nutrition is stimulated by the cooling effect of fresh air, and by bodily exercise, and its needs must be met by a food supply suitable in character and sufficient in amount to meet the expenditure on body heat and work.

221. The human body calls then for a constant supply of food, first for its growth, for the building up of its tissues and for repair, and secondly as fuel for the production of heat and energy. Both requirements are indispensable, and from the necessity for these there is no escape. Though no hard and fast line of division can be drawn, it may be said that certain kinds of food which are relatively rich in protein and mineral matter (meat, cheese, milk, herrings, dried peas, beans, bread, oatmeal, flour) contribute both to the formation of the body and its repair and supply it with fuel for the production of heat and energy; others kinds such as fat (lard, butter, dripping, margarine), sugar, sago and tapioca, afford an abundant supply of fuel, but cannot maintain growth and repair. Still other kinds of foods (fresh fruits, green vegetables) contain a small proportion of nutriment, but ensure the provision of the body with certain important principles conducive to good health.* The constituent parts of a dietary are important if the highest value is to be obtained, but, speaking generally, fresh digestible and appetising food is more important than chemical composition or proportion. It will be understood that digestibility is dependent partly upon the food itself being of a nature which is easily digestible and partly upon the organs of digestion being healthy and in good working order. Further, it should be noted that a variety of factors affect the relative value of food to the individual consuming it. For instance, there is the nature of the employment, whether sedentary or active, and the amount of energy called for. With increase of work there must be proportionate increase in quantity and in nutritive

* When work is nervously exhausting, e.g., night work, the food of the worker requires to be particularly light and digestible, well cooked and appetising, for the organs of digestion then lack an adequate supply of nervous energy, and cannot deal successfully with heavy indigestible and unappetising meals. The warmth of the food is of great importance. Hot drinks stimulate the tired worker. The proper adjustment of the food to the expenditure of nerve energy saves a great deal of indigestion and the minor complaints and lost time which result.

value of the food eaten. Ill-paid labourers and others whose food amounts only to a bare minimum cannot either put forth the same energy or work at the same speed as a well-nourished man. The man who has to work hard, long or rapidly, needs a proportionately ample food supply, composed of highly nutritive ingredients to withstand the strain. Fatigue both prevents digestion and demands food. Age, sex, weight and constitution likewise exert influence. Women require on an average about four-fifths of the food supply of a man, and an adolescent about seven-tenths. Season and climate also affect the question. Lastly, the predisposing influence upon the alcoholic habit of malnutrition, bad feeding, and long periods of work without refreshment should be borne in mind. There can be no doubt that "industrial alcoholism" is, in part, due to the lack of cheap good food.

222. What, then, in general terms, is the necessary dietary for a worker? Broadly, the answer is a dietary containing a sufficient proportion and quantity of nutritive material, suitably mixed, which is easily digestible, appetising and obtainable at a reasonable cost.

Character of Food Required.—The amount of physical force expended in daily work and the environment of the work have a great effect on the requirements of the body for food. Hard labour and exposure to open air together call for increased food supply; sedentary work in an artificially heated and confined atmosphere, on the other hand, reduces the output of energy and less food is required.

Natural foods yield the essentials required to replace the energy expended and for the repair and growth of the body. They contain these essentials in the form of *protein, fat and carbohydrates*, and also supply *salts* and certain substances of unknown nature, called *vitamines*, which exist in minute quantities in fresh foods and are necessary for the growth and health of the body. Vitamines are removed by some of the processes of milling, e.g., in the preparation of white flour, and polished white rice. They are destroyed by prolonged cooking, and are absent from foods preserved in tins; they are present in butter, dripping and margarine when made from beef fat, though absent when it is made from vegetable fat. For the preservation of good health it is essential that *fresh natural foods* should be eaten in sufficient amount. Fortunately the potato affords such a cheap natural food, and makes a good diet with bread and tinned food. Protein is the chief solid constituent of lean meat; it is also present in milk, cheese and eggs, and occurs in all vegetables, particularly in flour (bread), peas and beans; it is not only a source of energy, but it is also a body builder, and no dietary can be complete without it; the body requires protein in the food in order to build up its own living substance, and cannot do so with the aid of fat and carbohydrate alone. Protein stimulates the body to a greater expenditure of energy than does an equivalent value of carbohydrate or fat. There is reason to believe that more protein is required by those who work forcibly and rapidly, than by those who work in a slow, steady manner, e.g., soldiers in the front line require more protein than agricultural labourers. Fat is chiefly derived from animals; nuts (from which one kind of margarine is made) also are rich in fat, but other vegetables only contain fat in a much smaller degree. Carbohydrates are mainly derived from vegetables in the form of flour, potatoes or sugar.

Fat and carbohydrate can replace one another in a diet, but the body digests and deals best with a certain proportion of each. Fat, however, yields weight for weight more than twice as much energy as carbohydrate, and so in cold climates and cold weather more fat is naturally eaten. Experience shows that the diet should include raw food, fruit, or salads, in order to secure the vitamins which prevent scurvy. Fruit which is not over-ripe is particularly valuable.* Potatoes, cabbage, onions, carrots and turnips also contain the vitamins which prevent scurvy. Eight ounces of potatoes a day will supply sufficient. Particularly in times of scarcity when there is any restriction of diet, it is advisable that vegetable food, such as potatoes, should form a large proportion of the available diet, for the vegetables contain salts which neutralise the acids formed in the vital processes of the body.

Fortunately, the cheaper foods (bread, margarine, porridge, milk, herrings, cheese, beans, onions, cabbages, swedes and the cheapest cuts of meat) provide all the requisite nourishment, and are probably better adapted to maintain health than are more highly flavoured and expensive foods which artificially stimulate the appetite. The drinking of strong tea many times in the day is physiologically unsound, as also is the consumption of sweetmeats between meals, especially by boys and girls. Sugar is not a natural food, but an artificially separated foodstuff. It should not be allowed to lessen the appetite for the natural complete foods.

Calculation of Energy Value of Foodstuffs.—The energy value of a foodstuff can be determined by burning a weighed quantity of it in a suitable apparatus called a calorimeter, and ascertaining how much heat it gives off. The large calorie, which is used as the unit of energy value, is the amount of heat required to raise 1 kilogramme (1½ pints) of water from 15 degrees to 16 degrees Centigrade through 1 degree Centigrade (1.8 degrees Fahrenheit). Calculation has shown that, when dried, foodstuffs possess the following energy value:—

One gramme† of—

Protein	...	...	...	...	...	is equivalent to 4.1 calories.
Carbohydrate	...	...	...	...	...	" " 4.1 "
Fat	...	...	...	...	...	" " 9.3 "

The energy expended in mechanical work can also be expressed in calories, for one calorie has been found by experiment to be equivalent to the energy expended in lifting one kilogramme through 425.5 metres, which is about the energy expended by a man 70 kilogrammes (11 stone) in weight in walking up a staircase 6 metres (about 20 feet) in height. Such a man would require one extra calorie in the energy value of his food to make good this expenditure of energy. Even in walking on the level the body is raised at each step, and the calculation has been made that to walk 2.7 miles in an hour on a level road calls for the expenditure of 160 calories in a man of 11 stone.

* It should, however, be remembered that at the present time fruit, with few exceptions, is a prohibited import, and that foreign fruit is consequently in very short supply. Supplies should, therefore, as far as possible, be drawn from home-grown fruit or salads and vegetables. Raw fruit can be replaced by raw swede turnip. Children will eat this raw, or it can be grated down and eaten on bread.

† To express in terms of calories per pound it should be remembered that one pound is equal to 453.6 grammes; one ounce is equal to 28.35 grammes.

Example.—Suppose one pound of roast beef contained—

Protein	...	...	...	...	...	26.75 per cent.
Fat	...	...	...	...	...	12.90 "

in this case there would be $(26.75 \times 4.1) + (12.90 \times 9.3) = 229$ calories per 100 grammes.

In the pound of meat there would, therefore, be $229 \times 4.536 = 1,040$ calories.

For fuller information reference should be made to "An Inquiry into the Composition of Dietaries, with special reference to the Dietaries of Munition Workers," by Viscount Dunluce and Captain M. Greenwood, R.A.M.C. (T.), published as a Special Report by the Medical Research Committee.

Investigations made by a number of scientific workers indicate that about 15 per cent. of the energy expended is derived from protein, and about 80 per cent. from fats and carbohydrates combined: that is to say, that normally protein supplies only one-fifth of the total energy expended. Numerous investigations have shown that the energy daily required by a man engaged in moderately light munition work is about 3,500 calories of food as purchased. Where calculations are based on food as eaten, the minimum diet may be taken to be about 3,000 calories when balanced among the three classes of foodstuffs in the following proportions of dried weights:—

Protein	...	...	...	...	...	...	100 grammes.
Fat	...	...	...	...	...	...	100 grammes.
Carbohydrate	...	...	...	...	...	...	400 grammes.

Such would be contained in the following diet* :—

Lean meat	...	...	...	...	...	...	5 ozs.
Fat	...	...	...	...	...	...	1 oz.
Butter	...	...	...	...	...	...	1 oz.
Bread	...	...	...	...	...	...	16 ozs.
Potatoes	...	...	...	...	...	...	16 ozs.
Oatmeal	...	...	...	...	...	...	3 ozs.
Milk	...	...	...	...	...	...	$\frac{3}{4}$ pint.

Men engaged in hard physical work, especially in the open air, require a good deal more energy-producing food, and may consume as much as 4,500 calories with advantage. On the other hand, the energy required from food by a man clothed, lying at complete rest, at ordinary room temperature, in a still atmosphere, is about 1,600 calories of eaten food; while for a man engaged in a sedentary occupation, tailor or clerk working in a warm room, as little as 2,200 calories may suffice.†

An average adult woman worker requires rather less (about 0.8 or 0.9) than a man.

A STATEMENT OF THE PROBLEM.

223. Though there is little doubt that workers, on the whole, are getting a better type of food than a generation ago, it must be admitted that large numbers of workers of both sexes are not getting an effective dietary day by day. Much evidence is forthcoming that this is being increasingly recognised both by employers and workers. The difficulties in the way of adequate feeding arise mainly where the worker must have his meals away from home. In past years, and even now in normal times, the worker lived fairly close to his work, and was frequently able to return home for his meal. At present (apart from food shortage) the difficulties of securing adequate food are increased owing to the prevalence of night labour and to the fact that the large number of men and women who have to travel a considerable distance to their work.

- (a) In such cases the simplest alternative is for the worker to bring or receive from his home or lodgings food ready prepared for eating. The objection to this arrangement is the limitation in the kinds of food suitable, and that it is necessarily cold, and liable to be stale. There is a special danger of its being confined to what can be most quickly prepared the night before without much regard to its nourishing character. When the weather is warm, or the food is kept for any length of time in a hot workshop, it readily undergoes degeneration.
- (b) A second alternative is for workers to bring food which can be either warmed up or cooked at the factory. This is sometimes done by the worker himself, or facilities for the purpose are provided by the employer. Arrangements on these lines are probably better than those under which the worker brings his food with him ready prepared. On the other hand, it is to be remembered that warmed-up food is generally not so nourishing as freshly cooked food, that if a large amount of food is to be warmed up it is always difficult to deal satisfactorily with widely varying kinds of food, and that valuable time is lost if the worker is compelled to cook his own meal.
- (c) In some districts workers can obtain a substantial meal at public-houses, cook-shops or other proprietary establishments in the neighbourhood, but the accommodation in these places is often inadequate and unsuitable.
- (d) Lastly, there is the industrial canteen at or near the works.‡

224. This then is the problem—to supply suitable food at a low price for large numbers of persons at specified times. The modern progress of factory management reveals a variety of efforts to find a solution. There has been, it is true, considerable development in the provision of proprietary concerns in the form of improved coffee-houses and refreshment-rooms. Philanthropic movements have also been initiated with a similar purpose. But by far the most hopeful enterprise has been the establishment by employers of Industrial Canteens, or workpeople's dining-rooms in or near the factory itself. Hitherto there has been no statutory obligation upon the employer, though action in this direction has received the whole-hearted commendation of the Factory Department of the Home Office and the Ministry of Munitions. The earliest and best examples of such restaurants in factories are to be found

* Temporary shortages of supplies of particular articles of food may, of course, involve modifications of this diet.

† There is evidence that the workers in Germany are not getting more than this value in their ration, and the remainder of the civil population considerably less, receiving, in fact, a ration which has not been regarded hitherto as sufficient for maintenance.

‡ In Memorandum No. 19 (Cd. 8798) will be found the results of a number of analyses made by Dr. Leonard Hill, F.R.S., of the caloric value of various work peoples' dietaries. Canteen meals yielded 806–1,433 calories (163–305 dry weight in grammes); "carried food," 683–1,719; and women's dietaries, 397 (tea-shop) to 1,143 (carried food). Particulars are also given of caloric value of hostel dietaries, food substitutions and rations.

in the food industry, but makers of soap, paper, cloth, tobacco and tin boxes, have followed suit, and now in all parts of the country accommodation of greater or less degree of suitability and attractiveness is being provided. This pioneer practice has abundantly justified itself from a business and commercial point of view, and in the opinion of the Committee the time has come for a large extension of this method of solving the problem.

225. Speaking generally, it may be said that the accommodation provided accords with one or other of the following types :—

- (a) An available room for the workers to eat their prepared food ;
- (b) A room furnished with a " hot-plate " or " warming cupboard " * and provided with hot water ;
- (c) A refreshment barrow to perambulate the workshops at appointed hours (particularly useful for light refreshments during long spells or night shifts) ;
- (d) A fixed refreshment bar or buffet ;
- (e) A dining-room or canteen supplying cheap hot and cold dinners ;
- (f) Such a dining-room associated with an institute or club, with facilities for rest and recreation (e.g., rest-rooms, recreation or reading-rooms, portable gymnasium, baths, roof garden, or educational classes, &c.).

226. Some of these types may be suitably combined, and although arrangements indicated in (c) and (d) may prove sufficient and satisfactory in certain circumstances, the provision of proper meals seems obtainable only in the types (e) and (f). The Committee recognise that the necessity for, and character of, an Industrial Canteen are dependent upon the nature of the need and its degree in each factory. They are, however, convinced that in the highest interest of both employer and worker, *proper facilities for adequate feeding arrangements should be available* in or near, and should form an integral part of the equipment of modern factories and workshops.

ESSENTIAL CHARACTERISTICS OF THE INDUSTRIAL CANTEEN.

227. In order to ensure effective results from the establishment of Industrial Canteens, certain conditions seem to be essential. Speaking generally, these conditions concern—(a) establishment and (b) management, the former including questions of site, building and equipment.

ESTABLISHMENT.

Site.

228. The first important consideration in the erection of a new canteen is the question of a site for the building. The site should, if possible, have a pleasant, open outlook and southern aspect, and should be central and easy of access for the workers. With high buildings adjoining and mess rooms looking out upon blank walls not many yards distant, the canteen may prove unattractive and its success be to a great extent impaired. The canteen should, if practicable, be placed where water, gas, and electric mains are adjacent, as well as drainage capable of carrying off the discharge of soil and rainwater pipes and of sinks and lavatory wastes. An appropriate proximity to the works must also be considered.

Buildings.

229. Much will depend on the nature of the scheme adopted, whether it is (a) a mess-room, with or without hot closet, hot plates or hot water ; (b) a buffet bar ; or (c) a full restaurant canteen with kitchen, scullery, larder, stores, &c. There may be a combination of the three types. The amount and character of the accommodation necessary depends :—

- (1) On the situation of the factory and the opportunity for all or any of the workers to go home for meals ;
- (2) On the proximity of outside restaurants ;
- (3) On the hours of work (day or night) and the meal intervals ;
- (4) On the character of the work (heaviness, exposure, poison or danger zones) ;
- (5) On the usual customs of the district and the particular food necessities of the workpeople.

The seating accommodation must also be considered from the point of view of shifts and relays.

230. The attached plans have been prepared showing canteens suitable for 200 and 500 diners (facing pages 164 and 166). The question which immediately arises is whether the building shall be of—(a) temporary or (b) permanent construction. During the early stages of the war there was much to be said for the erection of a temporary building, mainly on the ground of cost, rapidity of erection, and the smaller demands made upon labour.

* " Warming cupboards " can be installed in or near the mess-room and heated by steam. The cabinet may be constructed of sheet iron (finished off with asbestos and wood covering), with shelves of perforated sheet iron. Employees deposit their food in basins or dishes when they come to work, the cupboard is closed and steam applied under regulation for a specified time. At the dinner hour the employees fetch their food.



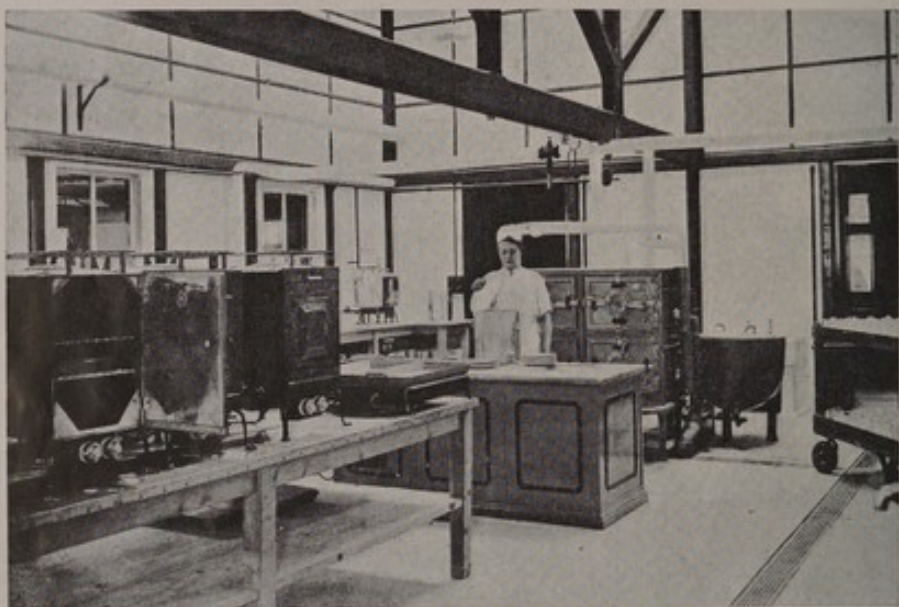
Canteen Kitchen.



Kitchen of a Large Canteen.



Canteen Scullery.



Canteen Kitchen.



Canteen Storeroom.

231. Permanent buildings naturally take longer to erect, the cost varies from 25 to 40 per cent. more than in the case of a temporary building, and the demands made upon labour are greater. On the other hand, a permanent building is, of course, more satisfactory, and costs proportionately less than the temporary building for maintenance. In normal times the case for the permanent building is a strong one, but at the present time for canteen purposes the temporary building should be considered, though it may be found in practice that even now a permanent building is preferable.

232. The construction of suitable buildings is indicated in sufficient detail on the drawings. It should not be overlooked that the wear and tear of the floors is considerable, whether in the mess rooms or in the kitchens, and, in view of this, the floors generally should be of concrete, finished with a granolithic face. This type of floor is smooth, hard, durable, and impervious, and is easily washed down after meals. Advantage should, wherever possible, be taken of using local material to save carriage, &c.

233. In a large number of canteen proposals it may be found that the dimensions of available sites will not admit of the buildings being erected in accordance with the suggested designs but the principles are the same. The canteen or dining hall, being the principal apartment, should be arranged with the most convenient methods of egress and ingress for the workers and with direct approach to the serving counter, so that traversing the whole or any great portion of the dining hall to obtain food is avoided. Short barriers in front of the counters are advisable to allow of each diner obtaining his or her food in the order of arrival and to prevent congestion and disorder. Adequate gangways or passage-ways for each diner to proceed to the dining tables without interruption to other diners are essential. From 8 to 10 square feet superficial area should be allowed per person seated. Separate dining rooms are usually provided for men and women, but they may be so designed as to be thrown together for social recreative or educational purposes. The kitchen should be situated as centrally as possible with regard to the dining room, which it should adjoin in order to facilitate counter-service. It may "central" or "terminal." The wash-up or scullery should open out of the kitchen and should abut immediately upon the main dining hall. A counter or shelf with communicating hatch should be provided to admit of dirty crockery being handed direct to the sinks. In addition to the sinks in the scullery, such accommodation is also required in the kitchen for the use of the cook in the preparation of food. The sinks should be supplied with hot water from an independent boiler, which should be placed as near as practicable to the sinks. The larder and store should open upon a yard with easy access for tradesmen's carts. They should be fitted with shelving of deal, 1-inch thick supported on 2-inch by 1½-inch framed bearers and uprights. The shelving should be kept 1-inch away from the walls. The larder should if possible face north and be permanently ventilated by perforated zinc panels. The sanitary accommodation for the canteen should preferably be situated in an isolated block of buildings adjacent to the canteen, but the requirements in this respect depend upon the sanitary accommodation already existing in adjoining buildings, and each case will have to be considered on its merits.

Ventilation, Warming and Lighting.

234. Ample window space (with a large proportion of the windows opening) is desirable for light and ventilation, and in no case should the total glass area of the windows be less than one-tenth of the floor area of the various rooms in which they occur. The fanlights for casement windows should be hinged at the bottom and fall inwards. Glazed cheeks or gussets should be provided to admit of continuous ventilation, and at the same time prevent down draught. All casement windows should be made to open for use in warm weather, and to flush the rooms with air after the principal meal. Louvre ventilators under the roof or in turrets provide ventilation for the main mess room. A simple cord attachment to wooden flaps should be provided to admit of these ventilators being closed during cold or windy weather. The kitchen should be provided with a continuous louver ventilator, as indicated on the drawings. It is desirable, where electric or other power is available, that an exhaust fan should be placed in the kitchen to extract the heat and steam from the kitchen and scullery, and incidentally assist in the general ventilation of the dining rooms. Larders should face north and have nearly half the glass omitted in the window panes and perforated zinc panels substituted to provide suitable ventilated storage for perishable food.

235. Central heating by radiators or hot water pipes would, no doubt, provide the most satisfactory means of heating the building. The cost, however, of such a heating installation adds so considerably to the initial cost of the whole scheme that it becomes extremely doubtful if the expenditure is warranted, especially in view of the fact that for four or five months of the year no artificial heating is required. Where central heating is not provided, use may be made of independent stoves, standing on the concrete floor, the stove pipe being carried up through the roof. Such stoves may be obtained from any iron-founder or ironmonger at varying prices.

236. The steps to be taken for the prevention and extinction of fires should be fully considered. The method of carrying the stove pipe through the roof should be carefully planned, as, owing to the combustible nature of the timber in roofs, defective construction at this point may prove a source of danger to the building from fire. The construction may simply consist of asbestos packing, a sheet iron sleeve piece, with 1½-inch space between the sleeve piece and the stove pipe, and hood to keep the rain out.

237. Where electricity is available it is, no doubt, the most satisfactory means of artificial illumination, otherwise gas should be used.

External and Internal Materials.

238. For inexpensive permanent construction walls may be 9-inch brick work rendered externally with Portland Cement $\frac{3}{4}$ inch thick and finished with rough cast surface; with large span roofs, brick piers of greater thickness will be required under the roof principals. Roofs may be boarded and slated, and floors made of concrete with granolithic surface.

239. The selection of materials, owing to the high prices obtaining, presents some difficulty at the present time. Formerly one of the most favoured external coverings for temporary buildings was galvanised corrugated sheet iron. The cost and supply of this material, however, is now prohibitive and alternatives must be sought in felt and other forms of roofing. Felts are usually laid on the boarding with a lapped joint and patent cement supplied by the makers, the sheets being then secured with galvanised clout or large flat-headed nails. Only the stoutest material of the respective makers should be used to ensure a watertight roof. Light asbestos slates also provide a satisfactory, although somewhat heavier, roof covering. All roofing felts need careful laying, otherwise bulging occurs, which, in addition to being unsightly, is a frequent cause of a defective roof.

240. A large variety of materials have been available during the war for the external coverings of the walls, amongst which may be mentioned feather-edged weather boarding (treated with creosote), ungalvanised painted sheet iron, plaster finished in cement, secured to the wood framing by expanded metal, asbestos slates, or other materials. Internally, plaster and cement on expanded metal, asbestos sheets (the joint covered by a small fillet), match boarding, or various other materials have been used above the dado. The dado should, however, be somewhat stronger; $\frac{3}{4}$ -inch match boarding is suitable. Thin sheet iron (painted) has also been used; or linoleum on flat-jointed boarding provides a suitable dado, and is easily cleaned. The interior of the building should present a clean and cheerful appearance and distempers of a fairly light tint are preferable. Straw colour, primrose, duck's egg green, or French grey are suggested as suitable. An alternative colour scheme would be a dark green dado about 5 feet high with 2-inch black line, and the remainder of the walls, including the roof, finished white, the roof principals being stained a dark brown.

Cooking Apparatus and Küchen Equipment.

241. The cooking arrangements in an industrial canteen naturally form an important part in the equipment of the building. There are various means of cooking food, but for canteen purposes attention may be confined to:—

- (a) Gas.
- (b) Coal.
- (c) Steam.
- (d) Electricity.

242. Gas by reason of its cleanliness, efficiency and the saving in labour which results from its use is probably the best cooking factor in small and medium sized canteens. In large canteens while the roasting is done by gas, it is economical to use steam for boiling, steaming and for warming the hot-closets. The use of steam is especially economical if it can be drawn from the factory boilers, but in the larger canteens it is worth while to instal an independent boiler to supply the steam for cooking purposes if it cannot be supplied otherwise. Coal is used where gas is unobtainable or expensive. It is most efficient as a means of cooking, but is less cleanly than gas and is objectionable in summer on account of the heat developed by large coal-ranges. Electricity is the newest means of cooking; not only, however, is the original installation costly, but unless the supply of current is exceptionally cheap the running cost is high.

243. The relative position of cooking apparatus naturally varies with the type of apparatus used, but generally speaking, it has been found better to have the stoves and roasters in the centre of the kitchen with the steamers or boilers behind, and the carving table and hot closets adjacent to the serving counter. The serving of tea, &c., should be kept quite separate from the general service table.

244. It is most essential that there should always be a plentiful supply of hot water through the sink taps for washing up purposes. There are several alternative methods of producing this, among which are the following:—

- (1) Circulator boiler connect to a storage system.
- (2) Large hot water geyser.
- (3) Separate boiler over each sink.

245. The maintenance of cleanliness is one of the most important points in the whole scheme of a canteen, and it is one that the workers are quick to appreciate. In the mess room all floors, tables, seats, and windows should be thoroughly cleansed every day, and in the kitchen all cooking apparatus should be well scoured and kept scrupulously clean. The table equipment should always be well washed and polished. The immediate surroundings of the canteen should be kept free from accumulated rubbish and refuse, as by this means trouble from flies is greatly reduced.*

* *Cost.*—About 6d. per foot cube, exclusive of central heating and lighting is now (1918) the standard cost for building the fabric. Equipment varies from 30s. to 50s. per person seated. Total cost for building and equipment of canteen for 500 persons will work out from £7 to £9 per place.

MANAGEMENT.

246. In the early part of the war excellent and devoted work was accomplished by some eight or ten public-spirited voluntary societies, including the Y.M.C.A., Lady Lawrence's Munition Makers' Canteen Committee, the Salvation Army, the Church Army, the Women's Legion, &c., in regard to canteen management. On the whole, however, the Committee are satisfied that the Industrial Canteen should be undertaken by the proprietors of the factory (whether public or private) and should be regarded as an integral and permanent part of the factory organisation, controlled like any other branch of the works under a duly appointed and competent manager or manageress. The proprietor should scrutinise the accounts of the trading, or arrange for their proper audit. He should watch the working and satisfy himself that full value is being obtained in the shape of increased nutrition, efficiency and contentment of the worker, and that current charges are reasonable. The selection of the canteen manager demands no less care than the selection of a head of any other department of the business. The qualifications principally required are organising ability, powers of discipline, a thorough knowledge of buying foodstuffs and a fair working knowledge of the economical preparation and cooking of food. Sympathy, tact and an understanding of the purpose of the canteen are also necessary.

Food and Dietaries.

247. The food supplied should be varied, fresh and good; suitable in quality and sufficient in quantity; well cooked, appetising and obtainable at low cost. It is obvious that the tariff must differ in accordance with food prices, and administrative charges and incidental expenditure. It will often be found expedient to allow the workmen's committee of management to examine the trading accounts periodically. The following figures show approximately the nature of a canteen tariff during the earlier war period:—

Dinner—meat or fish, two vegetables	...	...	...	4d. to 8d.
Hot-pot, cottage pie, meat puddings	...	...	...	3d. to 6d.
Meat pies and other prepared meat dishes	...	...	...	3d. to 6d.
Soup, bovril, oxo, &c. (with bread)	...	...	...	2d. to 3d.
Puddings and stewed fruits	...	...	...	2d. to 3d.
Suet, bread, currant, jam or fruit puddings	...	...	...	2d. to 3d.
Bread and cheese	...	...	...	1d. to 2d.
Vegetarian and cheese dishes	...	...	...	2d. to 4d.
Cakes, buns, tarts, bread and butter, sandwiches	...	...	...	1d. to 3d.
Tea, coffee, cocoa, milk, lemon, barley, aerated and mineral waters, &c., per cup or glass	...	...	...	1d. to 2d.
(Good quality important.)				
Fresh fruit in season, as practicable.				

248. In certain districts and in special circumstances, there may be a case for the establishment of a "wet" canteen, where alcoholic beverages may be obtained. Special supervision and restrictions are necessary in such cases.

Prompt Service.

249. The quick service of meals is essential. Three methods are practicable. (Method (1) is probably best, as a rule for large numbers):—

- (1) Long serving counters (with short barriers as at railway booking offices) from which workers fetch their food. A number of portions should be prepared beforehand and stored in hot closets under the counter. Portions should be standardised.
- (2) Food placed ready on the table before workers admitted. This may be convenient for breakfasts or teas, or where the food provided is cold and the same for all, but it is not always practicable for hot dinners.
- (3) Waiters or waitresses, organised in shifts.

Convenient Hours.

250. The canteen should be open at any hours which meet local needs and circumstances. Mid-day is clearly the principal occasion of its utility. But in many works it should also be open in the early morning hour for breakfast, and at supper time. Where there are night-shifts meals and refreshments should be available as by day. Provision should also be made for the supply of water, milk, tea or coffee at specified times.

Payment.

251. Different methods of payment are in vogue, but if payment at the time by bill or check is found, which is usually the case, to be impracticable, the most appropriate method is for workers to buy books or series of tickets or checks previously to the meal or at the door.

Accounts.

252. The factory account should bear the capital charges and certain current expenses, leaving to the canteen account the cost of food, wages and general administrative charges.

Organisation.

253. The Committee have been impressed with the importance of proper economical and effective organisation of industrial canteens. Their purpose, it must be clearly recognised, is to provide sufficient and suitable food and not to yield a revenue. The revenue of a canteen is improved health, contentment and physical efficiency of the workers, and not a cash balance.

254. Speaking generally, three methods of organisation are available and are not mutually exclusive. First, the employer may manage directly; secondly, he may hand over the management to a properly constituted committee of the workers, or of the workers and the staff conjointly; or thirdly, the entire direction may be contracted out to a professional or voluntary caterer. In not a few of the most successful canteens joint control is exercised by employer and men (*e.g.*, an elected shop committee with a chairman representing the management) who may or may not contract out the catering. The method of control is materially affected by the proprietorship. In all cases it should be disinterested and solely for the benefit of the workers. Exploitation in any form should be avoided, and efficiency, economy and smooth working kept steadily in view.* It must be borne in mind that money cannot be deducted from wages by the employer for food or drink without a contract under the Truck Act.†

255. It is not possible for the Committee to lay down hard and fast rules or methods for the successful organisation of canteens. In one district or set of circumstances, one condition or factor, and in another district another condition, is predominate. But whatever be the local circumstances to secure an effective industrial canteen it is necessary (a) that it should be accessible and attractive; (b) that it should be suitably constructed and equipped; (c) that the diet offered should be fresh, varied, good and in accordance with popular taste; (d) that the service should be prompt; (e) that the canteen should be open at convenient hours of day or night and (f) that the arrangements for payment should be simple and convenient.

256. The Committee recognise that since the issue of their first memorandum on the subject (Cd.8133) in November, 1915, substantial progress has been made, due in no small degree to the activity of the Canteen Committee of the Central Control Board. The industrial canteen is rapidly becoming a social agency. The Committee welcome the Police, Factories (Miscellaneous Provisions) Act of 1916, S. 7 (*see* Appendix H.) as a statutory enactment likely to make universal and permanent the advantages of this agency.

RESULTS.

257. The Committee have been impressed with the consensus of opinion which they have received from all parts of the country as to the substantial advantages both to employers and workers following the establishment of an effective and well-managed canteen. These benefits have been direct and indirect. Among the former has been a marked improvement in the health, nutrition and physical condition of the workers, a reduction in fatigue and sickness, less absence and broken time, less tendency to alcoholism and an increased efficiency and output; among the latter has been a saving of the time of the workman, a salutary though brief change from the workshop, greater contentment, increased opportunity for recreation, and a better mid-day ventilation of the workshop. The Committee are satisfied that the evidence of these results is substantial, indisputable and widespread. In the isolated cases where the canteen has failed it has been evident that its failure has been due to exceptional circumstances, misuse by the workers or mismanagement. In almost all large Works the Committee find that there is a body of men or women (averaging at least 25 per cent.) who in the interest of physical health and vigour need canteen provision at the factory. They are convinced that this group of ill-fed workers accounts in a large degree for such inefficiency as exists, and that its energy and output is reduced in the absence of suitable feeding arrangements. Whilst it is impossible to separate the benefit derived from canteens from other welfare agencies or to render statistical evidence as to the effect upon output, the Committee have received a number of statements in favour of Industrial Canteens from which they select the following:—

- (a) "In answer to your inquiry as to the effect which our canteen arrangements have had upon the health and efficiency of our own workpeople, we were so fully alive to the importance of this as to erect a complete installation, separated from the factory proper, for the use of those who live too far away from the works to dine at home. From 1,500 to 2,000 workpeople make use of these rooms daily.

"The building has a well-equipped kitchen, but the majority of those who dine at the works, although buying tea and light refreshments, bring their own dinner. This habit obtains elsewhere. We make a point, however, of having, in addition to other things, one or two cheap and very nutritious dishes, *e.g.*, a 1d. basin of soup or stew, of which some hundreds are sold daily. In planning the Dining Block, we felt it was not merely a question of supplying food, but of doing so under restful and comfortable conditions, in rooms well lighted and ventilated and properly warmed. A great deal more was done than was

* The tariff can be kept low only by careful management. The food materials can usually be made to pay, but the incidental expenditure is relatively heavy. Workers are not accustomed to paying for food in canteens, and will not always purchase the most nutritious food. Tact, discretion, and an appropriate menu of popular dishes are necessary. Constant supervision and the careful adaptations of means to ends are needed to prevent loss if good food is to be sold quickly, at the low price the worker can afford to pay.

† The Truck Act, 1831, Section 23, provides that "no deduction shall be made from the wages of a workman in respect of victuals dressed and prepared under the roof of the employer unless an agreement or contract for such stoppage or deduction shall be made in writing and signed by the artificer." Such an Agreement can be readily made and may prove to save time and prevent waste.

required for bare efficiency, and it is not necessary to build on so costly a scale. We have never had a moment's doubt as to the importance of a comfortable dinner hour for our people from the point of view of their efficiency in the afternoon.

"The health of our workpeople has unquestionably improved in recent years, and we feel sure that the Dining Room has helped to bring about this result. At the same time, as there are many factors which have come into play, it is impossible to value with any approach to accuracy the part that each of these has played. The proper ventilation of the workrooms, medical and dental attendance freely given at the works, with facilities for those in poor health getting to a convalescent home, are among the many factors which have each exercised an influence."

- (b) "A large number of our men workers still prefer to bring their own food with them and to infuse their own tea, in a building which we have supplied for the purpose."

"About 80 per cent. of our female workers earn a perfect time-keeping bonus each week, which means that they have not lost a minute, whereas the percentage of men who do so rarely exceeds 55 and is generally under that figure. I do not suggest that the whole of the credit for these differences is due to the fact that the women feed in the canteen and the men do not, but I have no hesitation in giving it as my opinion that this is one of the factors of the question."

"Especially as this factory is placed, 11 miles from Glasgow and miles removed from the nearest village, we simply could not do without a canteen, and I think you will agree that it is very satisfactory to know that although all our workers have to spend practically an hour morning and evening in getting from their homes to the factory and *vice versa*, which has the effect of keeping many of them out of their homes for a round of the clock, we have an excellent bill of health and have so far been able to resist very satisfactorily even the special dangers to health which attend working with amatol, T.N.T., and cordite."

"At the present moment in our whole staff of 10,000 workers we have not a single T.N.T. sickness case."

"I might add that our medical officer fully concurs in the opinion given as regards the value of a canteen from the health point of view."

"At first we had some trouble in getting our girls to take a substantial meal in the middle of the day. The home conditions of many of them had evidently been such that they were accustomed to a diet consisting largely of tea, bread and butter, pastry, &c., and they preferred to continue to feed themselves in that way even when they did buy food in the canteen. There are clear evidences that their tastes in this respect are improving and they are appreciating a properly cooked meal. It has taken a good deal of effort on the part of the management to get as far in this matter as we have, but I feel certain that once they fully experience the advantages to their own health with better food the workers will not readily return to their old methods."

- (c) "Whilst our experience in this respect is principally in regard to women workers, we are certainly of opinion that the benefit is a very considerable one, as not only have the canteens conduced to better time-keeping, but the direct effect of the substitution of well-cooked food for the cold (often tinned) or even re-heated food brought by the workers and eaten under uncomfortable and often insanitary conditions, has certainly had an excellent effect on the health and appearance of the women."

"The provision of canteens where the workers can obtain well-cooked and suitable food at a minimum cost is, therefore, advantageous—apart from whether there are other means for them to obtain their food in the neighbourhood of the factory—whilst the provision of hot drinks and soups on cold nights tends considerably to improve production."

"The institution of a canteen is also essential if a three-shift system (as in the case of our women workers) is to be adopted without an undue loss of time for meal hours."

- (d) "(One solution of the problem both from the point of view of the girl herself, who will get a good meal cheaply (owing to wholesale buying and more expert cooking) and from that of the factory, both as to health and output of energy, is undoubtedly the provision of meals by the canteen for all workers."

"Practical proof of this is shown by this factory, where incidentally the provision of two square meals a day with 1½ hours each to take them in and get out in the fresh air afterwards has put a stop to the far too frequent fainting whilst at work, to much constipation and other disorders due often to defective nutrition, and to much dissatisfaction among the workers themselves, really due to their feeling out of sorts from these causes."

"Proper feeding and proper ventilation, with cleansing of the workers before food and after leaving work, and attention to the flushing of the internal drainage of the body, will produce the maximum of immunity to T.N.T. poisoning or any other infection which may be prevalent, provided the worker starts healthy. Of this I am quite convinced. The Medical Department is occupied in sifting applicants for work in order to exclude obviously unsound persons, and to put less unsound persons into working order—by regulating their bowels and cleansing their mouths from the far too frequent sepsis before allowing them to work in T.N.T. It is the privilege of the management to see that these reasonably sound workers get suitably fed and housed, that their work is suitably apportioned and that they are trained up by competent persons to do this work with as little waste of energy as is compatible with the perfect performance of the particular duty on which they are engaged."

- (e) "The advantage of having freshly cooked meals, well served in the canteen, removed from the noise of machinery, and the odour of the factory has had a marked beneficial effect on the health and spirits of the workers. The meal hours in the canteen are now welcome breaks in the monotony of what was previously too often a 12-hour 'shift.' Since the introduction of canteens the employees have really worked in a 'shift' which consists of three parts with added initial energy for each part. The increased energy, good spirits, improved health and 'staying' power is appreciably noticeable to the most casual observer."

"An experiment has been tried in this factory of having concerts in the canteen during the long meal hour. The conduct of the workers is the best index of their success. The employees have packed the canteen; the best of their talent has been freely given for the benefit of their workers, the audience has been ideal in discipline and appreciation of the efforts of the entertainers."

- (f) "A canteen properly managed and in which the management of the factory take as great an interest in regard to its efficiency as they would do in any department of their work presents an unlimited scope for all high thinking employers, for the betterment of their workers. The first advantage of this is that it will draw employees and employers together on domestic matters, as I consider that the management of the canteen should be under the factory control, and that all supervision should be undertaken by a committee of the employees with the manager or some high official as *ex-officio* chairman. The various little questions that arise for discussion though small in themselves will be found to be of that nature which will inevitably result in the chairman having the opportunity of displaying a 'human touch' which he may rarely have an opportunity of at present—I do not wish to be misunderstood by this that the manager would be reduced to coddling or merely sentimental action, such would be strongly resented by the workers themselves, but the very fact that there would be the 'chief' taking an interest in the questions of their daily livelihood will be, I venture to believe, a big advance in bringing the two together."

- (g) "Knowing your interest in the details of these matters, we would like to mention how useful has been the installing of a number of small tea depôts, distributed throughout the shops, which are open for a quarter-of-an-hour in the afternoons, and again for a quarter-of-an-hour during the night shift, for the sale of tea and cakes. This has been done that we might put an end to the promiscuous tea making that went on previously. The running of these tea depôts has been only possible by the existence of the canteen, and from an administrative point of view, we are indebted to the canteen management that it has been possible to adopt this system of tea depôts."

258. Such declarations are, after all, substantial evidence and they confirm the conviction of the Committee as to the benefit arising as a result of a good Industrial Canteen. The Committee have been impressed not only with the improved nutrition manifested by the users of the Canteen, but by a lessened tendency to excessive consumption of alcohol, by the prevalence of the spirit of harmony and contentment engendered, and by a declared increase in efficiency and output.

CONCLUSIONS.

259. From what has been said in the present Section it will be understood that the Committee were convinced at a very early stage of their inquiries of the value and, indeed, necessity of establishing industrial canteens in order to provide for the proper nourishment of munition workers. As, however, the Central Control Board (Liquor Traffic), of which Lord D'Abernon was Chairman, had in June, 1915, appointed (under the statutory powers conferred on them by Defence of the Realm Regulation No. 5 of 1915) a Canteen Committee (the Chairman of which was Sir George Newman), the Health of Munition Workers Committee deemed it inexpedient to intervene in the work which that Canteen Committee had already commenced. Accordingly the burden of work in connection with the establishment of industrial canteens has fallen upon the Canteen Committee of the Liquor Control Board, assisted by His Majesty's Office of Works, who have thus facilitated the supply of proper and sufficient nourishment for the munition worker not only in the interests of sobriety, but also in the interests of industrial efficiency.* In the first enthusiasm of this great movement a number of voluntary assistants and voluntary workers undertook the responsible duties in connection with the establishment and maintenance of canteens. Eventually, however, it became necessary owing to the magnitude of the undertaking that the State should shoulder increased responsibilities in the matter. The Munitions of War Act, 1915, provided that "controlled" employers, in which category were included practically all manufacturers of munitions, in the wide meaning that modern warfare imparted to the term, were to receive only their standard pre-war profits plus one-fifth, the remainder being paid to the Exchequer. It seemed hardly reasonable to expect them to sacrifice profits so rigidly limited in order to provide canteens for their workers, and it could fairly be argued that, as the advantages of the increased output anticipated from the establishment of industrial canteens would accrue to the State, the State should find the money. On the initiative of the Liquor Control Board it was therefore decided that "controlled" employers should be allowed to charge to revenue the expenditure which they might incur with the approval of the Board on the establishment of canteens at their works; in other words, that the cost of the establishment of canteens should be borne from funds which would otherwise accrue to the Exchequer. At the same time the Minister gave instructions for the provision, where necessary, at all Government Munition establishments (Royal Arsenal, National Factories, &c.) of adequate canteen accommodation at the expense of the State, and entrusted the Board with the general responsibility for the organisation of the canteens at these establishments.

260. The Liquor Control Board have thus been the responsible authority for the organisation of industrial canteens in munition works throughout the country. They established the necessary departmental and expert staff for the effective performance of this duty, and in its execution have through their representatives visited all the larger and many of the smaller munition works, and have urged the provision of canteens wherever a real and undoubted need was found to exist, whether that need arose on grounds of liquor control or of nutrition of the munition worker. The Board have made it their study to do all that was possible to assist employers in the design, equipment and management of canteens. The services of their expert staff have been placed freely at the disposal of employers, and they have published a handy compendium of information on these subjects in the form of a pamphlet entitled "Feeding the Munition Worker," to the usefulness of which they have received numerous testimonies.

261. The policy of the Liquor Control Board, with which the Committee have fully concurred, has been first to encourage the employer or owner to make suitable provision for canteen accommodation where necessary; secondly, to facilitate such provision by voluntary or other agencies; or thirdly, to establish a canteen themselves, either managing directly or handing over the management to a properly constituted committee of employers and workmen. At the end of 1917 some 840 industrial canteens had been established in National and Controlled Munition Factories and at docks concerned in transport in connection with the war (at an approximate cost of upwards of 1½ millions). The canteens established under the auspices of the Liquor Control Board have been, with few exceptions, known as "temperance" or "dry" canteens—that is to say, no intoxicants have been supplied. In a few exceptional cases the Liquor Board have made special Orders providing for the "on" sale and consumption of beer limited in specific gravity and in quantity purchaseable. Exceptional conditions in various

* See First [Cd. 8117], Second [Cd. 8243], Third [Cd. 8558] and Fourth [Cd. 9055] Reports of the Central Control Board (Liquor Traffic) appointed under the Defence of the Realm Consolidation Act, 1914, and the Defence of the Realm (Amendment) (No. 3) Act, 1915.

areas owing to concentration of munition workers, congestion of population, the building of large factories in isolated places, the employment of women and night employment, have necessitated exceptional arrangements.

Speaking generally, the Committee are glad to recognise that the Liquor Control Board have initiated, guided or assisted, a social and industrial reform which force of circumstances has rendered imperative in the present emergency, and which has, the Committee are satisfied, contributed substantially to the successful output of munitions. The industrial canteen has, in fact, proved itself one of the most effective instruments in securing and maintaining a high standard of industrial work. It has contributed to increased sobriety; it has reduced "industrial drinking"; it has served as a counter-attraction to the public-house; it has supplied improved nutrition to the worker, which has led to a reduction in sickness and to increased energy, better time-keeping and improved output. The Committee earnestly trust that these substantial gains may be maintained in the future and that the Industrial Canteen will become a permanent and essential factor of the modern factory.

SECTION X.

SICKNESS AND ILL-HEALTH.

262. The effect of industrial occupation upon the health of the worker has been a subject of medical investigation since the seventeenth century. Early in the nineteenth century similar inquiries were instituted in England, and in 1831 Thackrah showed that the environment and conditions of factory life, or the mental and physical strain entailed, were associated with exceptional disablement, disease, or mortality among the persons employed. Numerous Commissions have been appointed by the Government to ascertain more precisely the exact causes of such effects, and these have considered successively the general circumstances of the worker, the injurious influences of the factory system, the special conditions of certain occupations, the risks incurred in the use of machinery, and the results arising among those employed in dangerous trades. Thus has been accumulated a body of medical experience, growing with the growth of industry and with the increase of our knowledge of the causes of disease. Concurrently with the appearance of evidence of a medical and social character further light has been thrown upon the subject by actuaries, insurance agents, and statisticians. As long ago as 1853, Finlaison, the actuary of the National Debt, said that "the real practical difference in the distribution of sickness seems to turn upon the amount of expenditure of physical force," and fifty years later, in 1903, Watson, who had studied the subject from an actuarial point of view, wrote that "the proportion of members sick during any year varies with occupation." Again, the experience of insurance authorities confirms the same view. The Report on National Health Insurance for 1913-14 states that "in many cases the rate of sickness is affected by occupations or by the conditions incidental to particular occupations." Lastly, there is the incontrovertible evidence furnished by the Bills of Mortality steadily accumulating in proof as the years pass. The Decennial Reports of the Registrar General demonstrate that certain occupations have a high comparative mortality, that this mortality is due to well-defined and preventable diseases, that the occupation may exert a greater influence on mortality than the aggregation of population and its associated conditions, and that occupational mortality is affected by the age incidence of the worker.

Causes of Sickness.

263. Sickness due directly or indirectly to the industrial occupation takes various forms and degrees from the passing headache to serious organic disease of fatal issue. The lungs, the heart, the digestive organs, the nervous system, the muscular system—each or all may be affected with results harmful both to industrial efficiency and output, and also to personal health and expectation of life. Moreover it must be remembered that an undue proportion of sickness in any group of workers usually represents among those not actually sick lessened vigour and activity which cannot fail to reduce output. Disabling conditions or influences which injure some have a tendency to mark all. Employers and their work-people should therefore have a general appreciation of these injurious conditions if they are to be on the outlook to guard against or mitigate their evil effect. Speaking generally, attention should be given to the following points:—

- (a) Excessively long hours of work, particularly by night, if continued produce fatigue, irritation and sickness. "You will find," writes Sir James Paget, "that fatigue has a larger share in the promotion or transmission of disease than any other single causal condition you can name."
- (b) Cramped and constrained attitudes or postures during work which prevent the healthy action of the lungs and heart.
- (c) Prolonged and excessive muscular strain, e.g., the lifting of heavy weights, or prolonged standing may produce rupture or varicose veins.
- (d) Machinery accidents.
- (e) Working in unventilated or insufficiently ventilated shops predisposes to disease and interferes with individual energy and physical capacity. The effect of continuously working in a stagnant or polluted atmosphere is not trifling or insignificant.

- (f) The air, even if fresh, may be too hot or too cold, too humid or too dry ; either extreme should be avoided if reasonable bodily comfort and the most efficient work are to be ensured.
- (g) Imperfect lighting, whether by day or night, conduces to eye strain and headache.
- (h) Working with, or in the presence of gases, vapours, poisons, or other irritating substances, may lead to direct poisoning.
- (i) Dust produced in certain industries unless effectually safeguarded may produce lung disease.
- (j) The manufacture and use of high explosives involves risks to the workers.

264. In considering the physical capacity of a woman for withstanding the fatigue consequent upon prolonged industrial employment, it has to be remembered that her body is physiologically different from and less strongly built from that of a man. Her muscular system is less developed. Account must also be taken of the fact that at the present time many workers have until recently lived a sedentary or domestic life and have not been in the habit of taking active and regular exercises. Certain ailments and forms of physical disability to which women are liable are readily caused or at least accentuated by inattention to these considerations ; among such conditions are :—

- (i) Disturbances of digestion due to unsuitable food, irregular and hurried meals, or to fatigue ;
- (ii) Anæmia, with possibly associated disease of the heart and circulatory system ;
- (iii) Headache ;
- (iv) Nervous exhaustion ;
- (v) Muscular pain and weakness, flat foot, etc.
- (vi) Derangement of special physiological functions.

265. Though these conditions may not in all cases be immediately incapacitating, they frequently tend to become chronic in nature and far reaching in effect, and they lead directly to mal-nutrition and to reduction of bodily energy. If allowed to persist they invariably lay the foundations of ill-health and disease in later years.

266. Special problems also arise in the prevention of sickness amongst boys and girls. Both physically and mentally they are less capable than adults of prolonged effort or sustained attention to work. They need vital energy not only for the maintenance of health but for growth ; even though there are no signs of immediate ill-health their future growth and development may become stunted.

267. Though these are a sufficiently formidable list of disabling conditions, or conditions which without proper care and precaution may readily cause disablement, they do not complete the inventory. At least as important as any of these occupational influences, but inseparable from them, is the predisposition to disease arising from the absence of personal hygiene. The necessities of individual health are few and simple, but they are essential. Suitable and sufficient food, fresh air, warmth, moderation, cleanliness in ways and habits of life, the proper inter-relation of work, repose and recreation of mind and body are laws of hygiene, the elements of vital importance for which facilities must be provided if the maximum industrial output of the individual is to be secured and maintained. These matters need consideration by the management just as much as the healthy supervision of the external circumstances of the factory and its technical processes.

Indications of Sickness.

268. In addition to the clinical signs and symptoms of ill-health and disease, there are three general indications of sickness in a factory which can be gauged by the Management :—

- (a) Absence, broken time irregular time-keeping, or diminished output of the individual worker.
- (b) Sickness register.
- (c) Death certificates. These, though few in number, form important indications of the health of the workers as a whole.

269. Every case of lost time or absence calls for inquiry. It should be properly recorded. The study of such records is certain to disclose the existence of adverse influences or circumstances previously unsuspected which may denote the beginning of sickness. Unfortunately the number of instances where reliable records are kept is comparatively few. Even when their importance is recognised difficulties have arisen owing to pressure on the time of the Staff, or owing to the unsatisfactory character of many of the medical certificates supplied by workers. These certificates frequently give no information as to the cause of illness or as to its probable duration. They seldom state whether immediate absence from work is essential, or whether it can be postponed for a brief period until a particular job has been completed. Apart from these, certificates are sometimes given on odd slips of paper, or do not show the address of the Medical Practitioner. In their Memorandum No. 16* the Committee have suggested the need for a form of Medical Certificate which, if adopted, should do much to obviate these difficulties. A model form is given in Appendix G.

270. Professor Loveday, in his memorandum on "The Causes and Conditions of Lost Time" which is included in the Committee's Interim Report on "Industrial Efficiency and Fatigue," sets out the results of a series of investigations which he made on behalf of the Committee into the Lost Time. He concludes that nearly all records under-state, and most records under-state greatly, the proportion of lost time due to sickness and other unavoidable causes. This is partly due to the difficulty in regard to medical certificates already referred to, and partly to the fact that many absences for which no medical certificates

are or can be forthcoming are attributable to fatigue, colds or other minor ailments. While such absences may in a sense have been avoidable, they frequently serve to prevent future breakdown. He gives reasons in support of the view that except where there is an undue degree of slackness more than half of the time lost is lost through unavoidable causes. Various methods are suggested for testing the accuracy of sickness records :—

- (a) If the returns of bad time keeping and sickness coincide in direction.
- (b) If the number of whole weeks lost through sickness is abnormally high when compared with the shorter periods similarly lost.
- (c) If the number of days lost through sickness is abnormally high when compared with the number of "quarters" similarly lost.

271. An affirmative answer to any of these questions, unless explicable otherwise, gives good reason for supposing the rate of sickness to be under-stated. While no doubt in some places and in some trades time-keeping has really been slack, there seems little doubt that the under-estimate of sickness and unavoidable absence generally has led to many misinformed and unjust statements about the lethargy and irregularity of the whole body of workers in controlled factories.

272. In scrutinising sickness returns and in studying their rise and fall, account must be taken of various causes of fluctuation :—

(a) *Climatic Conditions.*—It may be assumed that the rate of sickness will be above the average in January, February, March, April and occasionally in November. In the remaining months it will ordinarily be below the normal. If the sickness rate does not respond to considerable changes in weather, or fluctuates independently of them, other causes of fluctuation must be operative and should be determined.

(b) *The approach of a holiday.*—A worker, though feeling unwell, may hold on if a holiday is approaching, and a reduction in the sickness rate may accordingly result.

(c) *A holiday just past.*—If the sickness curve fails to respond to a holiday, and especially to a break of several days, or if its steadiness or rise cannot be attributed to worsened climatic conditions, epidemics or the like, there is reason for receiving statements as to sickness with caution and sometimes with suspicion.

(d) *Patriotic enthusiasm.*—Many workers will keep at work when they are convinced of its urgency and national importance even though they may be unwell and need rest. Consequently when a period of relaxation occurs the rate of lost time and also of sickness may rise substantially.

(e) *Long hours, much overtime, and especially Sunday labour* undoubtedly exercise a most deteriorating effect. Professor Loveday quotes the case of a factory where there was much Sunday labour during the Spring and where no fewer than 22 per cent. of the men were at one time sick. During the following August when Sunday labour had been much reduced (but overtime on week days remained heavy) the sickness rate was little over 4 per cent. This reduction was partly attributable to the change of season, but the figures of a neighbouring factory showed that in that district the weather during the Spring, though inclement, was not abnormally unhealthy, and Professor Loveday sees no reason to doubt the Manager's view that the weather was less accountable for the improvement than the restriction of Sunday work.

273. As regards the signs of ill-health most commonly met with amongst munition workers, a large body of information has been rendered available as the result of the medical examinations of male and female workers which were conducted on behalf of the Committee. Full particulars of the ailments and defects found by Dr. Agnew as the result of examining over 3,000 men and boys are given in a table set out on pages 98 and 99 of the Committee's Interim Report on "Industrial Efficiency and Fatigue." Dr. Agnew reports :—

"There is no one defect that points conclusively to overwork or strain, but many of the symptoms taken collectively indicate severe strain, and I would suggest that sleepiness on the night shift, headache, foot-ache and muscular pains are probably the most common signs of overwork. The nervous symptoms added to these go far to complete the picture. The effect of noise upon the individual and its contribution to feelings of over-tiredness and exhaustion must be considerable. In many of the factories, though the work was not heavy, the noise was such that the result of lengthened periods in these factories was almost as severe as exposure to high temperature coupled with hard work."

274. On pages 120 and 121 of the same Report similar particulars are given of the defects found as the result of examining over 1,300 women and girls; the results of these examinations were thus summarised :

"The ailments most frequently observed included indigestion, constipation, headache, anæmia and muscular pains. These are all frequently met with among women workers and cannot be attributed especially to munition work. The great difficulty in estimating their precise importance is the lack of any control investigation or data. In some cases the ailment had undoubtedly been caused or accentuated by conditions of factory work. In other cases it has existed before beginning munition work. In others again the workers expressed themselves as in better health than formerly."

Methods of Remedy and Treatment.

275. At the foundation of any sound system of dealing with industrial diseases lie two elementary principles : First, that prevention is better than cure ; and secondly, that for treatment to be imposed effectively it must deal with the beginnings of disease. Bearing these in mind, the preliminary safeguard

should be to provide for the medical examination of all workers in order to secure as far as may be their physical fitness for employment. In some munition works, and especially in those where dangerous substances are manipulated, a preliminary medical examination of all workers is usual. Dental treatment is also sometimes provided. Such examinations are specially important at the present time owing to the strain involved by the conditions of employment and owing to the large number of persons who are taking up industrial employment for the first time; but such examinations are always likely to be desirable where the work involves any special strain, and particularly so in the case of women. Apart from their value in detecting early signs of ailment or defect, medical examinations are valuable as affording convenient opportunity for the inculcation of sound doctrines as to personal hygiene, cleanliness and healthy habits. Periodic re-examination is practically confined to certain dangerous trades and processes, the workers in which have to be periodically examined under the Regulations of the Home Office or the Ministry of Munitions. Where they can be arranged for, such examinations might usefully be extended to workers engaged in other processes involving special strain or risk.

276. It is true that under Section 63 of the Factory and Workshop Act it is necessary for every boy and girl under 16 to be certified by the Factory Certifying Surgeon* as physically fit for employment in the factory. Unfortunately, this certificate is not always adequate for its purpose. The decision of the surgeon has normally to be based simply on one brief examination. More often than not he has no previous knowledge of the boy or girl, and generally, the records of the School Medical Service are not available. After a young person has once been admitted to a factory, no further medical examination is required except in the rare instances where the Factory Inspector may specially require it. In view of the strain which industrial employment may often impose on growing boys or girls, it would undoubtedly be an advantage if arrangements could be made for their periodic re-examination. It may be pointed out that the Departmental Committee on "The Night Employment of Male Young Persons" emphasised the need for such periodical examinations once at least in every six months, and recommended that records of the results should be kept.

277. The second step is to reduce to a minimum any unfavourable conditions obtaining in the factory by providing proper sanitary conditions and accommodation, safe-guarding machinery, controlling hours of labour, furnishing canteen facilities, and securing sufficiently-warmed, lighted and ventilated workrooms.

278. Thirdly, arrangements should be made for adequate medical and nursing schemes. Medical attendance is obtainable under the National Insurance system, or may be made available by the special provision of a medical and hospital service for the factory. Nursing can only be obtained by the employment of one or more trained nurses to undertake duties in the factory by night as well as by day. Such arrangements have been instituted in many munition factories, especially where women are employed, and have proved of great value to employers and workers alike. The duties of the factory nurse may include:—

- (a) Supervision of the health of the workers.
- (b) Superintendence of the rest-room for those who are temporarily indisposed.
- (c) Following up cases of sickness at home.
- (d) Taking charge of First-Aid treatment of injuries.
- (e) In the absence of medical advice, observing and controlling in its initial stages any threatened outbreak of the influenza type of sickness, which, if it extends, may temporarily paralyse output.

279. The Committee are glad to recognise the increasing frequency with which nurses are now being employed in factories to perform some or all of the duties mentioned above. The employment of doctors is, of course, less common. In factories engaged upon the manufacture or manipulation of poisonous substances and gases, 51 medical officers are at present employed. Of these, 14 are whole-time officers and 37 part-time. Their duties include the preliminary medical examination of the workers, the supervision of their health while at work, a constant inspection of the working conditions of the factory, and the regulation of suspensions. In addition, they are constantly concerned with other matters more or less directly affecting the health of the workers. They report periodically to the Ministry on medical problems arising in their work. At many of these factories dentists are employed by the management to treat new workers, who require to have carious teeth removed before they can be safely employed. In other factories the employment of medical officers is still rare, though it is increasing, and development is likely to be encouraged through the need for securing the proper supervision and maintenance of the first-aid appliances, the provision of which is required by the recent Home Office Order.† The need for training workers in the use of these appliances will also require to be provided for. The three cases quoted below indicate other directions in which development may be anticipated:—

- (a) At an engineering factory employing about 2,250 workers (mostly men) a whole-time medical officer has been appointed, who acts also as panel doctor for most of the employees. He makes a medical examination of all new employees. Absentees are followed up by him if they have not seen him before leaving work, and they again see him before resuming work. The number of patients seen varies from 60 to

* See Memorandum on "Certificates of Fitness," issued by the Home Office in 1915, and obtainable on application to that Office.

† See paragraph 289 and Appendix I.

75 a day, and the medical officer's work consists in the supervision of the dressing carried out by his male dresser, ordinary diagnosis, minor surgical treatments, and any attendance on the workers where necessary in their homes or at the neighbouring cottage hospital.

- (b) At an engineering factory, where about 2,500 men and women are employed, a medical officer attends at the surgery daily from noon till 1 p.m. He sees cases of injuries which have been held over for his inspection or which have come up to be redressed. He also examines all workers before engagement, when any physical defects, such as hernia, hydrocele, varicocele, varicose veins or heart trouble, are entered in a book and the entry countersigned by the worker; in this way claims in respect of that particular defect at some later date are avoided. The medical officer also treats at his own house cases sent to him by the nurses on duty.

Employees have to report every accident, no matter how slight, to the foreman, who passes the case on to the ambulance room. The workers are in no case allowed to treat any wound themselves. All wounds are dressed by nurses under the supervision of the medical officer. Patients are not sent to their own doctor, for the latter have not time for, and cannot be expected to, treat daily a large number of minor and apparently trifling injuries. Under the system adopted every wound, however slight, is dressed within a few minutes of its occurrence, and is properly cared for until it is healed. As a result, the proportion of workers who lost time on account of accidents was markedly lowered, and there was an increase in the proportion of cases that lost no time at all. This scheme is also of interest because the firm on starting it decided to carry their own insurance for all claims less than £100 and they found after due allowance was made for the doctor's salary and the expenses associated with the nurses, that they had at the end of 18 months a credit balance of nearly £500. To this balance must be added the indirect though considerable value of working hours and weeks saved.

- (c) A group of factories are employing one medical man, paid on a capitation basis, to make not less than four health inspections annually. His inspection includes the organisation of first-aid treatment; records of the health and progress of each worker; the condition of the sanitary conveniences; the cleanliness of the windows; the ventilation, temperature and cleanliness of each workplace; the facilities for obtaining food and drinking water; and the cloakroom and washing accommodation. He also advises on any medical subject connected with the work of the factory and as to the health of any worker specially referred to him. Any necessary observations or suggestions are entered in writing for the information of the management and for reference on subsequent visits.

SECTION XI.

INJURIES AND ACCIDENTS.

280. The provisions of the Factory and Workshop Act in regard to accidents fall into two main categories—the prevention of accidents, and the notification and investigation of certain kinds of accidents. The provisions for the prevention of accidents include the proper fencing of machinery (Section 10), safety valves for boilers (Section 11), the position and operation of self-acting machines (Section 12), the cleaning of machinery by women and young persons (Section 13), means of escape in case of fire (Section 14), and the making of doors to open outwards (Section 16). The occupier of the factory is required to notify to the factory inspector all fatal accidents and all accidents sufficiently serious to necessitate absence from work for a period of one day in some cases and of seven days in others. Notification is also required of dangerous occurrences such as fires, or certain types of explosions or accidents to machinery or plant. Under the Police, Factories, &c. (Miscellaneous Provisions) Act, 1916, Section 8, it is the duty of the factory certifying surgeon to investigate and report upon certain kinds of injury caused by exposure to gas, fumes, or other noxious substances, and also upon any other cases which may be specially referred to him.

281. How grave is the amount of disablement caused by injuries and accidents is shown by the fact that though only accidents of a certain degree of severity are notifiable, the number notified annually amounts to over 150,000. To these must be added a vast number of minor injuries and accidents which in the aggregate cause perhaps an even larger amount of interruption to work. A somewhat formidable return of accidents is therefore to be anticipated in munition factories, which include not only metal and engineering work, but certain dangerous trades and the manufacture of explosives. Moreover, the introduction of new labour, and of employees unaccustomed to the processes concerned, particularly in conjunction with the need for speed and pressure, overtime and night work with the consequent fatigue, must inevitably lead to greater risk of accident. The injuries in a typical munition works are not only open wounds, contusions and abrasions, injuries to the eye, sprains, simple and compound fractures, and injured limbs, but also scratches, cuts, burns, and other minor injuries which may readily lead to more serious conditions by neglect. The slightest wound may become infected with germs, and a greater or less degree of sepsis or blood poisoning supervene, with the resultant serious loss of time and efficiency, and possibly even risk of life and limb.

An insurance company reports that out of 27,500 accident claims in 1917, 2,700 were septic claims, over 2,000 of these being septic conditions caused through wounds on the hand.

282. Much valuable and suggestive information on the relation of the incidence of accidents to output and to fatigue is contained in Dr. Vernon's Memorandum on "An Investigation of the Factors concerned in the causation of Industrial Accidents."* The inquiry is of the greater importance in that so far as the Committee are aware no inquiry of a similar nature had previously been conducted at any rate in this country. As he points out previous inquiries on the subject have suffered from certain defects. In the first place the accident data are in no case correlated with the output data. Secondly no allowance has been made for the considerable period of time often lost at the beginning and end of a spell. And thirdly no allowance has been made for the time which has elapsed between the occurrence of the accident and the time when the worker applies for treatment. This period is always appreciable, and in the case of some types of accident (*e.g.*, sprains) may be considerable.

283. As to what are the principal causes of accidents Dr. Vernon states :—

"Speed of production is the *essential* factor in accident causation which can never be neglected. Its action depends especially on the degree of nervous and muscular co-ordination possessed by the worker, and on psychical conditions such as his alertness and attention.

"The various factors concerned in accident production may be classified under two main headings, according as they depend on the worker himself, i.e., are of personal origin, or depend on external conditions not directly under his control.

- | | | |
|-----------------------------|---|---|
| Factors of personal origin. | { | I. Nervous and muscular co-ordination in relation to speed of production. |
| | | II. Fatigue. |
| | | III. Psychical influences. |
| | | IV. Nutrition and alcohol consumption. |
| Factors of external origin. | { | V. Lighting. |
| | | VI. Temperature, humidity and ventilation. |
| | | VII. Defects of machinery, and absence of guards." |

284. For an adequate appreciation of the character and scope of Dr. Vernon's inquiry, reference should be made to the report itself :* here it must suffice to give a brief summary :—

Accident data were collected at four factories, for periods of 9 to 25½ months. The accidents (over 50,000 in number) were classified separately under the headings of cuts, foreign bodies in the eye, burns, sprains and injuries incurred one or more days before they were first treated. Eye accidents afford the most reliable index of accident incidence, as they are almost invariably treated within a few minutes of their occurrence. Cuts are fairly reliable, but sprains are quite unreliable, as the workers generally do not come for treatment till some time after they are incurred. Hence their incidence resembles that of 'previous injuries,' or depends on the inclination of the worker to attend the dressing station. This inclination varies greatly at different times. For instance, day shift women attended three times more frequently towards the end of the morning spell than at the beginning, but night shift women attended most frequently at the beginning of the shift, and only a fifth as frequently towards the end of it.

Speed of Production.—Output determinations at a fuze factory were made by measuring the excess electric power supplied to the various sections of the works, and verifying the results by direct enumerations of the articles produced. The output rose steadily during the morning spell and was 11 per cent. greater in the fourth hour of full work than in the first hour. It remained high during the first hour of the afternoon spell, but fell off during the rest of the afternoon. The incidence of accidents showed a qualitative resemblance to these output variations but not a quantitative one, for accidents increased 10 to 30 times more rapidly than output during the morning spell. Nevertheless it was concluded that varying speed of production is the factor largely responsible for the day shift variations of accidents in men, and not fatigue. Though the night shift output followed a similar course to the day shift output, the accident incidence, except that of eye accidents, was entirely different. It was at a maximum at the beginning of the shift, and fell gradually the whole night through to about half its initial value. This was due to the fact that the night shift workers started work in a careless and excited state, and calmed down gradually during the night. At the other factories, where 6, 9·2 and 15-in. shells were manufactured, there was very little hourly variation in the speed with which the operations on these shells were performed, and in correspondence therewith the hourly incidence of accidents incurred by the day shift was fairly steady. The night shift accidents dwindled rapidly the whole night through, because of the psychical factor.

The diurnal variations of accidents at the fuze factory generally corresponded with the output variations, as both rose to a maximum in the middle of the week and declined at the end of it. This correspondence held for night shift as well as day shift, and the diurnal variation of eye accidents was especially marked. In the shell factories the night shift accidents rose rapidly in the course of the week, and in women were 47 per cent. more numerous on the last day than on the first day. This was a fatigue effect. The monthly variations of accidents at the fuze factory corresponded with output variations, for the accidents gradually increased about 40 per cent., whilst the hourly output at the same time increased 30 per cent.

Fatigue.—The influence of fatigue on accidents to women was strikingly shown at the fuze factory when the operatives were working a 12-hour day, or 75 hours a week. The women's accidents were two and a-half times more numerous than in the subsequent 10-hour day period, but the men's accidents were not affected. The women's accidents showed a fivefold increase during the course of the morning spell, as compared with a threefold increase during the subsequent 10-hour day period, but the men's accidents did not change as between these two periods. The women's accidents were 45 per cent. times more frequent in the afternoon spell than in the morning spell, whilst the men's accidents were only 7 per cent. times more numerous. Also the women were treated for faintness nine times more frequently than the men, and were given sal-volatile 23 times more frequently, whereas in the subsequent 10-hour day period they were treated for faintness and given sal-volatile only three times more frequently. When the hours of work at one of the shell factories were equalised for the men and the women, whereby the women were made to work 9½ hours more than they had done previously, and the men 9½ hours less, the ratio of women's accidents to men's accidents (corrected for the alteration of hours) increased 19 per cent. for the day shift and 61 per cent. for the night shift.

Psychical Influences.—At all the factories the night shift workers suffered fewer accidents than the day shift workers, the average defect being 16 per cent. This was not due to the output being smaller, as at the fuze factory it was distinctly bigger by night than by day. It was psychical in origin, and due to the night shift workers settling down to a calmer mental state than the day shift workers, and so becoming less careless and inattentive. The psychical factor is one of the most important in accident causation.

Alcohol Consumption.—Indirect evidence as to the effects of alcohol consumption was obtained by assuming (a) that the increasing restrictions on the alcohol consumption of the nation in general during the war applied also to the munition workers; (b) that such of the night shift workers as took alcohol did so shortly before coming on to work. It was found that the accidents treated during the three spells of the night shift at the fuze factory fell off much more rapidly in men than in women—as one would expect them to do if the excess of accidents in the first spell were due partly to alcohol consumption—and that between February, 1916, and December, 1917, the fall steadily became less. Again, in the 12-hour day period (November, 1915, to January, 1916) the accidents were at a maximum on Monday and fell gradually to a minimum on Friday, which was 30 per cent. less than the Monday value. Then they shot up again nearly to the maximum on Saturday. This suggests week-end drinking, as no such variations were observed during the subsequent 10-hour day period.

* See Committee's Memorandum No. 21. (Cd. 9046.)

Lighting.—Accidents due to foreign bodies in the eye were 7 to 27 per cent. more numerous in the night shift than in the day shift, though all the other accidents were considerably less numerous. This was due to the artificial lighting, as the excess of eye accidents was most marked in the worst lit factory. During day shift the eye accidents to men were most frequent in the winter months, and most infrequent in the summer months, but this relationship was not observed in the women. Other accidents were not affected, for during day shift they were not more numerous in the hours of artificial lighting than in those of natural lighting.

Temperature.—The temperature at the fuze factory was recorded continuously for six months by means of a thermograph. Accidents were at a minimum at 65° to 69° F., and increased rapidly at higher temperatures (e.g., by 30 per cent. at temperatures above 75°), and slowly at lower temperatures. Continuous records were obtained of the external temperature of the town in which the shell factories were situated, and it was found that in all of them the accidents increased considerably as the weather grew colder, and diminished as it grew warmer. In one factory the women's accidents were nearly two and a-half times more numerous when the temperature was at or below freezing point than when it was above 47°, whilst the men's accidents were twice as numerous.

Prevention of Accidents.—Various directions in which accidents could be diminished were suggested by comparing the accident frequency of men and women at the different factories. The women suffered twice as frequently as the men from sprains, and were especially liable to wrist sprains at the fuze factory as they had not sufficient strength to push home the clamping lever of the lathes. Both men and women suffered many more sprains at the 6-in. shell factory than at the other shell factories, as they often moved the 90 lb. shells by hand, instead of with the tackle provided. The women at the shell factories suffered three times more burns than the men, chiefly from the hot metal turnings. Accidents arising from carelessness and inattention can be diminished by preventing the workers from talking to one another in the shops.

MEANS OF PREVENTION.

285. It has been estimated that from 25 to 40 per cent. of all industrial accidents are preventable if all practicable means are taken. In America it has been estimated that roughly 30 per cent. of accidents are due to illness or to imperfections in machines or in guarding dangerous parts, that 60 per cent. are due to apathy and lack of appreciation of danger on the part of operatives and only 10 per cent. to wholly unpreventable causes. Whatever the proportions may be, there is no doubt that a large number of accidents are preventable, and the State which desires the maximum output of munitions, the employer who pays compensation, the Unions who subsidise absentees, and the operative who undergoes suffering and pain and, perhaps, permanent disablement, are alike concerned to secure a reduction in the number of accidents.

286. It is obvious that much can be done by adopting various methods of prevention such as the proper and effective guarding of machinery, the provision of safety appliances, the proper regulation of dangerous processes, the adequate lighting of the factory, and the more careful cleaning of machinery. But however complete the provision made for securing the safety of the worker, its success must largely depend upon the intelligent co-operation of workers and foremen in the maintenance and use of the appliances provided, and in the enforcement of precautionary regulations. As already suggested, many accidents occur through ignorance or apathy, "familiarity breeds contempt." One method of securing the necessary co-operation which might with advantage be more widely adopted is by the establishment of committees of workers. The duties of such committees are to study the causes of accidents, to suggest and advise suitable means for prevention, to keep careful records, to make frequent inspection of machinery and plant, and to note any defects or dangers. The interest of the workers may be further encouraged by giving prizes for suggestions or by awards to the committee of the department where the greatest reduction of accidents has been secured. In some instances monthly pamphlets or bulletins have been published dealing with the safety and hygiene, with particulars of accidents, with notes as to their prevention and illustrations of safe and dangerous methods of working.

287. However perfect and complete may be the methods of prevention adopted, accidents will always occur, and provision must therefore be made for their suitable treatment, and particularly for the first aid treatment of minor injuries. Wherever possible training in the essentials of first aid should be given to a sufficient number of workers to provide that in each shop there are at least one or two persons who know how to render first aid in case of injury, and much valuable work has been accomplished in spreading knowledge of first aid practice by the St. John Ambulance Association and similar organisations, with a result that in many munition works there are employees who possess the requisite training. Unfortunately at the present time long hours of work and the difficulty of obtaining teachers makes training difficult to organise. Distribution may also usefully be made of leaflets or placards of instruction and advice. Any instruction or advice should be simple and precise, and should emphasise the need for treatment in all cases as well as methods of treatment.*

288. In the majority of factories some provision is made for the treatment of injuries, but inspection indicates that there is great and urgent need of improvement, especially for treating minor injuries. While one factory may possess a well-equipped surgery with a trained nurse in charge, at another provision for treatment may be wholly absent, or the surgical equipment may be represented by a soiled roll of some so-called "antiseptic" lint or gauze, an open packet of absorbent wool, a few bandages, some antiseptic lotion, or an unclean pair of scissors, all kept in a dusty drawer. It is obvious that provision of equipment for first aid is worse than useless unless it is properly kept and maintained.

289. What is required is an adequate though simple organisation which provides—(a) a local dressing station or aid-post in each workplace for minor injuries; and (b) a central dressing station or surgery

* A leaflet (see note at end of Section) has been issued by the Home Office and is obtainable on application.

for more serious cases or cases requiring continuous treatment. An Order* recently made by the Home Office under the Police, Factories, &c. (Miscellaneous Provisions) Act, 1916, Section 7,† requires that in the case of blast furnaces, copper mills, iron mills, foundries and metal works, a first-aid box shall be provided in the proportion of at least one to every 150 persons, and an ambulance room wherever 500 or more persons are employed. Arrangements should also be made for the immediate conveyance to hospital of cases which cannot be treated on the spot.

Local Dressing Station or Aid-Post.

290. In order to be effective under industrial conditions any form of treatment for minor injuries must be extremely simple, easily understood and readily applicable. Elaborate provision for the treatment of minor injuries is the less necessary, because of its unsuitability under factory conditions, and because in machine shops wounds are usually comparatively free from germs. Further, the treatment must be always and promptly available. The workman who sustains a slight injury while at work will often decline to surrender a quarter of an hour of time and earnings in going to and from a central surgery to have his wound dressed. Time is a consideration, and the exigencies of factory life do not allow of an elaborate procedure. The aid-post may take the form of a cupboard or box containing first-aid materials, with brief, simple and clear instructions as to their use. The box should contain packets of sterilised dressings, a supply of iodine solution (alcoholic solution containing 2 per cent. iodine), a bottle of "eye drops," a pair of dressing scissors, some triangular bandages, safety-pins, and a roll of plaster (1 inch wide). The sterilised dressings may suitably be of three sizes:—‡

- (a) Three dozen small size, for fingers, composed of a strip of gauze or lint 8 inches long and 1 inch wide, with narrow tape attached to one end. The tape should be rolled up inside the strip, which is then wrapped in a cover of ordinary non-absorbent wool and the whole sterilised. In use the wool is first removed and the dressing unrolled round the injured finger, when the tape is disclosed ready for tying the dressing in position.
- (b) One dozen medium size, for hands or feet, similar to the above, but 18 inches long and 1½ inches wide; and
- (c) One dozen large size, for which the ordinary field dressing may be taken as a pattern.

The aid-post should be under the care of an officer, preferably the foreman or forewoman, trained in first-aid work. This officer should keep a note of every case dressed, and should be responsible for seeing that the box is kept stocked and in proper order. Ordinarily one such aid-post should be provided in each workplace, but in large engineering shops several may be required.

Central Dressing Station or Surgery.§

291. The central dressing station|| should be easily accessible and specially constructed or adapted for the purpose. The room or rooms should, in large factories, provide for a surgery, a rest room, and a storeroom and nurse's room. Where a surgery is used for workers of both sexes a second small room will be found advantageous. The walls should be covered with glazed tiles, enamelled iron sheets, or washable paint. The floor should be of smooth, hard, durable and impervious material; the natural and artificial lightings should be ample; hot and cold water should be laid on or be immediately available; the room should be warmed in winter. A glazed sink is needed, the waste pipe opening over the drain, and trapped outside the surgery. A footbath, preferably fixed and provided with hot and cold water, is desirable. The furniture should consist of a table, a couch, chairs, and cupboards. The room should not contain a carpet, rugs, curtains, table-cloth, window blinds or wall pictures. The keynote should be simplicity and cleanliness. The floor should be washed once a day with antiseptic fluid, and the walls at least once a week.

292. The object of the central dressing station being the treatment of more serious cases than can be dealt with at the aid-post, and the re-dressing of cases of minor injury, it is desirable that it should be properly equipped. It may also be convenient to use it for the medical examination of applicants for work.

293. The station must be in charge of a competent person with knowledge of ambulance work. Wherever possible a trained nurse should be on regular duty, ambulance assistants being selected from employees trained in first-aid work. Many large works now have a medical officer on the staff, who is responsible for the supervision of the surgery and available for serious cases before removal to hospital.

* The terms of the Order are given in Appendix I.

† The terms of the Section are given in Appendix H.

‡ Such dressings may be obtained, amongst others, from Messrs. Cuxson, Gerrard & Co., Oldbury, Birmingham; and Southall Bros., and Barclay, Birmingham. Dressings are also prepared by Messrs. Burroughs, Wellcome & Co., Reynolds & Bransom, 13, Briggate, Leeds; C. F. Thackray, Great George Street, Leeds; and the St. John Ambulance Association, St. John's Gate, Clerkenwell.

§ For information as to the conditions under which capital expenditure on an ambulance room can be regarded as an expense for the purposes of the excess profits duty, see Appendix K.

|| See illustration facing page 96.

The equipment of the surgery will largely depend upon the character of the accommodation provided and the experience of the person in charge, but the following will generally be required :—

- (i) Stretchers, splints and strong bandages for major accidents ;
- (ii) Bandages and dressings for minor injuries (a stock should be kept to replenish the aid-posts);
- (iii) A simple steriliser and necessary surgical instruments such as scissors, forceps and tourniquet ; and
- (iv) Simple lotions and drugs (with sufficient enamelled basins).

Where a medical officer is employed at the factory he should be provided with accommodation adjoining the central dressing station. The accommodation should ordinarily include a consulting room (fitted with hot and cold water and a steriliser), a clerk's office and a waiting room. If arrangements are made for men and women to attend at different hours separate waiting rooms will not ordinarily be required.

294. The following statement is of interest, as showing the arrangements made at a large National Filling Factory for dealing with cases of sickness and injury :—

" Ambulance Equipment.—At each of our two factories we have a roomy ambulance building with accommodation for doctors' consultations, first-aid dressings, sickness cases, &c. Each ambulance building has two separate casualty dressing rooms, one for men and one for women, a ward with eight beds where sickness and accident cases can be treated at ordinary times, and where in the event of an explosion the victims can be promptly attended, a small emergency operating room with sterilisers for dressings and instruments and a roomy cupboard for surgical emergency appliances. At the other end of the ward there are two doctors' consulting rooms, patients' waiting room, store room, &c.

"The staff of the ambulance consists of two doctors, one sister and four nurses in the shell filling factory (where we have 7,000 workers and a night shift as well as a day shift) and one sister with two nurses in the cartridge filling factory (where we have about 3,000 workers and a day shift only).

"In connection with our ambulance station, we have an ambulance wagon, which is at our disposal day or night for removing patients to their homes or to hospital.

"Arrangements are also made with the Local Ambulance Association for the expedition of ambulance wagons in the event of any serious explosion at the factory.

"Two large local hospitals have arranged to receive our urgent cases when required in the event of explosion or otherwise. Liberal contributions are made by the factory workers to these institutions.

"Any of our T.N.T. cases who have been ill enough to require hospital treatment have been sent to the . . . Infirmary, where I am in touch with the Superintendent and also with the House Doctors and the Pathologist, who inform me immediately of any matter of importance concerning a worker.

" Convalescent Home for Workers.—The Y.W.C.A. very kindly opened a convalescent home about 6 miles from here in a bracing part of the country, and this has been kept almost entirely at our disposal and has been of inestimable value to us. The expenses of this establishment are defrayed partly by the Y.W.C.A. and partly by donations from our Workers' Hospital Fund.

" Home Visitation of Workers who are Sick.—Chiefly in order to obviate the risk of girls suffering from T.N.T. poisoning lying ill at home, undiagnosed, and possibly untreated, we adopted from the beginning a system of home visitation. A postcard is sent to all workers in T.N.T. parts of the factory who are reported absent for two days or more. As soon as the postcard is returned asking for a visit, our health visitor calls at the house and immediately reports to me. If, as a result of this visit, it seems necessary that the doctor should call, that is done later. Girls who are in financial difficulties are assisted and infectious cases may be reported. Workers requiring subscribers' lines for admission to hospital or to convalescent homes are notified, and so on. In connection with this home visiting department, we have a welfare secretary and a health visitor. The welfare secretary deals with all returned postcards. She arranges the work of the health visitor and makes reports to the doctor, keeps a card index of those visited, deals with the subscribers' lines for convalescent homes, infirmaries, &c., keeps the "Comforts Fund" money and the accounts connected therewith, and so on. The health visitor is not a trained nurse, but is sympathetic, tactful and conscientious, and is liked by the girls, who give her their confidence.

" Financial Aid to Sick Workers.—A fund has been in our hands for about a year and a half. The money is spontaneously voted by the workers' committee at their monthly meetings, and it is entirely subscribed by the workers themselves. Help is given from this fund to any worker who seems to be in financial distress especially through illness or accident and who is unable to provide herself with the necessary food and comfort. It is also given at times to provide holidays for necessitous cases. The money is chiefly distributed through the health visitor on the recommendation of the doctor. This system has the advantage over other systems of financial aid that it is given for necessity observed by the doctors, nurses or health visitors, and does not conduce to begging."

295. The following is an account of the arrangements which have been made at a munition works in the Midlands :—

"I commenced work here in 1914 ; for about two years I did the welfare work and nursing, but by that time the number of employees had increased so much that I had to give up the welfare work and specialise on the work I was engaged for (nursing). We have two ambulance rooms in different parts of the works but new and larger ambulance rooms with rest rooms attached are under consideration.

"We are starting classes in connection with St. John Ambulance and hope to have four St. John Ambulance people—two men and two girls—in each department, in charge of an ambulance cupboard. At present all accidents are attended to by myself in the daytime and a night nurse at night. Serious cases only are sent to hospital and minor cases attended to here. Repeated dressings are done each day at the works : this is more satisfactory as it keeps us in touch with the people and we know when to expect them back at work. We also give electrical massage to those patients recommended by the doctor. Besides this I am qualified to treat simple medical cases, and we find this prevents a great loss of time by the employees. We keep a report of all accidents.

"All children under 16 are examined by a doctor when engaged ; if they have bad teeth, a note is given them and they are sent to the dental hospital for treatment ; if anything is wrong with their eyes, to the eye hospital ; if anything is wrong with their throat, to the Ear and Throat Hospital, and so on.

"The employees pay 1d. per week and from this fund so subscribed they receive hospital notes and obtain free treatment at the hospitals. The major portion of this fund goes to the Local Hospital Saturday Fund,

and our employees can, when recommended by their doctor for a change of air, get a fortnight's free treatment at a convalescent home; there are two at Llandudno, one at Malvern and one at Droitwich (for rheumatic subjects). Through the Hospital Saturday Fund our people can be supplied with artificial appliances, such as glasses and elastic stockings. The children of our workpeople obtain the same benefits, the convalescent home for children being The Red House, Great Barr, near Birmingham. The distribution and the clerical work in connection with these notes is done entirely by the Nursing Department. The Welfare Superintendent looks the cases up and refers them all to me."

Systematic Records.

296. As already suggested, it is important that a full and accurate Register should be kept of all cases of sickness and accident, with particulars of dressings, re-dressings, and treatment.

297. A case book should be drawn up somewhat as follows:—

Identification number.	Date.	Name of injured person.	Nature of injury or illness.	How caused.	Progress of case with dates of subsequent dressings, and the occurrence of any sepsis.	Date of final dressing.
1	25.11.15...	Mary Smith ...	Crushed thumb	Fall of shell ...	25.11.15, 26.11.15, 30.11.15 ...	3.12.15.

Each case when first treated may appropriately receive a card, numbered to correspond with the entry in the case book, to be brought on the occasion of subsequent dressings.

This card must be brought to the surgery each time the patient comes for treatment.

Identification Number.	Name.	Nature of injury or illness.	Date.	Instructions.
1	Mary Smith ...	Crushed thumb ...	25.11.15 ...	To come to-morrow.
			26.11.15 ...	To come on 30th.
			30.11.15 ...	To come on 3rd Dec.

NOTE.—Extract from First Aid Leaflet issued by the Home Office:—

TREATMENT OF MINOR INJURIES.

The following suggestions have the approval of H.M. Medical Inspectors of Factories in rendering first-aid in factories and workshops so as to prevent subsequent septic infection or blood poisoning.

A SCRATCH OR SLIGHT WOUND.

Do not touch it.
Do not bandage or wipe it with a handkerchief or rag of any kind.
Do not wash it.
Allow the blood to dry and so close the wound naturally; then apply a sterilised dressing and bandage.*
If bleeding does not stop, apply a sterilised dressing and sterilised wool; then bandage firmly.
If the wound is soiled with road dirt or other foul matter, swab freely with wool soaked in the iodine solution† and allow the wound to dry before applying a sterilised dressing.

A BURN OR SCALD.

Do not touch it.
Do not wash it.
Do not apply oil or grease of any kind.
Wrap up the injured part in a large dressing of sterilised wool.‡

AN ACID BURN.

Do not touch it, or apply oil or grease of any kind.
Flood the burn with cold water.
Sprinkle it (after flooding) with powdered bicarbonate of soda.
Apply a sterilised burn dressing of suitable size.‡
However slight the burn, if the area affected is extensive a doctor must be consulted.

Do not remove any dressing, but, if the injured part becomes painful and begins to throb, go to a doctor at once.

Destroy all dressings, which have been opened but not used; they soon become infected with microbes and then are not safe to use.

NOTE.—Danger from minor injuries arises from blood poisoning which is caused when microbes infect a wound. The majority of wounds are at first "clean," that is they are not infected with microbes; such infection usually occurs later and comes from handkerchiefs or other materials applied to stop bleeding or to wipe away blood, and, in the case of eye injuries, from efforts to remove fixed particles with unclean instruments. It is better to leave a wound alone than to introduce microbes by improper treatment. The congealing of blood is Nature's way of closing wounds against infection, and should not be interfered with.

* Minute wounds can be efficiently closed by applying collodion.

† An alcoholic solution containing 2 per cent. of iodine.

‡ This would not exclude treatment by prepared paraffin or picric acid.

Burns and scalds when the skin is not broken will heal if left alone; all that is necessary is rest and a protective covering. When blisters form they must not be pricked, except under medical advice.

Rest is an important aid to healing. A short rest at first allows healing to commence and often saves a long rest later. An injured hand or finger can be rested in a sling, and an injured eye by a bandage, but an injured foot or toe can only be rested in bed.

RESULTS.

298. The Committee are satisfied of the urgent necessity and value of some such organisation as that suggested above. They have been much impressed in visiting munitions works with the useful part performed by competent nurses and the large number of cases of injury and sickness which receive treatment. Thus in one munition works employing rather over 4,000 workers the ambulance department during December, 1917, dealt with 1,260 accidents (including 635 cuts, 291 bruises, and 150 eye cases), 1,703 redressings, and 1,428 medical cases (including 415 indigestion, &c., 486 headaches, and 351 colds), a total of 4,391. For January, 1918, the figures were 1,186 accidents (including 670 cuts, 218 bruises, and 202 eye cases), 1,956 redressings, and 296 medical cases (including 118 indigestion, etc., 71 headaches, and 70 colds), a total of 3,438.

SECTION XII.

EYE INJURIES.

The Effect of Industrial Conditions upon Eyesight.

299. The rapid extension of munition work has brought in its train a great increase in the number of accidents and injuries to eyes. The result has been not only personal suffering and inconvenience but also serious loss of time and a reduction of output. The eyes are among the hardest worked of all the organs of the body and they are extremely sensitive to external conditions. It is therefore not surprising that a number of special eye diseases and injuries from accidents to the eyes have come to be associated with particular processes in certain industries. Diseased conditions of the eye and defective eyesight are very common, and are a serious and widespread cause of inefficiency. Every effort, therefore, should be made to prevent them. The following statement emphasises the point:—

"The treatment of superficial injuries of the eyes is a subject which has, during the past year, acquired increased importance, on account of the large number of superficial injuries occurring daily to the eyes of workers in munition factories. The out-patient book kept at the Ophthalmic Department of the Glasgow Royal Infirmary shows that the number of those suffering from 'fires' and other trivial eye injuries who applied for relief during August, 1916, was more than double the number of those who had come suffering from similar injuries during the corresponding month in previous years. The figures in 1914 and 1915 are practically identical, and a scrutiny of patients during 1916 shows that the great increase has been brought about almost entirely by the attendance of men and women engaged in the manufacture of munitions. In such cases it is a matter of national importance that patients should receive skilful medical help as soon as possible after the occurrence of the accident, in order that there may be no unnecessary delay in their return to work."

300. The following statements are also of interest:—

"I think that it is somewhat of an exaggeration to say that each of these cases loses three days' work. If we take an average I should put it as more than half a day and less than a whole day. I think that I can safely say that these small accidents cause the loss of about 2,000 days' work in the town of Coventry alone. The more serious ones are responsible for the loss of weeks for each man, and I have in the past year had to remove about a dozen eyes after industrial accidents. Practically all of them could be avoided by the use of goggles. Most of the trivial accidents would be prevented if the men would wear goggles at the emery wheel and for grinding."

"At the Northumberland, Durham and Newcastle Eye Infirmary there has been an increase in the number of patients in 1914 and 1915, and this is largely due to the number of people engaged on munition work. For example, in 1914, 2,491 eye cases were referred for treatment from the Elswick Works; in 1915 there were 4,973 similar cases; and in 1917, 4,567 in spite of the present attention at the spot by ambulance workers."

301. Industrial work may cause impairment of eyesight in three principal ways:—

- (a) Injuries due to exposure to intense heat or industrial poisons.
- (b) Accidents due to flying particles, &c.
- (c) Eyestrain due to uncorrected errors of refraction or other causes.

302. Apart from the immediately irritative effect associated with such work as acetylene welding, the influence of prolonged exposure to intense heat and light may take so long a period to manifest itself that the damage which may result is not likely to appear during the war. The effect also upon eyesight of certain industrial poisons, such as lead, is in the bulk small and no special action in regard to this matter is called for.

303. *Accidents.*—It has been estimated that normally in any general group of industrial accidents over 5 per cent. must be ascribed to eye injuries. There is reason for belief that eye injuries in munition works are relatively more frequent than in normal times and that for engineering factories these cases probably represent about 7 per cent. of all accidents, a total which may, however, be greatly exceeded. The accidents are mainly due to particles of metal which enter the eye, the majority are slight in character

and should give rise to no permanent damage. To the damage which results from injuries sufficiently serious to come under observation must be added the graver conditions arising from infection following upon "fires" or other trivial eye injuries. Account must also be taken of the time lost and temporary inconvenience suffered from a much larger number of slight causes which may only incapacitate the sufferer for short periods, perhaps half a day. In so far as immediate reduction of output is concerned, these slight cases have probably a greater effect than the more serious injuries. Speaking of these cases, an ophthalmic surgeon in Glasgow writes†:—

"In most instances the actual physical damage is slight, and the worker will be able to resume his duties in a few hours, or utmost in one or two days, if only the injury to the eye be promptly and skilfully treated. If, on the other hand, the injury be neglected or if it be treated by anyone who is unskilful or careless sepsis will almost certainly occur; and all experience teaches that infection of the wound is a far greater danger than the actual physical damage to the ocular structures. The occurrence of sepsis at once transforms a very trivial injury to the cornea into a suppurative keratitis, which may run a prolonged course, lead to more or less impairment of sight, and in serious cases even destroy the eye."

304. *Eye Strain*.—Broadly speaking, eye strain may be due to defects of vision or to the nature and conditions of work. It may be accentuated by age, fatigue or unsatisfactory health of the worker, by near-distance work, insufficient or excessive illumination, abnormal position, or long hours. For munition work the eyesight of the worker should never fall much below that of normally useful vision. For fine work the eyesight should be approximately normal. Notwithstanding the important bearing of good eyesight upon output, the question has not hitherto received adequate attention. Evidence has been forthcoming of eyestrain and headaches resulting from (a) inadequate light, both artificial and natural; (b) artificial lights, adequate in amount, but so placed as to throw a glare upon the eyes of the workers; (c) employment of workers (whose eyesight should be aided by suitable glasses) to carry out fine work without first testing their eyesight. Eye strain, including headache, may be one manifestation of general fatigue. It is thus likely to become more marked when long hours are worked, when night shifts are necessary, or when workers are under-nourished, anæmic, or of poor general physique.

305. Several of these points are exemplified by the report on a medical investigation in regard to the health of woman workers, in the course of which an inquiry was made into the eyesight of 156 workers engaged in different departments of a factory. Most of the eye defects were found in the Fuse Department where fine processes were in operation, involving close attention and considerable likelihood of eye strain. In the work of machining shells only about 19 per cent. of eye defects were noted, but in the fuse department the proportion reached 64 per cent. The results of the Inquiry were thus summarised:—

"It will be noted that in the Fuse Department 8 per cent. of the workers were obliged to obtain glasses since starting factory work, 19 per cent. complained of eye strain, of whom 12 per cent. found sight difficult on the night shift, and 2 per cent. found the eye strain increasing in severity. Besides these, 10 per cent. appeared to have latent eye strain as shown by severe headache, blepharitis, &c., and probably required to have their eyes tested. Conjunctivitis was present in 11 per cent. Many workers complained of the artificial light falling directly on their eyes, and others said that the reflection of the brass work of the fuzes was dazzling. The artificial lighting in the factory was by electric lights placed over the benches. Owing to difficulty in train service it was not possible to visit the factory during the night shift in order to watch the effect on the girls, or to observe if shade could be adjusted without undue interference with the work, but this point appeared to need consideration.

"On the other hand, it must be remembered that cases of eye strain or frequent headaches may not be due entirely to factory conditions. Several girls had been warned at school by the school medical officer that their sight was defective, and had neglected to obtain glasses. Five workers had obtained glasses, but did not wear them; in one instance the previous occupation of dressmaking was probably responsible for the initial eye strain, and in another case a girl who had previously been a domestic servant now visited the cinema three times a week, although suffering from marked eye strain. It is also probable that some of the employees were still feeling the effects of overtime and seven days' weekly work, which had recently been discontinued, and some visual improvement might be expected on subsequent examinations."

Prevention and Treatment.

306. Many conditions likely to cause temporary or permanent damage to the eyesight of munition workers are admittedly preventable, while prompt and effective treatment of the injury when it has occurred will reduce suffering, hasten recovery and lessen the chance of permanent injury.

307. *Methods of Prevention* consist first of general measures designed to improve the physical health of the workers, and so to enable them to resist the effects of fatigue, and secondly of special measures designed to avoid undue strain on the eyesight or to reduce the liability to accident to a minimum. The general measures include the provision of suitable lighting, the establishment of canteens, the allowance of adequate time for sleep and rest and have already been dealt with elsewhere. The special measures naturally vary according to circumstances. The following suggestions may, however, be made:—

308. *Examination of Eyesight*.—When operatives are being engaged for fine work their eyesight should be tested by a medical officer, or, if he is not available, a nurse or welfare supervisor should apply simple eye tests* to discover whether the vision is normal. Any worker who fails to reach the standard adopted should be referred to an ophthalmic surgeon or eye hospital for regular examination and if necessary be supplied with glasses. When workers are examined for glasses the nature of the work to be performed should be specified whenever possible. For many people, and particularly those past middle-life, the

* Each eye should be tested separately, and the following standard is suggested as a minimum:—6/9 in both eyes (Snellen's types), though $\frac{1}{2}$ in one of the eyes may be sufficient in some cases; and the ability to read standard type 0.45 at 1 foot distance. The necessary standard types can be procured from any optician.

† "The Treatment of Superficial Injuries of the Eyes."—Paper by A. Maitland Ramsay, M.D., Lecturer on the Eye, University of Glasgow.

glasses which give the best acuteness of distant vision would not enable the owner also to do fine work at close range and *vice versa*. Workers who complain of frequent headache, pain in the eyes, or show signs of conjunctivitis should also be tested.

309. *Eye-guards and Goggles*.—Under certain conditions the eyes should always be guarded from flying particles of metal. On this point the observations of an official American publication* may be quoted:—

"The one feature of safety in nearly all of these occupations is the use of suitable goggles in those occupations known to cause injuries to the eyes. No other protection can take the place of this one. It is one of the most difficult measures in accident prevention to carry out. Workmen object to the use of these protectors, and even when provided they are not worn. The fault for this lies often in the type or kind of goggles that have been provided. Many of these not only decrease the efficiency of the worker who wears them, but they cause injury to the eyes of the wearer. Many conscientious workers refuse to wear goggles that are provided for the common use of all workers in the establishment. In this they are justified, as many infections of the eye are capable of transmission by means of eye protectors. The remedy is a better mutual understanding between employer and employee, and an insistent educational campaign on the value of this protection. Frequently the nature of the work is such that the lenses become clouded with steam or perspiration. Anti-sweat pencils should be provided to prevent this. The goggles worn should be of such a thickness of glass that they will withstand a hard blow and of such a quality and so securely fitted into the frame that if broken the glass will not fly into small pieces but will remain in the frame. Goggles should be fitted to the wearer."

To be effective, an eye-guard should:—

- (a) prevent particles reaching the eye from in front, from either side or from below. Practically nothing enters from above;
- (b) be light and comfortable, allowing free play of air;
- (c) not impede vision or become obscured by the impact of particles;
- (d) be strong and cheap.

310. Two forms of eye-guard are here illustrated which have been designed to meet the requirements stated above†. That shown in Figure 1‡ has the advantage that spectacles required to correct any error of refraction can be worn behind it. The eye-guard shown in Figure 2§ is composed of a strip of leather with detachable eyepieces (see Figure 3) pierced with holes for ventilation.

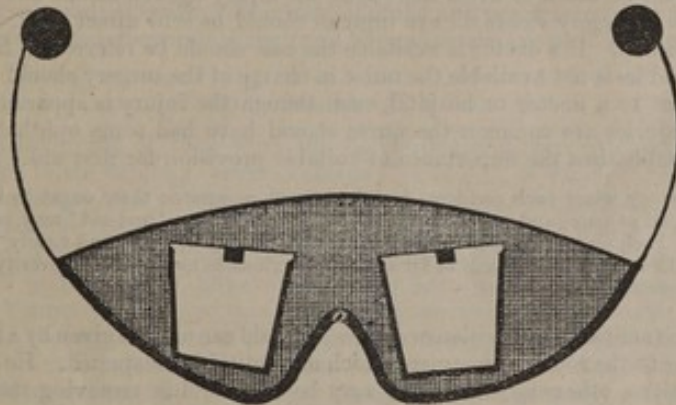


FIGURE 1.

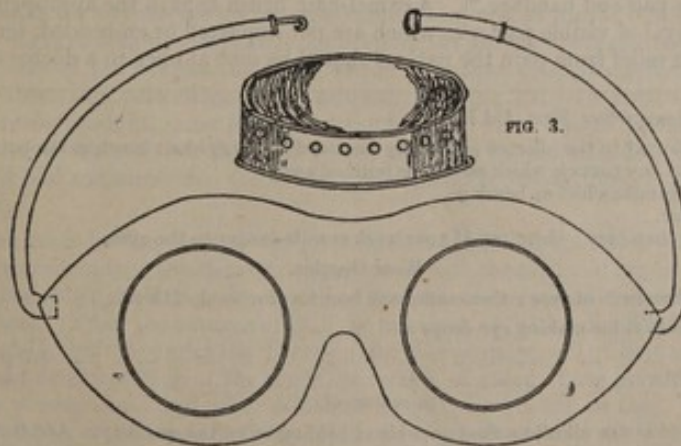


FIGURE 2.

* The Commonwealth of Massachusetts, State Board of Labour and Industries, Industrial Bulletin Number 5. Boston 1916.

† Some oculists recommend Crook's glass No. 1 or No. 2, with fine gauze side pieces.

‡ From a design prepared by the Mentor Safety Appliance Company.

§ From a design prepared by Messrs. Wallach Bros.

311. The fact that no particles are likely to enter from above is important, because the upper part of the goggle can be left open to allow of ventilation. A closed screen is not only hot and uncomfortable, but the transparent medium, usually glass, may become obscured by condensation of moisture. Where fine work has to be executed there must be clear vision and for this there is no better medium than glass. The objection has been raised that glass broken by a flying particle may be driven into the eye and cause a worse injury than if it were not present. Such accidents appear, however, to be very exceptional and a foreign body of considerable size would be required to inflict it. Glass, such as is used for shooting goggles, of sufficient strength to stand the impact of pellets of shot should be employed. The main objection to glass, or indeed to any other transparent medium, is that after a time it becomes pitted and obscured. Eyeguards should therefore be so made that the glass can be easily removed and cleaned or replaced. Where there is exposure to bright light, as in the process of acetylene welding, the glass should be tinted or specially prepared to obscure the chemically active rays at or beyond the violet end of the spectrum. Dark blue glass is usually employed for the purpose, though as the following statement suggests, it is not that best suited for the purpose.

"My own experience has been that workmen at acetylene welding have generally been provided with very dark neutral smoked protection glasses, and not with dark blue glasses. These would certainly be better than dark blue glasses, and of all the tints which could be employed, probably a very deep rose tint would be the best that could be selected—dark blue would, in my opinion, certainly be unsatisfactory. As regards the use of Crooks' glass in protection goggles, this glass is very expensive, and is certainly unnecessary for ordinary mechanical protection purposes. The virtue of it is the same as that of rose-tinted glass, for it has the power of excluding the actinic rays. I should think it could hardly be necessary to employ this glass, of which I believe only a limited quantity is available, for workers' goggles."

312. While goggles must be regarded as the principal and most effective protection against eye accidents, it is possible in some grinding and chipping processes to fix a wire or glass screen to the machine in such a manner as to protect the workers' eyes. Such an arrangement may, for example, be useful in emery wheel grinding where the machine is used by many different workers irregularly through the day.

313. *Treatment of Accidents.*—First aid treatment is all that can be rendered effectively in the factory. Every precaution should be taken to avoid increasing the injury by well meant but mis-directed efforts to give relief. Where a surgery exists all eye injuries should be sent direct to it, no treatment being attempted in the workshop. If a doctor is available the case should be referred to him at once. If the injury is not serious and he is not available the nurse in charge of the surgery should render first aid, the patient being then sent to a doctor or hospital, even though the injury is apparently slight. At any factory where such injuries are common the nurse should have had some ophthalmic training. The following statement emphasises the importance of suitable provision for first aid.

"In every factory where such accidents are of frequent occurrence there ought to be a rule that injuries should be reported at once, and provision should be made whereby 'first-aid' may be given with the least possible delay. Such an arrangement would not be difficult to carry out, and timely first-aid would effect a cure in the mildest cases and prevent as far as possible extension or increase in severity of the injury in those that were more serious."

314. If there is no ambulance provision or a nurse, first aid can only be given by a fellow workman who should be instructed as to the routine treatment which may suitably be applied. He should be forbidden to exceed his instructions, otherwise, though he may be successful in removing the offending particle, infected ulcers may follow the operation or he may even perforate the cornea. First aid is mainly needed to relieve pain and should usually be limited either to the use of eye drops which may be applied from a suitable bottle, or to a pad and bandage.* A camel-hair brush kept in the appropriate solution may be provided for the removal of visible particles which are not impacted or embedded, but its use should not be encouraged. After relief from pain the patient should be sent at once to a doctor or hospital.

* Eye Injuries. (Home Office First-Aid Leaflet):—

Apply the eye drops† to the affected eyeball by means of the camel-hair brush in the bottle.

Do not try to remove any particle which cannot be brushed away.

Tie up with a clean handkerchief or bandage.

Go to a doctor at once.

Prevention is better than cure; therefore, if your work entails danger to the eyes,

Wear Goggles.

Goggles have saved hundreds of eyes; thousands have been lost for want of them.

† Instructions to chemist for making eye drops:—

Cocaine	...	...	...	...	...	...	...	...	0.5 per cent.,
Hyd. Perchlor.	...	...	...	...	...	...	...	...	1 in 3,000,
in castor oil.									

Weigh 95 grammes of castor oil into a flask capable of holding twice the quantity. Add 0.5 gramme of powdered cocaine. Warm in a water bath till dissolved. While the solution is still warm (but not hot) add 1 cubic centimetre of a solution containing 3.3 grammes of mercuric chloride in 100 cubic centimetres of absolute alcohol. Mix the solutions by rotating the flask.

About half an ounce, or 15 c.c., of this solution should be supplied in a bottle from the cork of which a camel-hair brush is pendent in the fluid.

SECTION XIII.

SPECIAL INDUSTRIAL DISEASES.

315. The manufacture and manipulation of toxic chemical substances upon the immense scale required in warfare have brought many special dangers to the health and lives of munition workers. To some of these the Committee made reference in their Memorandum No. 8 (Special Industrial Diseases) issued in April, 1916, in which they gave a brief account of the information which was then available and likely to be useful.

LEGISLATIVE PROVISIONS.

316. The Factory and Workshop Act, 1901, contains numerous provisions for safeguarding the health of workers employed in certain "dangerous and unhealthy industries." Section 73 requires the notification to the Chief Inspector of Factories of cases of poisoning from lead, phosphorus, arsenic, mercury and anthrax by the medical practitioner attending the case. By an Order of January, 1916, toxic jaundice was added, that is to say jaundice due to tetrachlorethane, T.N.T., or other nitro or amido derivatives of benzene, or other poisonous substance. The employer must also notify these cases to the Inspector of Factories. Section 79 gives the Secretary of State power to certify that a process is dangerous, and to make such regulations as appear to him reasonably practicable and to prescribe the conditions under which employment in the process shall be carried on. These regulations impose duties on both the employer and the worker. Such regulations have been made for various lead processes, and also in connection with the manufacture of T.N.T. Section 82 requires that the regulations shall be posted up in conspicuous places where they may be conveniently read by the persons employed.

Acting under powers conferred by Regulation 35 A.A. of the Defence of the Realm Regulations, the Ministry of Munitions, with the concurrence of the Secretary of State, has made regulations dealing with the use and manipulation of T.N.T.

Under Section 8 of the Workmen's Compensation Act, 1906, the Secretary of State has power to make Orders extending the provision of the Act to diseases contracted in the course of employment. Several Orders* have been made extending the provision of the Act, under certain conditions, *e.g.*, to toxic jaundice, dermatitis, and other diseases arising from the manipulation of T.N.T. and other industrial poisons.

TRINITROTOLUENE (T.N.T.).

317. At the very beginning of their work the Committee had their attention called to cases of sickness apparently due to the explosive trinitrotoluene ("T.N.T."), of which the manufacture and use was then rapidly increasing. This substance had hardly been regarded as toxic before the war; no ill-effects had been traced to the small quantities previously used, and it was generally believed to be much less toxic than dinitrobenzene, which had been manufactured and used in this country for many years. A fatal case of toxic jaundice, however, definitely ascribed to T.N.T. poisoning, was reported to the Home Office in February, 1915, and this appears to have been the first recorded fatality from this cause. At the time of the appointment of the Committee in September, 1915, the first fatality from toxic jaundice due to the manipulation of T.N.T. had just occurred at a Filling Factory, and during the succeeding winter months sickness due to T.N.T. poisoning became generally recognised as a growing menace plainly concomitant with the introduction of new labour in rapidly expanding processes of manufacture and manipulation which had necessarily been hastily organised.

318. The urgent calls for an increase both in the volume and rate at which T.N.T. could be supplied made the position one of grave anxiety, and had it not been for the preventive measures, based on previous knowledge and experience of the nearest analogies, which were then promptly advocated by the Home Office, the mortality from this poisoning, which advanced during 1915-16 until the autumn of 1916, when it reached its greatest height, must have been far higher. In July, 1915, the Home Office had warned the factories then concerned that T.N.T. might be absorbed through the skin, or by the inhalation of dust and fumes, and had recommended accordingly that suitable precautions should be taken against both avenues of entry.

319. During these months the Committee gave their cordial co-operation towards bringing to bear upon the problems confronting the Ministry the advice which the skill and experience of the Factory Department of the Home Office could suggest, as well as the knowledge gained by scientific investigations organised for this purpose. From the autumn of 1915 the resources of the Applied Physiology Department of the Medical Research Committee under the direction, for this purpose, of Dr. Benjamin Moore, F.R.S., had been applied to the determination of the mode, or modes, of entry of the poison to the body with a view to its effective prevention; and other collateral enquiries were set on foot. The symptoms of T.N.T. poisoning already reported seemed closely similar, in respect at least of the fatal cases in which jaundice was characteristic, to those which had occurred earlier in 1915 as due to exposure to the fumes of tetrachlorethane, used as a constituent of varnish applied to aeroplanes—a cause of industrial poisoning to which further reference will be made below. This coincidence in time of the two forms of poisoning made it natural to look then upon the inhalation of the fumes or the dust of T.N.T. as probably the chief cause of this new and unexpected danger at the Filling Factories, in spite of the fact that the path of

* Statutory Rules and Orders, 1913, No. 814; 1914, No. 1007; 1915, No. 660; 1916, No. 286.

entry to the body in the most familiar examples of poisoning from the industrial use of nitro-compounds was well known to be by way of the skin. Administrative measures at the factories were chiefly addressed during the spring and early summer of 1916, as new factories sprang into existence, to the perfection of ventilation and the removal of dust and fumes from the air. Although it was well known that dinitrobenzene and other nitro-compounds could rapidly enter the body through the skin, the apparent immunity with which the great majority of persons could freely handle T.N.T. without signs of poisoning had done much to divert general attention from the explicit warning given by the Home Office in 1915 that absorption of T.N.T. by the skin was to be guarded against.

320. With the advent of warm weather in the summer of 1916, coincident with the preparations for the Somme offensive, a large increase in the amount of T.N.T. sickness occurred; and a conference upon this was held on 25 August, 1916, at the Ministry, when representatives of the Health of Munition Workers Committee met those of the Factory Department of the Home Office and of the factory managements. The experience of one very large factory in which up to that time no death had occurred was brought forward to show that, if proper ventilation was secured, the risk of poisoning was small in spite of an almost universal distribution of T.N.T. powder over the factory floors and furniture, as well as upon the skin and clothes of the workers. In the following month, however, several cases of fatal toxic jaundice were notified from this factory while at the same time experiments conducted by Dr. Moore and his colleagues both in the laboratory and in factories showed conclusively not only that the poison could enter the system freely by way of the skin, but that poison having so entered could be held within or under the skin itself and so remain for continued absorption even after, and sometimes for many days after, the worker had been altogether removed from the neighbourhood of T.N.T. The experimental evidence gave no ground for attributing any important share in the poisoning to the inhalation of dust or fumes; the value of ventilation from this point of view appeared to consist in aiding the maintenance of the chemical balance of the blood and in removing dust which might otherwise settle upon the skin or food, or enter the noses and mouths, of workers, and for these purposes ventilation was nugatory in the face of manual processes involving the scattering of T.N.T. dust upon every exposed surface of the workshop and of the workers. It became apparent that a campaign had to be fought in detail for the reduction of danger by the trial and adoption of every expedient for minimising physical contact between the workers and the manipulated T.N.T. For the introduction of the necessary measures when devised, and further for their general enforcement, new legal powers were required.

321. With a view to an immediate concentration of effort upon these problems, Mr. Montagu in October, 1916, appointed a Committee to consider and advise him as to (1) the prevention of poisoning in Filling Factories, and (2) the treatment of cases of such poisoning, and to make such enquiries and experiments as they might deem desirable for these purposes. This T.N.T. Advisory Committee contained representatives of the Factory Department of the Home Office, members of the Health of Munition Workers Committee, the Medical Officer for the Filling Department, together with engineering and administrative representatives of the various departments concerned within the Ministry. This Committee, sitting daily at first, worked actively towards the framing of defensive regulations against T.N.T. poisoning. They made recommendations upon the organisation and functions of the medical officers of the Filling Factories, upon the probable scope of the legal powers likely to be required by the executive, and they considered and advised upon the best modes of translating into practical preventive methods the knowledge then being gained of the possible modes of T.N.T. poisoning and of their pathological results. In December, 1916, Dr. Addison, having succeeded Mr. Montagu as Minister, reappointed the Advisory Committee, who submitted to him in January, 1917, a detailed code of regulations governing the use of trinitrotoluene in all factories and workshops in which it, or any mixture containing it, is used or manipulated. The necessary powers having been obtained, these rules were formally given legal effect in February, 1917, though during several preceding months they had been widely introduced into practice, owing to the dissemination of knowledge of the dangers of T.N.T. by the Ministry's medical officers and the scientific workers engaged, and no less to the goodwill of the factory managements. These regulations, still in force, are given below in summary form.

322. Before outlining the pathology of T.N.T. poisoning as such, reference may be made to the remarkable practical results which have coincided with the progressive application of the findings of scientific investigation to practical measures for the preservation of the T.N.T. workers. The Returns of the Home Office of cases of toxic jaundice from T.N.T. for the quarter October-December, 1916, show 86 cases, including 23 deaths, as compared with 29 cases (four fatal) in the corresponding quarter of 1917; though the number of the workers exposed in the latter year to risk was far greater than in 1916. Accompanying the cases of jaundice there has also been an unmeasurable volume of minor illness, which has shown a parallel reduction in all factories; in one of the largest factories for instance, in which the sickness returns have been generally the highest, sickness attributed to T.N.T. has declined from being 11 per cent. of the operatives in August, 1916, to 1 per cent. in January, 1918. The latest returns show that T.N.T. sickness has been almost abolished, while no fatal case has been reported since February, 1918, and there is now good ground for believing that when all factories have reached the standards attained by the best of them from this point of view, and now within the reach of all, T.N.T. poisoning may become so rare as to be almost unknown. The results so obtained must be regarded as a striking testimony to the value of close co-operation between research work on the one hand, carried out not only in the laboratory but also in the field of its practical application, and administrative action on the other. They show, further, the benefits of a co-operation between factory doctor and factory manager established now to a degree almost unknown before.

323. While the experimental analysis of the paths by which T.N.T. may enter the body, the new tests which have been devised for tracing its elimination in changed form, and other gains in knowledge, have gone to secure the present successful measures of prevention, much still remains to be discovered with regard to the detailed nature of the complex toxic effects of T.N.T. or of its derivatives, when it has once gained access to the system. When Mr. Winston Churchill succeeded Dr. Addison as Minister of Munitions in the summer of 1917, the practical problems of T.N.T. poisoning had been so far solved, and the maintenance of the preventive measures so organised in the Health and Welfare Section of the Ministry, that he found it unnecessary to reappoint the former large T.N.T. Advisory Committee, whose work had been in the main completed, and instead he formed a small Committee of medical experts for the purpose of maintaining and co-ordinating further enquiries into this subject and of advising him with a view to administrative action that might seem desirable in the light of fresh knowledge. Further researches are being actively prosecuted into the toxicology of T.N.T. and in this direction a definite advance in the curative treatment is still to be hoped for. But while these studies have great theoretic interest and are likely to have importance in the study of toxic jaundice known to be produced in special conditions, or in persons specially susceptible, by other poisons and certain drugs, the present success of preventive measures against T.N.T. poisoning allows the hope that these investigations may have only an academic interest for the Ministry of Munitions as such.

324. *The Pathology of T.N.T. Poisoning.*—It would be out of place here to give detailed descriptions of the pathological results that may be produced by the absorption of T.N.T. For these, reference may be made conveniently to the following :—

"Trinitrotoluene Poisoning." (An account communicated on behalf of the T.N.T. Advisory Committee. References to earlier work may be found here.) *British Medical Journal*, December 16, 1916. Report of Discussion at the Royal Society of Medicine. *Proceedings Royal Soc. Med.*, January, 1917.

"The Causation and Prevention of Trinitrotoluene (T.N.T.) Poisoning," by Dr. Benjamin Moore, F.R.S. Medical Research Committee, *Special Report Series*, No. 11, 1917.

"The Effect of Trinitrotoluene upon the Blood," by Dr. P. N. Pantou. *The Lancet*, July 21, 1917.

"Preventive Measures against T.N.T. Poisoning," by Dr. W. D. O'Donovan. *Proceedings Roy. Soc. Med.*, April, 1918.

325. T.N.T. when manufactured and used in a pure condition or compounded with ammonium nitrate (amatol or ammonal) is by far the most important of the dangerous substances used in the production of high explosives. Danger arises not only from its explosive power but from its liability to affect the health of the workers exposed to it. Operatives engaged in its manufacture, packing or loading, may become affected. Apart from this, unless the incidence of poisoning is rigidly controlled other workers may become disorganised through fear of contact, and fresh labour may become difficult to obtain.

326. T.N.T. may be absorbed through the skin or through the digestive tracts, or by inhalation of fumes or dust. Poisoning may take one or more of the following forms :—

- (a) T.N.T. stains the skin yellow. Skin disease (*Dermatitis*) is due to a direct irritant action. Some workers are more susceptible than others. The effects, like those of other irritants, are increased by flushing, perspiration, and mechanical friction. Localised rashes, especially where there is pressure or friction as from bands or ill-fitting clothes, are common. The parts most frequently affected are the hands, wrists, face, neck, and feet. There is ground for the view that dermatitis is distinct in its incidence from other forms of its poisoning.
- (b) *Digestive troubles.*—Gastritis, shown by pain in the stomach, vomiting, and constipation, is the most common of the ill effects of poisoning.
- (c) *Blood Changes.*—Blueness of the lips and, rarely, breathlessness on slight exertion are evident signs of absorption of T.N.T. These signs are an indication for cessation from T.N.T. work, during which they will generally disappear rapidly. They must be taken as a warning that the absorption of T.N.T. is going on, and if this cannot be explained by faulty factory conditions or by careless and unnecessary handling—when proper precautions ought to prevent recurrence—they point to a special susceptibility, and the worker should be transferred to other employment. Pallor does not necessarily signify anaemia, which is uncommon among T.N.T. workers. A rare and fatal form of anaemia (aplastic anaemia) has occurred in a very few instances and is characterised by a slowly, increasing debility or by sudden unexplainable subcutaneous or uterine haemorrhages.
- (d) *Liver degeneration, "toxic jaundice."*—Jaundice is here a sign of gravely serious illness, and will be shown by a yellow tinge first of the whites of the eyes and later by yellowness of the skin. (This must not be confused with the yellow staining which T.N.T. itself may cause in the skin by direct contact.) Jaundice may appear without obvious warning, though rarely before the fourth week of employment, and it is possible that in half the cases it arises after a preliminary warning, which has been given by the blood changes just mentioned but which may have been overlooked. Every effort should be made to recognise the first beginnings of this illness, and to take them as an indication for immediate cessation from all T.N.T. work and for proper medical treatment. Many cases are now known of apparently complete recovery after serious illness of this kind.

327. To detect a case of T.N.T. poisoning care must be taken to avoid confusion with digestive disturbances due to other causes. Accounts given by patients may be unintentionally misleading. The yellow staining which usually occurs with T.N.T. cannot be taken as in itself a sign of poisoning. The following points are the more important indications of T.N.T. poisoning:—

- (a) Pallor of the face and an ashen grey colour of the lips, tending to disappear if the worker becomes excited, as by medical examination. Sometimes the lips and tongue are purple in colour; the tongue is generally free from fur.
- (b) The character and situation of the stomach pains.
- (c) The presence of constipation and stomach distention.

Treatment when jaundice is absent should be simple and successful. It should include (i) the immediate removal from contact and all the fresh air possible, (ii) rest in bed for a day or two, (iii) a diet consisting of milk, milk puddings, fruit and green vegetables, with drinks such as barley water, tea and coffee. If jaundice is present, hospital in-patient treatment is necessary. Milk should be given in small quantities to begin with, the amount being slowly increased to two pints a day.

The occurrence of T.N.T. poisoning depends sometimes upon personal idiosyncrasy. Women do not appear to be more readily affected than men. Boys and girls may be more susceptible than adults, and, in consequence, their employment has been forbidden under the age of 16, and is only allowed under the age of 18 with the special consent of the Ministry. Serious poisoning seldom occurs within the first four weeks of employment. While the great majority of workers are insusceptible and remain so, a small minority are susceptible and liable to succumb between the fifth and fifteenth week of exposure. The few affected are not always those who owing to ill-health or malnutrition might be expected to be especially liable. Industrial conditions, though important, have perhaps less influence than personal idiosyncrasy.

328. It is essential that strict measures should be taken for prevention. The precautions prescribed by the Regulations of the Ministry for the use and manipulation of T.N.T. are as follows:—

- (a) Exposure to dust and fumes should be reduced to a minimum by cleanly methods of work and by ventilation and cleaning of workplaces.
- (b) No person may be employed for more than a fortnight without an equal period of work at a process not involving contact with T.N.T., unless such employment has been specially approved by the medical officer of the factory.
- (c) It is of the utmost importance that all workers should obtain ample and suitable food. Every person employed should be supplied gratis daily with half-a-pint of milk, or some equally nutritious substitute.
- (d) Special working costumes should be provided for all persons employed. These should be cleansed or renewed at least once a week.
- (e) Cloak-rooms should be available where clothing put off during the working hours should be placed.
- (f) Washing facilities are essential, with a suitable supply of soap, nail brushes and towels.
- (g) A constant medical supervision should be exercised not only by formal medical examination but also by scrutiny of the workers while at work. The medical officer should have power of immediate suspension where necessary. Careful health records should be kept.
- (h) A special official should be appointed to secure the carrying out of the prescribed regulations. A woman welfare supervisor is also essential wherever women are employed.

329. Similar preventive measures are required by the Home Office and the Ministry for the manufacture of T.N.T.

The following statement describes the medical arrangements made in a large National Filling Factory:—

"In the early days we were confronted by the spectre of T.N.T. poisoning in a wide variety of processes—shell filling with amatol and T.N.T. blocks, liquid filling, 'hot mixed' filling press houses, incorporating houses, trotyl bag filling, &c.—and no one could tell us how it might be exorcised.

"Cleanliness.—Our first preventive measure was cleanliness. The method was to watch the shops from day to day, instruct workers and overseers in the meaning of 'physiological cleanliness,' and devise means of preventing T.N.T. from entering the bodies of the workers by any of the possible channels of absorption. After some initial difficulty with the management (who were naturally chary of moisture) we were allowed to introduce our system of damp dusting of benches and damp mopping of floors. A slightly moistened cloth was used for dusting the table and the girls were instructed that the powder on tables and floors must be 'kept damp and kept down,' in order to prevent it getting into the air and being thus swallowed and inhaled. The method of dusting was to 'coax' the powder off the table with the slightly moistened cloth instead of flicking it about and contaminating the atmosphere. The floors were swept with damp sawdust.

"This method was easily adopted in the Trotyl bag-filling shops and was most successful. In other parts of the factory, such as the melts, press houses, rectifying rooms, &c., it was a much more difficult matter to obtain perfect physiological cleanliness and it was only after many months of hard uphill work that any approach to this was reached.

"Every foreman, forewoman and worker had to be convinced of the necessity of this cleanliness, and we had a long educative campaign. Then we had to introduce a new T.N.T. cleansing department with reliable overlookers whose duty it was to keep all T.N.T. shops free from powder. The staff of this cleansing department has been large and the expense to the factory has been considerable, but the results have afforded ample repayment."

" *Lectures to Overlookers.*—A necessary part of the doctor's duty in a T.N.T. factory is the education of overlookers, foremen, &c., in the rationale of the prophylactic measures to be employed. In this factory it has been our practice, as each new group of overlookers was engaged, to devote one lecture of the course of preliminary instruction to the question of T.N.T. poisoning and its prophylaxis. The overlookers are thus from the outset co-operators with the doctor in all efforts to prevent T.N.T. sickness.

" *Mouth-wash and Gargle.*—As an additional precaution each worker is made to wash out her mouth and throat at lunch hour, and after each shift with a fluid provided (popularly called 'the gargle'). Special 'gargling lavatories,' with numerous basins, are built for this purpose in connection with each T.N.T. shop. These basins are also supplied with hot and cold water and the workers are encouraged to wash their hands thoroughly with hot water and soap before proceeding to the shifting house. N.B.—Cold water has no advantages and many disadvantages.

" *Ventilation* and other such obvious health measures are also kept under medical supervision.

" *Questions of Suitable Clothing,* boots, gloves, &c., are discussed jointly between the doctor and the lady superintendent.

" *Questions of Food and Canteen* arrangements are discussed with the lady superintendent and the canteen superintendent.

"The doctor advises regarding suitable menus, adequate food substitutes, &c. On the advice of the doctor a free breakfast consisting of porridge and milk, sausage or egg, bread and butter and tea is given to all workers while employed on T.N.T. This takes the place of the milk originally recommended by the Health of Munitions Workers' Committee.

"In our early days it was difficult to persuade the women workers to eat substantial meals, and the doctor was asked to publish a leaflet making an appeal for more adequate feeding on the grounds of health and patriotism. 'Post hoc' (but due also to many other causes) we now find that the great majority of our workers take a substantial mid-day dinner in the canteens.

" *Choosing of Suitable Workers for T.N.T. Processes.*—No worker is engaged for any occupation involving exposure to T.N.T. without being passed by the doctor as suitable.

"During the first few months we engaged girls at the rate of 500 to 600 per week. As, according to present knowledge, the chief dangers of T.N.T. are to the liver and the bone marrow, the attention of the doctor is directed chiefly to the detection of anaemia and 'biliousness' or any liver trouble. No girl with any trace of cyanosis of lips or yellowness of sclerotics is admitted as, although possibly healthy, such a girl would lead to difficulty for the doctor at her weekly medical inspection. The result of this preliminary medical examination is that the T.N.T. workers in the factory conform to a certain standard which, although arbitrary, is of great assistance to the doctor in her subsequent work of inspection and diagnosis.

" *Enquiry into Epidemics, &c.*—The doctor takes measures against the spread of infectious diseases, and sees to the occasional examination of water supply, milk supply, &c. A thresh disinfectant for the sterilization of clothing is installed in the factory."

LEAD.

330. *Disease and its Causes.*—Operatives come in contact with lead and its compounds in a variety of processes in munition factories, e.g., in smelting lead and spelter; in making sheet lead and bullets; in file cutting; in hardening and tempering metals; in common tinning; in soldering and plumbing; in the manufacture of accumulators and of indiarubber; and in the use of lead paints and red lead. Under industrial conditions lead gains access to the body principally by the inhalation of lead fumes or dust. Lead tends to accumulate in the body, and careful investigations have established that a daily dose of as little as 2 milligrammes must be regarded as capable, when inhaled as fume or dust, of setting up chronic poisoning. Lead may also enter the system through the digestive tract, by eating with unclean hands, or by putting pipes or other articles into the mouth while the hands are soiled with lead. Lead is a cumulative poison, that is to say, even small doses absorbed day after day tend to collect in the system and finally cause illness. The existence of a blue line at the gums is an indication of lead absorption, and headache, colic, constipation and marked paleness are early manifestations of poisoning.

331. *Prevention.*—The prevention of inhalation of dust or fumes is the principle underlying the Regulations made by the Secretary of State for the chief industries concerned with the manipulation of lead and its compounds. Inhalation of lead in the form of fumes or dust can only be avoided with certainty by preventing the production of dust (e.g., by keeping all lead material damp), and by ensuring the lead fumes do not escape into any place in which work is carried on. The nature of certain processes, however, may render the production of dust inevitable or the escape of fumes possible. Under such conditions localised exhaust ventilation should be applied as closely as is practicable to the point of origin, so as to withdraw the dust or fumes from the atmosphere of the workplace. Respirators may be required in a few exceptional cases, but, as a protection against dust, only a few of the many forms of respirator obtainable are effective, and no one of them is comfortable to wear; while as a protection against fumes no respirator exists which an operative can be asked to wear for prolonged periods.

332. To prevent lead entering the system through the digestive tract the following special steps should be taken:—

- (a) Smoking should be prohibited in all places where lead is manipulated.
- (b) No person should be allowed to take a meal or to remain during the time allowed for meals in any room where lead is used.
- (c) Special mess rooms or canteens should be provided where workers can take their meals. Good food is of special importance in helping a worker to resist poisoning. In particular, workers should not commence work without having taken food. Evidence shows that hungry and ill-fed workers succumb more readily than others, and excellent results have been obtained from supplying workers with at least half a pint of milk or cocoa before starting work in the morning.

- (d) Overalls should be provided and cloakrooms established, separate provision being made for the keeping of outdoor clothes and overalls respectively; they should never be allowed to come in contact with one another.
- (e) Special washing facilities should be provided, and should be sufficient to enable the workers not only to wash their hands, but also their faces, necks and arms. Such facilities will only be effective if a sufficient supply of hot and cold water, clean towels, soap and nail brushes is always available. In some processes the employment of women, boys and girls is forbidden.

Where their employment is allowed, boys and girls should be closely watched, because they are not so likely to observe the necessary precautions as grown-up people. Women should be especially careful as the injurious effect of lead in them seriously interferes with the health of their children. Only healthy and temperate persons should be employed.

333. The manifestations of poisoning can be detected by a medical man, and their presence indicates that the worker should be transferred to other work. The Home Office Regulations require employers to have persons engaged in various lead industries examined periodically by a surgeon who is entrusted with powers of suspension from work. This medical supervision has been found of much value, and has been widely adopted even in industries not governed by Regulations. It may be usefully extended to all factories where the use of lead oxides or other of its many compounds, may have been introduced into the manufacture of munitions. In the handling of metallic lead, *e.g.*, bullets, the risk of poisoning is very slight, and medical supervision is less important.

AEROPLANE DOPE.

334. In the earliest stages of the war, certain dopes used for aeroplanes contained a poison—Tetra-chlor-ethane—which gave rise to cases of toxic jaundice amongst those engaged in its manufacture and manipulation. In addition, numerous cases of ill-health occurred. The manufacture of these dopes ceased in September, 1916. The dopes now in use, though free from Tetra-chlor-ethane, are still not without harmful effects upon the health of the worker. Volatile constituents of the new dopes and varnishes, such as acetone substitutes, benzol, &c., though they have not been found so far to produce illness of the nature produced by Tetra-chlor-ethane, cause headache, dryness of the throat, coughs, nausea, sickness and serious anæmia.

335. Good ventilation of the dope room decreases the intensity of the symptoms. On the other hand, the effects are aggravated by the temperature of 65 to 70° Fahrenheit which has to be maintained, and it is of great importance to procure a satisfactory solution of the problem of ventilating the dope rooms while maintaining the requisite temperature.

The localised exhaust of the dope fumes at the point of their origin is hardly practicable in the case of parts having the size of aeroplane wings. In some works, however, a partial solution on these lines is obtained by laying the wing to be doped in a large shallow tank connected to an exhaust fan, and as the doping proceeds, drawing a spring roller-blind arrangement in stages across the open top of the tank. Small components such as wheel covers can be doped under suitable hoods having a localised exhaust. The fuselage and cockpit can be doped separately in the doping room before the machine is erected, or the machine, when completed, can, if practicable, be run for doping into a cubicle provided with exhaust fans. If the size or weight of the machine make it impracticable to use a doping cubicle the dope can be applied to the fuselage when in the erecting shop, provided the shop is of large size and well ventilated by natural means, and provided the doping is done after the ordinary hours of employment.

The Home Office requirement with regard to the ventilation of dope rooms is that the air shall be changed 30 times per hour. This standard also applies to doping cubicles. In order to attain it, in conjunction with the maintenance of a temperature of 65 deg. to 70 deg. Fah., economy demands that the height of the room should not be much more than sufficient to accommodate the largest size of wing to be doped. The average height, the Home Office recommends, should not be greater than 15 ft. to 20 ft., or less than 10 ft.

Dope rooms and cubicles should preferably be ventilated by means of extraction or propeller fans of the open blade type, having a free intake to the fan and a free discharge to the open air. Louvres, wind screens or other obstructions should not be fitted on the discharge side, as these considerably reduce the output. As the fumes are heavier than air, the fans should be installed at, or arranged so as to draw from, a point near the floor level. If the air inlets into the dope room are properly proportioned—the total inlet area should not be less than three times the discharge area of the fans—no draught should be felt in the room, either with the doors closed or opened temporarily to allow passage of persons or materials. The air inlets should be provided at the side of the room opposite the fans and at about 10 ft. above the floor level. They may be of the open hopper type, or be covered with cheese cloth, to serve as a dust filter and to diffuse the incoming air currents. The provision of ample air inlets prevents the formation of pockets of dense fumes in the room by draughts of high velocity, and the impingement of such draughts on the doped surfaces with the consequent formation of white patches on the fabric. It may be remarked that the Home Office authorities have always been strongly opposed to plenum ventilation in dope rooms.

The heating of the air may be effected by means of numerous steam or hot water pipes and radiators placed close to the air inlet openings, by hot air plenum ducts, hot air stoves, slow combustion stoves or hot chambers heated by steam pipes. It should always be remembered that the temperature and rate of change of air with a given plant are inter-connected, and that if the air inlets are closed, the fans slowed down or the outlets partially obstructed so as to attain the temperature required, the standard of ventilation is correspondingly reduced. It is not advisable greatly to exceed the specified number of changes of air per hour—30—as some have done to be on the safe side. If the changes are made 60 to 100 per hour, the maintenance of the required temperature in cold weather becomes impossible. In lofty shops, if difficulty is experienced with regard to the temperature, the height of the room should be reduced by match-boarding or other non-conducting material, and the walls of temporary buildings should be lined with wood.

Doping should be commenced at the end of the wing nearest the exhaust fan. The workers, when not applying the dope, should stand as near the fresh air inlets as possible. Work should not be commenced on an empty stomach. The workers must not be allowed to take a meal in the dope room. If no provision is made for removing the wings to a separate drying room as soon as the dope is tacky, the wings should be placed to dry in a position between the workers and the fans, but not so as to obstruct the fans.

336. With a view to reducing ill-health amongst the workers so far as possible, the following preventive measures are also desirable :—

- (a) Periodic medical examination of all workers should be provided for.
- (b) Periods of exposure should be reduced to a minimum, and not prolonged by overtime.
- (c) Operatives should not be allowed to remain in the work place during meal hours.
- (d) Adequate facilities should be provided for obtaining sufficient and nourishing food.
- (e) Overalls should be provided.
- (f) Adequate washing accommodation should be provided.

POISONOUS GASES.

337. The chief dangers arising from the manufacture and manipulation of poisonous gases are :—

- (a) Poisoning by the lethal and lachrymatory gases ;
- (b) Irritation of the skin, eyes and other exposed parts of the body, caused by the handling of raw materials or finished products ;
- (c) Mechanical accidents ; these, however slight in the first instance, may become serious, unless they receive prompt medical attention on account of the poisonous character of the bodies handled or manufactured.

338. Apart from mechanical safeguards against accident, the principal measures necessary for prevention and treatment are :—

- (a) The appointment of a medical officer for each factory ;
- (b) The medical examination of all workers before engagement, and at frequent intervals during employment ;
- (c) Suitably equipped ambulance stations in charge of a trained nurse and under the constant supervision of the medical officer ;
- (d) Hospital accommodation for special cases ;
- (e) Suitable protective clothing (including overalls, helmets, respirators, gloves, goggles and clogs) ; all such clothing must be worn only during the period of actual working. Overalls should be washed weekly.
- (f) Suitable cloakrooms ;
- (g) Washing facilities sufficient to enable workers to wash thoroughly at the end of each period of work ;
- (h) No food may be taken into a workplace ;
- (i) Adequate facilities for obtaining food.

339. Notification is required of all cases of gassing, eczematous affection of the skin, inflammation of the eyes, poisoning and mechanical accidents.

FULMINATE OF MERCURY.

340. *Disease and Its Causes.*—In the manufacture and use of fulminate of mercury, there is a liability of mercurial poisoning and eczema. Owing, however, to the small amounts manipulated, the symptoms of mercurialism are seldom marked, but a blue line may be seen on the gums, appetite may be impaired, headache may be present, and there may be nervousness and depression. The last symptom is important, not merely as a sign of illness, but as an indication that the operative should be removed from dangerous work which calls for a steady hand and a clear head. Eczema of the hand, forearm, and face occur, and may cause serious disability.

A medical examination of 60 women workers employed on manipulating substances containing mercury fulminate showed that only five had remained in good health throughout their work at the factory. The most common symptoms were *rash* on face or hands (41·6 per cent.) often associated with severe *internal pains*, sickness and diarrhoea (30 per cent.). The *eyes* are often affected, either with conjunctivitis (35 per cent.) or inflamed lids (20 per cent.). *Soreness of mouth and gums* occurred in 21·6 per cent., though salivation was infrequent (7 per cent.) and a blue hue on gums was only noticed in two instances. Workers complained of the difficulty caused by soreness of the mouth, as this affected their appetite and was most painful if artificial dentures were worn. *Disorders of menstruation* occurred in 20 per cent. of those examined, and *depression* was marked in 25 per cent. *Sleeplessness* was generally due to the irritation produced by the rash, probably increased by the fact that at least 25 per cent. of the women admitted that they slept in some clothes worn during the day. It was ascertained that 41·6 per cent. wore neither veil nor respirator, although in about 30 per cent. the onset of symptoms was associated with sneezing or signs of "cold" due to the inhalation of the mercurial powder.

The greatest susceptibility was shown in the case of a woman in whom mere contact with a mercury worker wearing a dirty overall was sufficient to produce a rash. Rashes were more severe in those women who did not wear veils or respirators, it was noted that one worker who remained immune for two months habitually used a veil, respirator and goggles, though it cannot be said that these afford complete protection.

341. *Prevention.*—The principal preventive measures to be adopted should include—

- (a) The provision of overalls and of adequate cloakroom and washing accommodation;
- (b) Adequate facilities for obtaining food. No worker should be allowed to commence work without food;
- (c) Careful selection of workers;
- (d) Where exposure is marked, periodical medical examination;
- (e) Transference to other work of those specially affected.

TETRYL (TETRA-NITRO-METHYL-ANILIN).

342. *Disease and its Causes.*—Manipulation of this explosive produces a light dust, which may cause troublesome eczema. Individuals vary in their susceptibility; some appear to be almost immune, while others can hardly enter a room where tetryl is handled without suffering severely. Observation suggests that this may depend on the varying natural dryness or moistness of the skin of different persons. The parts most frequently affected are the conjunctivæ, the openings of the nostrils and the chin. The hands and arms are less often affected, and in this the eczema caused by tetryl differs from that due to tri-nitro-toluene, which usually affects the forearms and hands. Operatives manipulating tetryl may also suffer from headache, drowsiness, and lack of appetite in varying degrees of intensity.

343. *Prevention.* The principal measures to be taken consist in:—

- (a) Avoiding the escape of dust by carrying out manipulations in glass cupbords with armholes for introduction of the hands.
- (b) Providing light gauze veils to protect the faces of the workers.
- (c) Supplying, if veils are not worn, some simple powder (such as a mixture of one part of zinc oxide to two parts of starch) for applying to the face before beginning work).
- (d) Providing adequate washing accommodation and encouraging the use after washing of an application for the skin.*
- (e) Excluding workers who show special susceptibility or idiosyncrasy.

344. Apart from its tendency to cause eczema, tetryl stains the skin and hair; in order to prevent this, overalls and gloves should be worn, and, where women are employed suitable head-coverings should be used.

PICRIC ACID.

345. Picric acid (Melinite or Lyddite) is known chemically as tri-nitro-phenol, and is made by the nitrating action of mixed acids upon carbolic acid. The manufacture, though simple, exposes those engaged in it to risk of the inhalation of nitrous fumes. Workers engaged in the use of picric acid, however, are usually regarded as being employed in a non-poisonous occupation. Those handling it usually become dusted over with a fine yellow powder which stains the hair and exposed skin surfaces of the body a bright canary yellow colour. Occasionally an irritating dermatitis of a simple type is found on the hands and forearms; and those who are commencing work for the first time in picric acid may have an initial gastritis, which passes off in two or three days. Systemic poisoning, however, is practically unknown among picric workers, and much confusion has arisen between the negative effects of picric acid and the ill effects of T.N.T., since both stain the skin a yellowish colour and workers are apt to call all shell filling work T.N.T.

346. Except in relation to nitrous fumes, which are dealt with below, no special precautions are called for.

NITROUS FUMES.

347. The present demand for explosives, nearly all of which are products of nitration, has introduced increased risk of exposure to nitrous fumes, not only in nitrating processes, but also in the manufacture of nitric acid to be used in these processes. The Factory Department of the Home Office have issued the following memorandum:—

"In the manufacture of nitric acid, and in its use for various purposes, particularly in the manufacture of explosives, danger exists of accidental escape of nitrous fumes into the workplaces. The full effect of inhaling these fumes is not felt immediately, and unless workers are warned of the danger, they may continue at work and unwittingly inhale a fatal dose.

"In such a case the affected person develops an irritating cough which becomes steadily worse, until, three or four hours after exposure, he becomes seriously ill, suffering from marked dyspnoea and collapse; sometimes these symptoms have come on after leaving work on the way home. The secretion of mucus now becomes profuse, and vomiting, which helps to clear the air passages, may occur. The congestion of the

* An application found of value to prevent eczema is a mixture of two parts of castor oil to one part of lanoline; this mixture, which should be rubbed into the skin after washing on leaving work, should be placed in the lavatories for general use.

bronchioles and alveoli progress, and, if the case survives for 48 hours definite pneumonic consolidation may develop. More frequently a fatal issue results in about 30 hours, the patient remaining conscious until near the end.

"Every case exhibiting the initial symptoms does not progress to a fatal termination, and recovery has occurred even after marked collapse and dyspnoea.

"*Prevention.*—Notices warning those employed of the danger of remaining in an atmosphere containing nitrous fumes should be posted in every place where there is any possibility of these fumes escaping.

"Emergency helmets* of a pattern which can be easily and quickly put on, and provided with a fresh air supply from without, should be kept in accessible places near at hand, and the efficiency of such helmets should be tested at least once a month.

"Respirators such as are efficient to intercept dust are useless against gases, and must not be used.

"*Treatment.*—The following routine may usefully be pursued pending the arrival of a medical man :—

"Make the patient lie down.

"Keep him warm.

"See that he has plenty of fresh air.

"If he is blue in the face :—

"(i) Administer oxygen ; and

"(ii) If he has not been sick, give a drink of 1 ounce of salt in 10 ounces of lukewarm water and repeat the dose until he is sick ;

"(iii) Meanwhile, send for a doctor.

"Persons even apparently slightly affected must not be allowed to walk home until permitted to do so by the doctor."

DERMATITIS.

348. *Disease and its causes.*—The occurrence of serious dermatitis, or eczema, caused by exposure to trinitrotoluene and to tetryl has already been referred to ; and similar trouble may result from exposure to fulminate of mercury. Apart, however, from these special substances, eczema is liable to occur among munition workers employed in engineering works, who come in contact with certain fluids used to lubricate and to cool metals. Two forms of inflammation of the skin, which however may coexist, result—(i) yellow pustules and boils, and (ii) more general inflammation which in marked cases develops into typical weeping eczema. Probably the occurrence of pustules and boils is due to sebaceous glands and hair follicles becoming blocked and infected with oily grime rubbed in by soiled overalls. The more general inflammatory conditions appear to be caused by the direct action of the fluids used, accentuated by the abrasive effect of fine particles of metal produced during machining processes.

349. *Prevention.*—Clean overalls, and the provision and use of suitable washing accommodation with hot water laid on, have proved to be the best means of prevention.

350. The First Aid Leaflet issued by the Factory Department of the Home Office contains the following advice in regard to eczema from lubricating oil :—

"Dermatitis and eczema from oils and fluids used to lubricate and cool metals can best be prevented by cleanliness of (1) the overalls, and (2) the skin. All overalls should be washed weekly ; and the hands and forearms daily in warm water before leaving the factory. Lanoline and castor oil ointment (equal parts) applied to the skin after washing is a help. When dermatitis and eczema occur washing should be stopped and a doctor seen at once."

351. Experience has shown that, if lubricating and cooling fluids are filtered free from metal particles, and if they contain a small amount of some antiseptic, say carbolic acid up to 1 per cent. or other coal tar antiseptic, cases of eczema do not occur. Antiseptic lubricants and cooling fluids are rapidly coming into general use in engineering shops, and cases of eczema are less prevalent than formerly.

SECTION XIV.

CLEANLINESS, VENTILATION, HEATING AND LIGHTING.

FACTORY ENVIRONMENT.

352. The Factory and Workshop Act, 1901, Section 1 (i) provides as follows :—

"The following provisions shall apply to every factory as defined by this Act, except a domestic factory.

(a) It must be kept in a cleanly state.

(b) It must be kept free from any effluvia arising from any drain, watercloset, privy, urinal, or other nuisance.

(c) It must not be so overcrowded while work is carried on therein as to be dangerous or injurious to the health of the persons employed therein.

(d) It must be ventilated in such a manner as to render harmless, so far as is practicable, all the gases vapours, dust or other impurities generated in the course of the manufacturing process or handicraft carried on therein that may be injurious to health."

* Such helmets can be procured from Messrs. Siebe, Gorman & Co., Ltd., 187, Westminster Bridge Road, London, S.E.

353. In subsequent sections these various requirements are elaborated. It will be convenient to deal with them separately.

CLEANLINESS OF FACTORY.

354. As has already been pointed out, the first provision of the Factory Act is that the workshop must be kept in "a cleanly state." Section 1 (3) deals with lime washing.

355. A high standard of cleanliness not only is essential for health but also has an important bearing on the self-respect of the workers. The difficulties in maintaining such a standard are frequently substantial, and constant attention is necessary. In the majority of Munition Works the conditions are not unsatisfactory in this respect, but in some works, and especially in the older and more crowded ones, the conditions leave much more to be desired. If dust is allowed freely to accumulate, its inevitable circulation in the air represents a material danger to health even where it is not derived from poisonous substances.

356. *Flooring.*—(Section 8 (1).) If the floor is to be kept clean it should be hard, smooth, durable and impervious. While flooring of concrete or similar material may be best for the parts of a shop where the machinery is placed and for passage ways, it is not the material most suitable for workers to stand on. It is a matter of common knowledge that some softer material such as wood is much less fatiguing to stand on for any continuous period. It is also warmer for the feet—a matter of no small importance in cold weather. Where the processes render a wet floor unavoidable it is extremely desirable, however effective the drainage may be, to provide low wooden platforms upon which the worker can stand.

GENERAL VENTILATION AND HEATING.

357. The provisions of the Factory Act in regard to these two matters are as follows :—

Section 7 (i).—"In every room in any factory or workshop sufficient means of ventilation shall be provided and sufficient ventilation shall be maintained."

Section 6 (i).—"In every factory and workshop adequate measures must be taken for securing and maintaining a reasonable temperature in each room in which any person is employed, but the measures so taken must not interfere with the purity of the air of any room in which any person is employed."

358. In their report dated 1902 the Departmental Committee on "The Ventilation of Factories and Workshops" recommended that :—

"such a standard of ventilation should be prescribed for all classes of factories and workshops not otherwise specially dealt with, that the proportion of carbonic acid in the air at about the breathing level, and away from the immediate influence of any special source of contamination, such as a person or light, shall not (except on very foggy days, when no tests should be made, on account of the vitiated state of the outside air) rise during daylight, or after dark when only electric light is used, beyond 12 volumes of carbonic acid per 10,000 of air, and that when gas or oil is used for lighting the proportion shall not exceed 20 volumes after dark or before the first hour after daylight."

359. The standard thus recommended has generally been adopted by the Home Office in determining whether the ventilation of a factory is sufficient within the meaning of the Act.

360. The Factory and Workshop Act is concerned only with the minimum necessary in ordinary times, but present conditions and circumstances render it necessary to consider the problem of ventilation from a somewhat different standpoint. At present the importance of proper and effective methods of ventilation are intensified by the increase in the number of workers (many of whom are new to industrial conditions), by the long hours of work, and by the continuous occupation of the shops by day and by night. Frequently there is no interval in which natural ventilation can restore a vitiated atmosphere, and each shift succeeds to the conditions of ventilation left by its predecessor.

The objects of ventilation are to provide :—

- (a) Air which is pure and clean for the workers to breathe ;
- (b) An atmosphere which is stimulating and refreshing.

361. Air which is entirely pure from the chemical point of view may afford an atmosphere of a most depressing character which is highly detrimental to physical efficiency. It is not enough to aim only at clean air, as has been often the custom in the past, or only at a stimulating atmosphere. Both objects must be constantly borne in mind.

362. *Clean Air.*—The impurities which are liable to be added to the air inside the workshop are—

- (a) Carbonic acid given off in the breath of human beings, and by fires, gas lights or any other form of open combustion. Carbonic acid in the percentage found in rooms and factories is harmless, but it affords a useful indication of the efficiency of ventilation. If it is efficient the percentage of carbonic acid will not measurably exceed that in the atmosphere. This is the ideal to be aimed at, rather than the practice hitherto followed of keeping the acid below 12 parts per 10,000 of air in day time and below 20 at night.
- (b) Various ill-defined volatile substances arising from human beings, from the skin and the alimentary canal, especially when personal cleanliness is defective. These substances are probably harmless in themselves, but they excite a feeling of discomfort or even of disgust.

- (c) Bacteria arising from human beings form a more definite and more directly harmful sort of impurity. Colds, sore throat, influenza and the like are largely spread from an infected individual to his neighbours by organisms which are carried in the air. Though these diseases may be regarded as trivial in character, there can be no doubt as to the amount of industrial inefficiency which they cause. Of diseases more serious as regards life as well as health tuberculosis of the lungs is undoubtedly found disseminated in a like manner.
- (d) Industrial processes may give rise to varied impurities such as dust and fumes. Some are simply unpleasant, others are directly harmful. Fuller reference to these has been made in Section XIII.

363. It is obvious that the kind of impurity present in any particular workshop will vary widely with the prevalent conditions. Given normal conditions, impurities can be removed by an effective system of general ventilation.

364. *Stimulating Atmosphere.**—At first sight a workshop may have so large a cubic capacity in relation to the number of work-people and the kind of process in operation that it does not require any definite ventilation. This is wholly false. In large shops there is a mass of stagnant atmosphere which is obviously depressing and relaxing, and fails entirely to provide the stimulating effect of cool air in gentle motion which is provocative of the best physical and mental exertion. This exhilarating influence of atmosphere depends essentially upon the cooling of the skin by moving air, and is closely connected with questions of temperature and heat. Cool air is more stimulating than warm, and more conducive to physical effort. Damp warm air is more relaxing than dry air at the same temperature. These considerations are fully borne out by direct experimentation in the laboratory, and the desirable atmosphere is characterised by being—

- (a) Cool rather than hot;
- (b) Dry rather than damp;
- (c) Diverse in its temperature in different parts and at different times rather than uniform and monotonous;
- (d) Moving rather than still.

365. The explanation of the familiar conditions of such an atmosphere appears to lie in the cooling and varying stimulation of the skin of the exposed parts of the body. The concentration of a current of air on too small a part of the body only causes what is commonly known as a draught. It is a common experience that a slightly open window causes a draught, whereas a widely open window does not.

* Whether a workshop has an atmosphere which is satisfactory in this sense may generally be judged by the sensations, especially on first entering from the outside air. More accurate information may be obtained by the study of the particular way in which a "stuffy" atmosphere may be made "fresh." The ordinary thermometer measures the temperature of the air; the wet-bulb thermometer determines the humidity and gives an important measure of the facility with which the body can be cooled by sweating. These instruments, however, give only very imperfect data as to the cooling and skin-stimulating properties of any atmosphere, and it is necessary to have in addition some measure of the rate at which a warm body will lose heat.

In the observations made for the Committee by Dr. Leonard Hill, the rate of cooling has been investigated by means of the Kata thermometer (purchasable from J. Hicks, 8, Hatton Garden, E.C.). A large bulbed spirit thermometer (of standard size) is used; this is heated in hot water, and the rate of cooling measured by taking the time which the meniscus takes to drop from 100 degrees F. to 95 degrees F. while the instrument is suspended in the atmosphere. This gives the dry reading, and shows the rate of cooling due to radiation and convection. To take the wet reading the bulb of the Kata thermometer is covered with a damp muslin glove and the operation repeated, giving the rate of cooling when evaporation is added to radiation and convection. The rate of cooling at body temperature is recorded by means of a factor (determined for each Kata thermometer) in mille calories per square centimetre per second. The number of seconds occupied in the fall from 100 degrees to 95 degrees is divided into the factor.

In addition to the readings of the Kata thermometer those of the wet and dry bulb thermometer were taken. The records show how with the same wet and dry bulb readings, the rate of cooling may be strikingly different. The Kata thermometer, like the human body, notes the rate of change, while the thermometer notes a given state or the result of change. Thus the Kata thermometer takes count of the movement of the air and indicates conditions of comfort.

The following examples are given in illustration of the results obtained. The first set of readings are for a bright pleasant day in May, and the other four are for typical shops as a contrast of types of "bad" and "good" shops. A comparison of the first, second and third sets of readings shows that with the same temperature widely different rates of cooling may exist.

RATE OF COOLING AT BODY TEMPERATURE IN MILLE CALORIES PER SQ. CM. PER SEC.

	Wet Bulb.	Dry Bulb.	Radiation, Convection, Evaporation.	Radiation, Convection.	Evaporation.
(1) Bright, pleasant day in May, out of doors ...	60	68	27.2	7.5	19.7
(2) Brass foundry (good)	60	72	24	7.3	16.7
(3) Machine shop (bad)	61	72	15	4.6	10.4
(4) Cartridge annealing and cleaning (bad) ...	64.5	80.5	17.5	3.0	14.5
(5) Cartridge annealing and cleaning (good) ...	54.5	60.0	24.0	9.0	15.0

WAYS AND MEANS.

366. The ventilation and heating of every workshop provides a separate problem. There is no uniform or stereotyped method which will give satisfactory results everywhere. The means to be adopted must be subject to local considerations in each case, and the general lines alone can be indicated here :—

- (a) Cubic capacity is the first essential. Though the minimum of 250 cubic feet per worker (400 during any period of overtime) prescribed by S. 3 (1) of the Factory Act is seldom infringed, the provision of adequate ventilation may be rendered difficult, owing to the close proximity of the workers to one another. They should at least be so arranged that they do not cough or sneeze in each others faces.
- (b) Definite openings communicating with the outside air should be provided in every workshop, preferably opposite each other. The average machine shop and all similar one-storey shops should be provided with louvres along the length of the roof ridges, or better with narrow openings where the roof meets the wall. Such louvres should be permanently open and would generally ensure that the atmosphere will at least not be grossly bad.
- (c) Such fixed openings do not, however, allow of the flexibility required to meet varying internal and external conditions, and should be supplemented by the use of doors and windows (which will open) and fans. Fans are specially valuable to meet emergencies, and abnormal conditions, and provide for the thorough cleaning of the air during meal-times.
- (d) Local sources of impurity and heat production should be dealt with by the provision of hoods, exhausts, &c. (see also paragraphs 372-379). Smoke and fumes from neighbouring chimneys may also require attention.

367. As a result of a detailed inquiry into the conditions of ventilation at an important factory, a member of the Committee reports :—

"The skylight method of ventilation is a bad one, unfortunately it pertains throughout the factory, both in old and new shops. The opening of a skylight leads to a local draught and this usually entails its closure. The skylights too take time and trouble to open and shut, and rain comes in when they are open and may rust metal work upon which it falls. For these reasons the opening of the skylights is generally neglected, except at the intervals when a special set of men carry out the duty. Moreover, skylights opened here and there do not ventilate the shop in all its parts. The warm smelly air rises up against the roof and does not escape in parts where no skylights are open. A very great improvement would be made in all these shops if louvres were introduced running continuously along the whole length of each serratation of the roof. These louvres would allow a ceaseless, draughtless and equal ventilation of every part of the shops. It is regrettable that the new shops should not have been designed with such louvres, for the efficiency of their action is demonstrated in many factories.

"The smell of oil and soap suds can be lessened by strict attention to cleanliness. Similarly the cleaning of machines and floors is the first thing to pay attention to in regard to the smell of the machine shops. In the stress of present conditions and lack of labour cleaning is sure to suffer. Continuous roof louvres would ensure ceaseless change of air and a cooler temperature, and these together would ensure a much fresher atmosphere. The monotonous smell and lack of freshness of the air nervously disturbs the more sensitive men who are working long hours and at a high pitch, men some of whom have been used to an open-air life, and who, acquainted with the popular but erroneous doctrine of ventilation, concern themselves over chemical poisons in the air, the presence of which they believe to be indicated by the close smell.

"In the days of hot summer weather there is no means provided of cooling the workers beyond the stirring of the air produced by the shafting and belts. In some of the shops the Committee saw in action impulsion fans, each placed high up on the wall of the factory with a sheet of canvas placed below it and stretching out into the shop so as to act as a baffle. These fans sent a grateful current of moving air through the shop in hot weather. Such an installation repays itself by the increased efficiency of the workers."

368. It is unnecessary to emphasise the close connection which exists between ventilation and temperature. For a shop to be too hot is disadvantageous from every point of view, but the stimulation of too cold an air may be more than counterbalanced by the physical depression which results, and in cold weather efficiency may deteriorate because the worker becomes uncomfortably chilled.

In his memorandum on the causation of industrial accidents, Dr. Vernon states that :—

"At each of the three shell factories B, C and D the women's accidents greatly increased during cold weather. The men's accidents increased, though to a less extent, at two of the three factories, and but for exceptional conditions would have increased at the third factory likewise. At factory A there was no detectable seasonal change in the number of accidents, and so there can be very little doubt that if the shell factories had been more adequately heated the whole of the seasonal increment of accidents might have been avoided. The data collected at factory A show that in order to reduce accidents to a minimum the temperature should be kept at 65-69 degrees, but probably not much harm would be done so long as it was not allowed to fall below about 55 degrees. As the temperature falls below 50 degrees, however, there can be little doubt that accidents increase very rapidly. An external temperature at freezing point probably meant an internal temperature of about 45 degrees at factory C, and a temperature of 40 degrees or less at certain parts of factory B, and we saw that under such conditions the women's accidents were respectively 48 per cent. and 143 per cent. greater than when the external temperature was above 47 degrees."

369. Dr. Vernon adds the opinion that "the optimum temperature for accident limitation is higher than the optimum for output." What is the best temperature depends on the character of the work and the habit of the worker. Sedentary workers require a warmer atmosphere than those engaged in more violent labour. It may, however, be suggested that when the air is stagnant the temperature should not exceed about 60 degrees F., though it may be somewhat higher when the air is in motion.

370. Means of heating are usually restricted by practical considerations to some system of steam heating or hot-water pipes; the ideal form is no doubt by radiant heat, as may be seen from the excellent and invigorating conditions which prevail in many smithies and forges. Gas-heated radiators in which the burnt gas escapes into the shop are not permissible. A plan by which warmed air is pumped into the shop (commonly known as the "plenum system") tends to create an atmosphere of a highly relaxing and depressing character. The means of ventilation should be kept separate from that of heating, and the "plenum system" should only be used to pump in cool air in summer.

371. *Maintenance.*—The most complete installation for ventilation and heating may be rendered ineffective by injudicious management or failure in proper or continuous maintenance. Rapid changes of climate at different times of the day, varying circumstances of use and occupation, all require appropriate treatment. Mismanagement is frequently due to the fact that it is the prescribed duty of no one in particular to observe the prevailing conditions and to put in operation the appropriate appliances for the supply of air and heat, and the Committee are of opinion that some responsible person should be specially detailed for the purpose. While it is for the management to provide the means it is for the workers to aid in their use and application. The effective maintenance of ventilation is the more important owing to the large number of women now employed in munition works, since women are especially susceptible to the effects of defective ventilation.

LOCAL AND EXHAUST VENTILATION.

372. In addition to the general provisions in regard to ventilation, the Factory and Workshop Act contains various special provisions in regard to the provision of local or exhaust ventilation in the case of dangerous or unhealthy industries.

Section 74 provides—

"If in a factory or workshop where grinding, glazing, or polishing on a wheel, or any process is carried on by which dust, or any gas, vapour, or other impurity is generated and inhaled by the workers to an injurious extent, it appears to an inspector that such inhalation could be to a great extent prevented by the use of a fan or other mechanical means, the inspector may direct that a fan or other mechanical means of a proper construction for preventing such inhalation be provided within a reasonable time; and if the same is not provided, maintained and used, the factory or workshop shall be deemed not to be kept in conformity with this Act."

Section 79 provides that—

"Where the Secretary of State is satisfied that any manufacture, machinery, plant, process, or description of manual labour, used in factories or workshops, is dangerous or injurious to health or dangerous to life or limb, either generally or in the case of women, children, or any other class of persons, he may certify that manufacture, machinery, plant, process, or description of manual labour, to be dangerous; and thereupon the Secretary of State may, subject to the provisions of this Act, make such regulations as appear to him to be reasonably practicable, and to meet the necessity of the case."

373. Local or exhaust ventilation is normally required to remove from the atmosphere dust, heated fumes, or volatile vapours. The essentials to such ventilation are—

- (a) A duct along which a flow of air is maintained in a definite direction.
- (b) Suitable opening or openings in the duct through which the dangerous substances are withdrawn.
- (c) Suitable openings for the admission of air into the workroom.

374. Nearly every work place has special problems in the solving of which expert advice may be necessary. There are, however, certain principles that are generally applicable to all such instances. The duct along which a flow of air is maintained should be of sufficient length and size. It must not contain bends so sharp as to impede the flow of air. The opening or openings through which the air enters the duct must not be too small or they may become choked with dust. The openings should have hoods so arranged as to surround so far as possible the seat of origin of the substance to be removed. In the case of dust from a revolving wheel, the hood and duct should be placed so as to intercept the dust which is thrown tangentially from the wheel and to catch dust which would otherwise fall to the ground; the dust then comes under the influence of the air current in the hood, and is drawn into the duct, while the air current itself is assisted by the air thrown off by the wheel. Where dust is created by manual labour the operative should stand or sit facing the opening of the hood so that the current of air draws the dust away from him.

375. For heated fumes the hood should be bell mouthed, and its lower end should envelop and extend below the place from which the fumes originate. The opening of the hood should be at such an angle as to prevent accumulation of dust, or in the case of heated fumes to prevent the expanding gases from rebounding and escaping like smoke from the badly constructed chimney. Volatile substances are difficult to localise. If, as is usually the case when noxious vapours have to be dealt with, the vapour is heavier than air, the openings to the duct must be at the ground level and as near as practicable to the place where the vapour is given off.

376. The removal of dust or volatile substances is generally best effected by a current of air produced by mechanical means. Generally speaking, where a keen draught as for the removal of dust is required, pressure fans should be employed since these fans, though requiring more power to drive them, can work against considerable pressure and smaller ducts may be used. Where, on the other hand, large volumes of air are to be removed, volume fans can be more economically employed, but with such fans

attention to the sectional area of the ducts is of great importance. The ducts must never be constricted at any point; the total area of the opening must be greater than that of the fan, and all sharp bends in the duct must be avoided. Further, the delivery side of the fan must not be impeded or so placed as to be exposed to the action of wind.

377. Heated fumes can usually be removed without using mechanical power provided that the duct is vertical and of ample diameter and height. Down draughts should be guarded against by the provision of wind cowls or by other means.

378. The distribution and size of openings for the admission of air to the workroom is a matter of essential importance. To obtain an interchange of air and so secure general ventilation, these openings should be placed as far as possible from the exhaust openings, preferably on the opposite side of the workroom, and to avoid draughts such openings should comprise an area three times that of the exhaust openings. Where volatile vapours are being dealt with, it is specially important that the openings should be ample and should be arranged high up in the workroom. The supply of in-coming air may in some cases be ensured by the use of a pressure fan driving in air through well distributed openings.

379. Experience shows that installations which are in themselves satisfactory frequently fail to effect their purpose through insufficient attention to their care and maintenance. Hoods become detached from ducts; holes are broken into the ducts, and ducts have been found blocked with every kind of débris. The whole installation may be impaired by a dust collecting apparatus with exits of inadequate area.

LIGHTING.

380. The Factory and Workshop Act does not contain any provision in regard to the lighting of factories. The question has, however, been exhaustively dealt with in the Report of the Departmental Committee on Lighting in Factories and Workshops, published in 1915. The essentials of good lighting are summarised as—

- "(a) Adequacy;
- "(b) A reasonable degree of constancy, and uniformity of illumination over the necessary area of work;
- "(c) The placing or shading of lamps so that the light from them does not fall directly on the eyes of an operative when engaged on his work or when looking horizontally across the workroom;
- "(d) The placing of lights so as to avoid the casting of extraneous shadows on the work."

381. An expert witness before the Committee thus summarised the principal effects of good lighting:—

- "(a) The quality of work and output both suffer if the illumination is inadequate, particularly in the case of delicate operations often called for in munition factories. Adequate illumination assisted the supervision of workers, with the result that carelessness and errors on the part of newly trained workers were more readily detected, and instances in which a worker required a rest were noticed more speedily.
- "(b) Inadequate illumination, by adding to the difficulties of skilled labour, increases the nervous strain on operators and reacts on their physical condition.
- "(c) The risk of accident is in many cases increased by inadequate lighting.
- "(d) In cases where machines do not receive sufficient attention the risk of breakdowns is increased.
- "(e) It is generally recognised that operators work more cheerfully in well-lighted rooms; bad lighting on the other hand, has a depressing effect on the spirits, and thus affects the operator's capacity for work."

382. Natural lighting is to be preferred to artificial lighting on grounds of health as well as of economy. Where it can be provided roof lighting is generally superior lateral lighting, especially if it can be arranged that the light enters from the north. In a good system of roof lighting the illumination is very uniform. In modern factories where lateral lighting is employed, a large part of the walls are devoted to windows, but it is evident that there is a limit to the width of the room beyond which the illumination falls below what is adequate. What this width is will depend partly upon the nature of the work to be done in the shop and partly on the extent to which light is impeded by outside obstacles such as neighbouring buildings, or inside obstacles such as machinery.

383. The effect of light coloured walls and white ceilings on the general brightness of the rooms and in forming an effective background to dark objects should not be overlooked. Sometimes the natural lighting may be improved by deflecting vertical light into the room by means of reflectors or prismatic glass, or by whitening the surface of an external wall or building which obstructs the light. The position of permanent working points should be so adjusted in relation to the windows and to internal obstacles of whatever kind as to secure so far as practicable adequate light for each.

384. The necessity for regularly cleaning the windows on the inner and outer surfaces cannot be too strongly insisted on. Not only do dirty windows seriously hinder daylight from entering the shop, but the daylight period of work is considerably shortened and needless expenditure on artificial lighting incurred in consequence. Air-raid regulations have tended to increase this loss of natural light. Dr. Agnew, in the course of his medical inquiries, inquired into this question. He reports:—

"The natural lighting in almost every case would be good if the windows were cleaned regularly, but owing to the Anti-Air Raid Darkening Regulations the windows were not cleaned regularly, or if cleaned regularly the transmission of daylight is interfered with by blinds which have become dislodged or have got out of order and hang loosely about the windows. The advantage of white washing the walls and keeping the ceilings clean was shown by contrast with some workshops where these processes are sadly neglected."

385. In the construction of shops care should be taken to render the outsides of windows easily accessible for cleaning. In many existing shops access is so difficult as to make cleaning almost impossible.

386. Artificial lighting is of special importance at the present time when night work is done, and when women and boys are employed in large numbers. Bad lighting affects output unfavourably, not only by making good and rapid work more difficult but by causing headaches and other effects of eye strain. The difficulties of supervision which are always considerable are further increased if the general lighting of the workshop is insufficient. Attention should be paid to the lighting of passages and the immediate surroundings of the factory as well as to that of the factory itself.

387. In the Report of the Departmental Committee standards of lighting for factories are suggested, and though the figures given are the minima considered necessary, they may at any rate prove of assistance in considering the relative amount of light necessary in different parts of the factory. The unit of illumination is the "foot-candle,"* that is, the illumination produced by a light of one standard candle at a point of a surface one foot from the source and so placed that the light strikes the surface at right angles. Thus, 1 candle 1 ft. from the surface is 1 foot-candle, 50 candles at a distance of 1 ft. is 50 foot-candles, and 50 candles at 10 ft. distance is 0.5 foot-candle.† Light should also be constant and uniform, without glare and without casting extraneous shadows on the point to be illuminated. Artificial lighting is usually obtained by use of coal gas, oils, or electric light. Cannel-coal gas is more illuminant than bituminous-coal gas. The chief results of the burning of coal gas are an increase in CO₂ and watery vapour, raising of temperature, with some production of sulphurous acid and other constituent bodies. Each cubic foot of gas pollutes the atmosphere to the same degree as one adult person. The best form of gas illumination is now commonly obtained by the use of an incandescent-mantle burner properly ventilated. Oil-lamps give fair results, but raise the temperature and give off CO₂ and watery vapour. Electric light is the most hygienic form of illumination. No oxygen is used up, no CO₂ or moisture is produced.

SECTION XV.

SANITARY ACCOMMODATION, WASHING FACILITIES AND CLOAKROOMS.

SANITARY ACCOMMODATION.

388. Section 9 of the Factory and Workshop Act requires that—

"(1) Every factory and workshop must be provided with sufficient and suitable accommodation in the way of sanitary conveniences, regard being had to the number of persons employed in or in attendance at the factory or workshop, and also where persons of both sexes are or are intended to be employed or in attendance, with proper separate accommodation for persons of each sex.

"(2) The Secretary of State shall, by Special Order, determine what is sufficient and suitable accommodation within the meaning of the Section."

389. This Section only applies to those parts of the country in which the analogous provisions of Section 22 of the Public Health Acts Amendment Act, 1890, and of Section 38 of the Public Health (London) Act, 1891, do not have effect. A Special Order was issued by the Home Office in February, 1903. While this Order strictly only applies to those districts in which the provisions of the Factory Act have effect, it may be regarded as prescribing the minimum conditions which are generally considered as sufficient and suitable. The Order includes the following provisions:—

"(a) Not less than one sanitary convenience shall be provided for every 25 females.

"(b) Not less than one sanitary convenience shall be provided for every 25 men provided that—

"(i) Where the number of males exceeds 100 and sufficient urinal accommodation is also provided, it shall be sufficient if there is one sanitary convenience for every 25 males up to the first 100 and one for every 40 after;

"(ii) Where the number of males exceeds 500, and proper supervision and control is exercised by a special officer, one convenience for every 60 men need only be provided in addition to sufficient urinal accommodation.

"(c) the accommodation must be so arranged and maintained as to be conveniently accessible at all times to all persons employed.

"(d) Every sanitary convenience must be kept in a cleanly state, sufficiently ventilated and lighted, and must not communicate with any workroom except through the open air or through an intervening ventilated space.

"(e) Every sanitary convenience must be under cover and so partitioned off as to secure privacy, and if for the use of females must have proper doors and fastenings.

"(f) Where persons of both sexes are employed, the accommodation for each sex shall be so placed that the interior shall not be visible, even when the door of a convenience is open, from any place, where persons of the other sex have to work or pass; if the conveniences for one sex adjoin those for the other, the approaches must be separate."

* On the continent of Europe the *meter-candle* is the unit (= about $\frac{1}{10}$ of a foot-candle).

† Over the "working areas" of workrooms illumination at floor-level should be not less than 0.25 foot-candle; in all open places, roadways, yards or other approaches to workplaces, 0.05 (see Report of Departmental Committee on "Lighting in Factories and Workshops"—Cd. 8000, 1915).

390. In some new factories, or in isolated situations, the most approved system of drainage and construction cannot be carried out, and recourse must be had to pail closets; in such cases the accommodation should be at a higher rate in relation to the number of workers employed than the rate set out above, unless proper arrangements can be made for daily scavenging (out of working hours).

391. Whatever the arrangements made it is of the utmost importance that a high standard of cleanliness should be maintained; especially at the present time this must be regarded as one of the essentials for the maintenance of the health of women workers, many of whom are new to industrial conditions. It will generally be found desirable, if not essential, to appoint someone to be responsible for proper supervision and maintenance. At one time provision for women was often unsatisfactory, largely no doubt owing to the rapid increase in their numbers and to their employment in many factories for the first time. Now, however, conditions are better and the need for proper provision and maintenance is generally recognised. While there has probably been an improvement also in the provision for men, it is in some places still highly unsatisfactory. Thus Dr. Agnew reports of the factories in one district which he visited:—

"The appalling condition of the sanitary accommodation calls for immediate action. In some cases the provision is insufficient, and almost everywhere the condition of such conveniences as are provided is so revolting that it is impossible to describe. They are also commonly situated in almost inaccessible places, the approach to which is particularly dangerous at night."

Conditions such as these should obviously be reformed at the first opportunity.

WASHING FACILITIES AND BATHS.

392. Under the Factory Act and the Regulations of the Home Office and Ministry of Munitions the provision of washing accommodation is only required where workers are engaged on processes in which poisonous materials such as lead or T.N.T. are manipulated. Though provision is most needed where poisonous substances are used, or where heat, dust or dirt are present to an unusual degree, there is a general agreement that washing is beneficial to the health and efficiency of all workers, and that facilities should be provided wherever possible. Account must also be taken of the effect upon the self-respect of the worker, who is able to leave his employment clean and tidy. There is the mutual discomfort of the association with his fellow travellers of a man who returns home straight from work from some dusty or dirty employment. Lastly, there is the relation of cleanliness to good health and personal efficiency, a relation which is sufficiently obvious to make emphasis unnecessary.

393. There is ample evidence of the desire of workers for a more extended provision. Thus a representative Trades Unionist stated in evidence before the Committee that—

"Material improvements in the arrangements for washing are desirable. It would be a great help if a worker could have the opportunity for really washing up and putting himself in a condition to go out with his family without having to return home first. Anything in the nature of evening recreation is rendered almost impossible if a worker has to travel all the way home, perhaps right through the city, and get cleaned up before returning to the city with his family."

394. The Reports upon the medical examination of individual workers contain frequent references to the desire for better facilities. Thus—

"In the bullet department there are only nine basins with cold water and nail brushes provided for 130 girls, 30 of whom handle lead. Soap can nominally be obtained from the forewoman, and towels, conspicuous by their absence, are supposed to be provided bi-weekly to each of two sets of basins. Complaints are made by foremen that towels, &c., are stolen and the workers complain of lack of accommodation. Very little washing is done, I think, although the girls had their hands jet black." In another case "washing facilities are quite inadequate, workers in some departments being unable to wash their hands at all before meals, though at most processes they become very dirty. Many state that they clean their hands with oil, though they are not supposed to use oil for this purpose; others wash their hands in the water running from their machines. Even those who handle lead do not always wash their hands before meals; these latter state that five minutes is allowed for washing, and that hot water is provided but no soap or towels."

395. Since this Report was written there has been a marked advance in the washing facilities provided for women but there is still room for improvement. Experience shows that, when facilities for washing are provided and maintained in a decent state, they are usually used; there may be a short period of inertia at first, but workers have not only no innate desire to be otherwise than clean, but soon bring influence to bear upon any of their fellows who do not avail themselves of the facilities offered.

396. While the general provision of baths cannot be regarded as a practical proposal, there is no doubt that extended provision is highly desirable in the interest of health and efficiency. Provision is at present mainly limited to a few works covered by the Home Office Regulations, or where the processes involve strenuous work in a high temperature. When men are employed under condition of great heat baths may prove an effective antidote to muscular rheumatism. It is unnecessary to emphasise the benefit and refreshment derived from a bath after work under strenuous conditions; where they are provided they are appreciated. Thus an employer has informed the Committee that—

"Spray baths are provided for the foundrymen, who number about 100. Tickets can be bought at the rate of 10 for 3d.; this charge includes the use of towel and soap. Seven minutes out of working hours are allowed each man in the foundry to wash thoroughly before stopping time. Though the foundrymen are not in any way specially selected they use the spray baths greatly, especially in summer."

397. The need for baths is undoubtedly accentuated by the limited facilities for washing generally available in the worker's home. A representative of the National Federation of Blast Furnacemen has informed the Committee that not more than 5 per cent. of the members of his Union have a house with five or six rooms and a bath. "In Lancashire and South Yorkshire many are living in houses of three small rooms with no scullery. Considering the dirty state into which the men's bodies and clothing get when working, baths should be general." The need for baths is also much felt by women living in lodgings, many of whom have come from good homes. In some districts considerable use is made

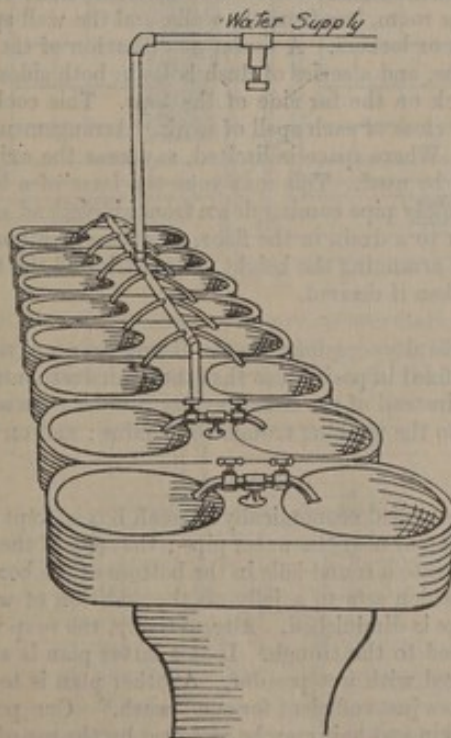
of public baths. Unfortunately there are frequently no public baths within easy access, or they are not open at hours when they can be used by munition workers. While the inadequacy of the housing accommodation available for his workers is not a matter for which the employer can ordinarily be held responsible, yet it is one which he cannot altogether neglect in determining what is necessary to secure their health and efficiency.

Washing Facilities.

398. *Lavatories.*—It is of the greatest importance that attention should be paid to details of construction. Frequently the details seem to have been left to a building contractor with no special knowledge of the hard usage to which fittings are subjected under the conditions of industrial life; as a result lavatories, though adequate when new, may quickly fall into disrepair. Separate basins, originally provided with plugs attached by chains, are found with the chains broken, the plugs lost and the waste pipes stuffed up with rags. Walls against which basins are fixed, unless protected by an enamelled surface, soon become splashed with soap suds, and present an uninviting aspect which cannot be easily or quickly improved. Waste pipes are often too narrow for convenient cleansing, or contain sharp bends and angles, and consequently become blocked or broken.

399. Sufficient provision must be made for draining the lavatory floor, which if, not properly constructed, becomes uneven and the site of pools of dirty water. The floors should be smooth, hard, impervious and properly sloped and graded. Nail brushes and soap, even though frequently renewed, disappear, and thus involve a constant source of annoyance and expense. These troubles may be largely overcome by adhering to certain principles in construction. The installation should be—

- (a) As simple as possible in construction and arrangement;
- (b) Strong and durable, able to withstand considerable wear and tear;
- (c) Sufficient and suitable in accommodation so that a large number can wash together or in a short time*;
- (d) Economical in space;
- (e) So constructed that it can be easily cleaned, and contain a minimum of removable or detachable articles;
- (f) Basins, if provided, should not be too small and should not have grooved rims;
- (g) Provided with an ample supply of water (hot and cold);
- (h) So situated in the factory as to be readily accessible; and
- (i) Well lighted, thoroughly ventilated and kept at a reasonable temperature.



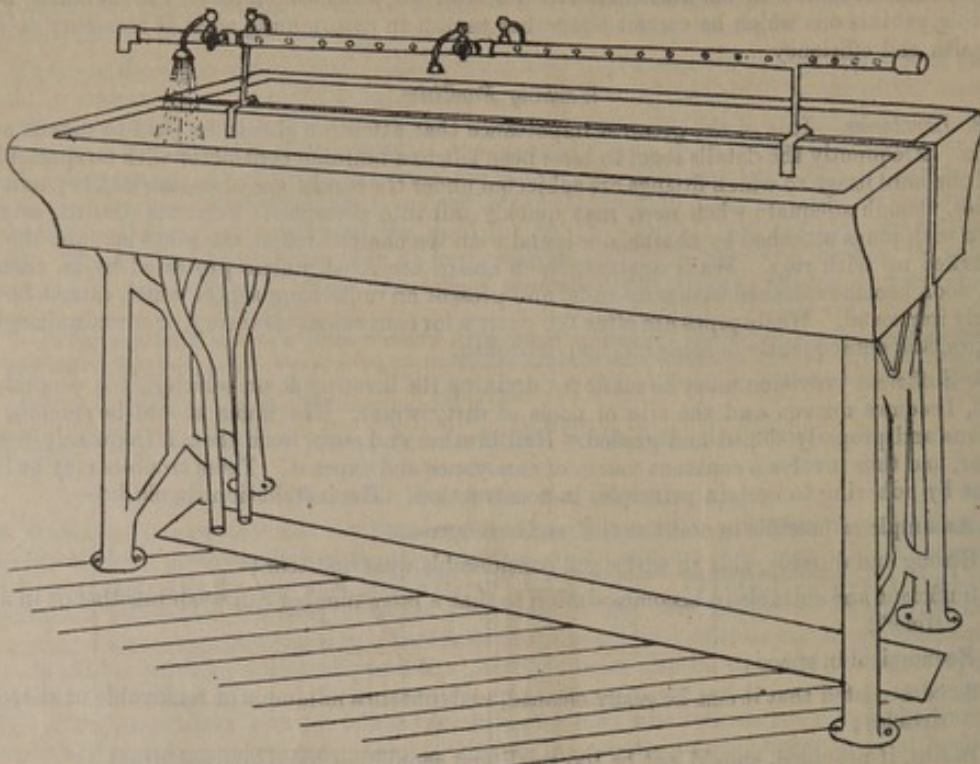
† FIGURE 1.

*The standard adopted under Factory Regulations is as follows:—The washing conveniences should be under cover, and maintained in a cleanly state and in good repair. There should be either—

- (a) A trough with a smooth impervious surface (fitted with a waste pipe without plug), and of such length as to allow at least 2 feet for every five persons, and having a constant supply of water from taps or jets above the trough at intervals of not more than 2 feet; or
- (b) At least one lavatory basin for every five persons, fitted with a waste pipe and plug, or placed in a trough having a waste pipe, and having either a constant supply of hot and cold water or warm water laid on, or (if a constant supply of heated water be not reasonably practicable) a constant supply of cold water laid on, and a supply of hot water always at hand when required for use by persons employed.

† Handbasins as used in a National Projectile Factory.

400. Where difficulties arise in regard to the use of ordinary lavatory basins they may in certain cases be overcome by using such a washing trough as that illustrated in Figure 2. Here the necessary plumbing



* FIGURE 2.

is reduced to a minimum; there is no plug; washing is done under a spray of water; the waste pipe opens directly over the drain; and the drain itself is flush with the floor, which is sloped towards it. The trough stands in the centre of the room, free from the walls, and the wall space can be used for cloakroom accommodation, whether hooks or lockers. A useful modification of the water supply is to have only two spray taps for occasional use, and a series of flush holes in both sides of the water pipe, the supply to which is controlled by a cock on the far side of the taps. This cock is turned on just before the operatives come to wash at the close of each spell of work. Arrangements can be made for controlling the temperature of the water. Where space is limited, say near the exit of a big engineering shop, a more compact installation may be used. This may take the form of a large circular basin with spray taps radiating from a central supply pipe coming down from above, and with an open pipe in the centre for carrying off the waste water to a drain in the floor, as shown in Figure 2. Wherever spray taps are used, advantage is gained by so arranging the height and position of the taps that a douche bath for the head, neck and arms can be taken if desired.

401. *Nail Brushes.*—The difficulty occasioned by the disappearance of nail brushes may be overcome by having large brushes made and fixed in position so that they can drain into the trough. In use the hand is rubbed against such brushes instead of the usual reverse process. In a number of factories stout nail brushes are provided attached to the washing troughs by chains; and on the whole this plan appears to work satisfactorily.

402. *Soap.*—Soap may be supplied economically in small boxes, kept locked and fixed in convenient positions above the trough, say on or near the water pipe; the soap of the consistency of butter, or jelly, is obtained by inserting a finger into a round hole in the bottom of the box. Soap for use in this way can be obtained in powder form† which sets to a jelly on the addition of water; by buying soap thus in powder form the cost of carriage is diminished. Alternatively, the soap may be served out as a powder placed in a flour dredger chained to the trough. If this latter plan is adopted care must be taken to prevent the holes getting clogged with wet powder. Another plan is to make the powder into blocks and then to cut it into small cubes just sufficient for one "wash." One point, however, should be borne in mind, the natural oil of the skin and hair may be removed by the use of strong alkaline soaps; if such soaps are used, as may be necessary to cleanse hands soiled with oil and grime in engineering works, then some ointment, glycerine or lanoline should be employed after washing to restore the suppleness of the skin. Without this precaution the skin may become dry and cracked, and so be unable to resist bacterial infection when dermatitis results.

* From a design by Stourbridge Glazed Brick and Fire Clay Company, Ltd., Blowers Green, Dudley.

† Such soap is prepared by Messrs. Lever Bros., Port Sunlight, Cheshire.

403. *Towels.*—The supply of clean, dry towels should be adequate ; for this purpose it is desirable that—

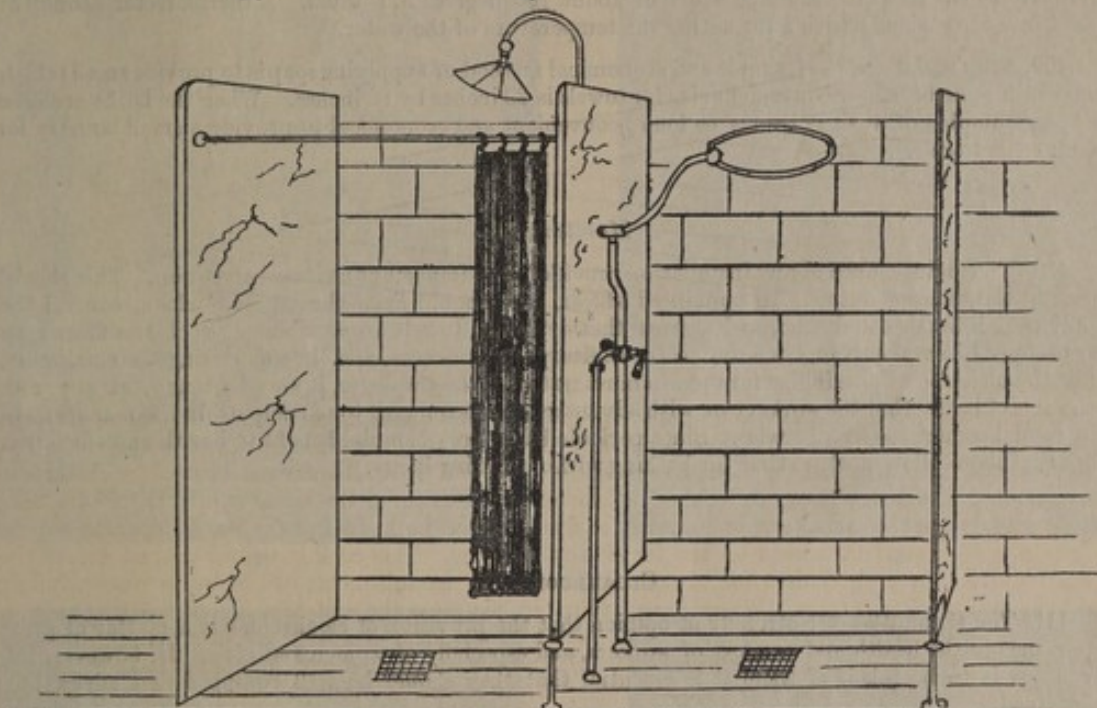
- (a) A towel at least 5 square feet in area should be provided for each worker, and should be renewed or washed daily ; or
- (b) One roller towel fastened in position, at least 15 square feet in area, should be provided for every three workers, and should be renewed or washed daily ; or should be provided for every nine workers and should be washed or renewed after every meal time and at the close of the day's work.*

The provision of separate towels is preferable, and is made in National Filling Factories, partly because the danger of infection is minimised, and partly because each worker thus obtains a dry towel. They should be numbered or otherwise separately marked.

404. *Mirrors.*—A mirror is desirable, especially for women.

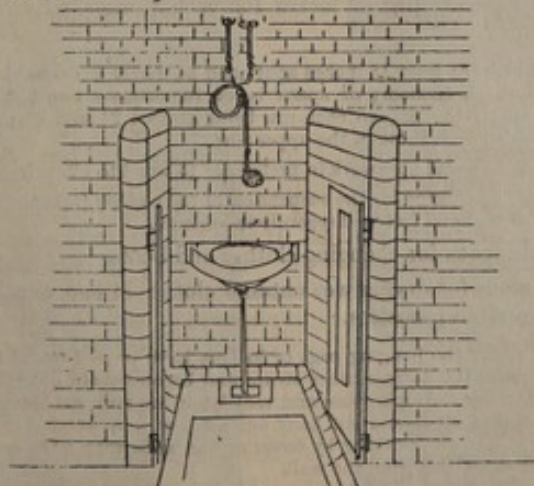
Bathing Facilities.†

405. *Baths.*—For men, the simplest and at the same time the cheapest and most efficacious installation is that of shower or douche baths. In comparison with other types, a shower bath economises space, time and water, and possesses the advantage that the stream of water is constantly clean. Moreover, the stimulating effect on the skin of the falling water is greater than is obtained by total immersion. Douche baths have been strongly recommended for use by coal miners, and have been installed with success in



‡ FIGURE 3.

many factories (see Figs. 3 and 4). For women, ordinary shower baths are unpopular, because of the difficulty of keeping the hair dry or of drying it after bathing ; a horizontal spray fixed at the level of the shoulders, or obtained from a movable nozzle or ring on a flexible tube, may meet this objection. Such an arrangement may also be found preferable for men.



§ FIGURE 4.

* These suggestions are identical with the requirements of the Home Office Order for the Manufacture and Decoration of Pottery.

† Reference may usefully be made to the Report of the Departmental Committee on Washing and Drying Accommodation at Mines. (Cd. 6724, 1913.)

‡ From a design by Messrs. Doulton & Co.

§ From a photograph taken in a munition factory.

406. *Cubicles.*—The cubicles in which the baths are placed should be arranged to secure privacy. In order to reduce the time which each worker spends in the cubicle it may be possible to arrange for the workers to dress and undress in a separate compartment, but at any rate in the case of women some provision for dressing, including a seat and pegs, must be provided inside the cubicle. Where this is done the size of the cubicle should not be less than 3 feet wide by 4 feet deep. The walls should ordinarily not be less than 6 feet high. A space should be left between the floor and the walls of the cubicles sufficient to permit of drainage and cleaning.

407. *Cleaning.*—The building and fittings should be so constructed as to facilitate the maintenance of absolute cleanliness. Square corners, ledges or rough inner surfaces should be avoided. Wood should be used only for seats, and for this purpose hard wood should be employed with spaces between the wood for ventilation. The walls and partitions (and this applies also to lavatories and sanitary conveniences) should always have smooth and curved surfaces which can be readily washed down and which cannot be used for writing on. Enamel tiles and bricks or enamel metal sheets may be used for this purpose; any initial cost thus incurred is soon recouped by saving in cleaning and lime-washing.

408. *Water.*—The water used should, of course, be clean and should not be liable to cause injury to the health of the workers or to yield effluvia. It will generally be found preferable for the temperature of the water to be regulated by an attendant rather than for the temperature of each bath to be regulated separately by the worker. A temperature of about 100 degrees F. is usual. A thermometer should be placed in a convenient position for noting the temperature of the water.

409. *Soap and Towels.*—A simple and economical method of supplying soap is to provide small tablets sufficient for one bath. A convenient size for towels is 25 inches by 60 inches. When the baths are used by a large number of workers it may be found convenient and economical to provide a small laundry for washing the towels.

Maintenance.

410. The maintenance of any installation provided is as important as its construction. This should be made the definite duty of an appointed officer, who should keep the lavatory clean, control the supply of nail brushes and soap, and arrange that dry clean towels are available. Such an officer may also usefully be employed in attending to the sanitary conveniences, and in supervising the cloakroom. While the ultimate responsibility for upkeep must rest with the employer, it may be found, at any rate in the case of baths, that the worker can, with advantage, be encouraged to participate in the management by a special committee or otherwise. Since periodic baths are of special benefit to health and efficiency, it is desirable to allow workers time for bathing within working hours.

CLOAKROOMS.

411. The Committee are strongly of opinion that the provision of cloakrooms is a matter of great importance to the health and comfort of workers, and especially of women and girls. If, however, full advantage is to be taken of them it is essential that they should be well equipped and adequately maintained.

412. Cloakroom accommodation in order to be satisfactory should comply with the following conditions:—

- (a) It should be conveniently situated not only for the workshop but should also be close to the canteens, lavatories and sanitary accommodation.
- (b) It should provide a separate peg or locker for each worker, which should bear the worker's name or work number.

Hanging pegs should be at least 18 inches apart and 24 inches is desirable; and may be usefully separated by a small partition. If economy of space is of importance two horizontal rows of pegs may be provided about a foot apart, the pegs in each row being at least 24 inches apart, and the pegs in the lower row being placed midway between those in the upper row.

Lockers may be made in metal openwork in preference to wood to allow free circulation of air.

Another alternative is to arrange for the suspension of the clothes from the roof of the building by rods which can be raised to the roof and fastened securely in position.

- (c) There should be ample space for changing clothes and boots.
- (d) Provision should be made for drying wet outdoor clothes in bad weather as well as the clothes worn for work at certain processes.

Steam pipes placed under the hanging pegs or lockers have proved useful for this purpose; care must however be taken, otherwise the damp clothes steam and become more objectionable than if spread out in the open air and allowed to dry. Ample space and ventilation are required between the pegs or in the lockers. Where pegs are used the clothing should not hang against a wall or wooden partition, but provision should be made for ventilation behind the clothing by covering the walls with laths or strong wire netting so that the clothes are kept at least an inch from the wall.



(1)



(2)



(3)



(4)



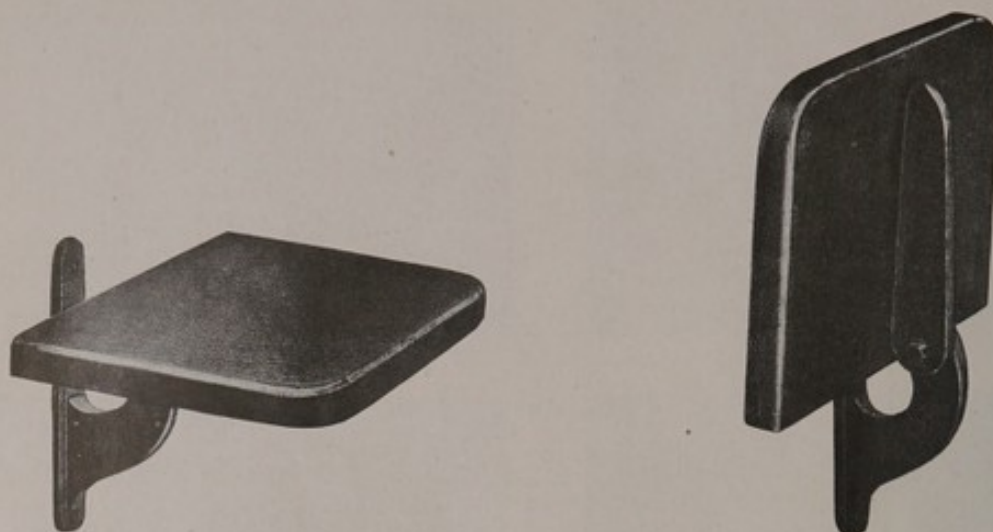
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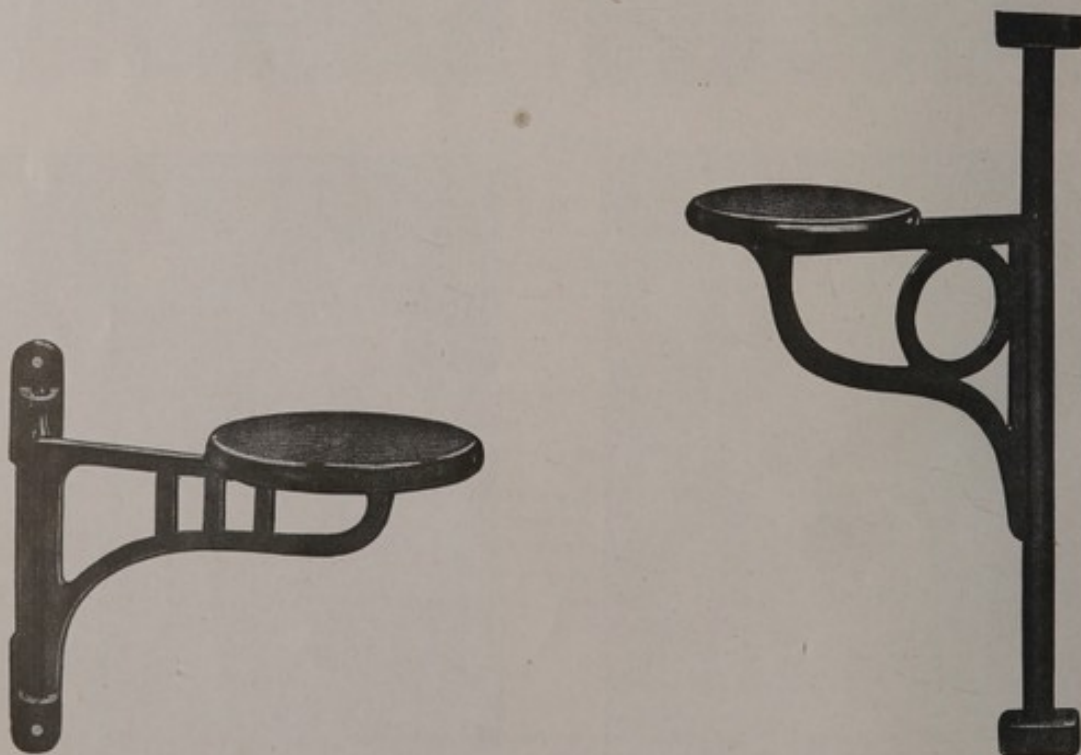
(6)

TYPES OF PROTECTIVE CLOTHING. (See paragraphs 425-431.)

TYPES OF SEATS.



No. 1.—Folding Seat to screw to wall or partition.



No. 2.—Swing Seat to screw to leg of table, and when not in use to swing under table.

No. 3.—Swing Seat with iron pillar support to screw under table in any position, and when not in use to swing under table.

From designs from the North British Lifting and Moving Appliance Company, Ltd., Glasgow.

- (e) A high standard of cleanliness should be maintained, and all practicable precautions should be taken against vermin.
- (f) Cloakrooms should be thoroughly ventilated.
- (g) Cloakrooms should be in charge of an attendant, and means taken to prevent petty pilfering and theft.

SECTION XVI.

SEATS, WEIGHTS, CLOTHING, DRINKING-WATER.

413. The Committee have not made any detailed laboratory study of methods for eliminating fatigue in regard to industrial machinery, lifting tackle, motion, &c., or of the application of American schemes of "Scientific Management" to factory conditions in this country. They have regarded such studies, important though they are, as lying outside their reference. There are, however, certain matters intimately affecting the health and efficiency of the worker to which some brief reference should be made.

SEATS.

414. Fatigue and ill-health and consequent loss of time and output are often due among women girls to prolonged standing. The following extracts from recent reports emphasise the point:—

"Women here are employed on 30 different processes on lathes, milling and drilling machines, chiefly on shells weighing 130 lbs. in the rough and 90 lbs. when complete. Certain operations, e.g., nose blending, are difficult and arduous . . . what renders the operations most trying is the lack of seating accommodation."

"Many of the women and girls complained that they could not sit down even when waiting for work, as no seats were provided and they were not allowed to sit. One chair in the Welfare Supervisor's room is supposed to be for girls' use, but they have never used it. At night this room is locked up and a girl who is taken ill has to sit on a chair in the cloakroom until it is light enough to go home."

415. The Factory Act does not require seats to be provided for workers such as is the case for shop assistants under the Shops Act, 1912, but the Secretary of [State has now power under the Police, Factories, etc. (Miscellaneous Provisions) Act, 1916, Section 7, to make an Order requiring an employer to make reasonable provision for "the supply and use of seats in workrooms." No Order* has as yet been made under this Section, but in a General Order made in December, 1916, governing the employment of women at night on wool-combing a condition was inserted that "the employer shall provide suitable seats for the use of women and girls at times when their work is not in need of attention."

416. Though opportunities for sitting are being provided to an increasing extent there are still a number of employers who hesitate to provide such facilities through fear that they will be abused. Experience, however, cannot be regarded as justifying this fear. It should be explained that the object of the provision of seats is not to secure that all work should be done seated, since a sedentary life has its own disadvantages, but rather that means should be provided for varying the position wherever possible and for occasional use when the work necessitates a standing position. There are many types of munition work in which for a considerable proportion of her time the worker is simply standing by watching her machine, which she could do sitting equally well. In almost all the munition work which must be done standing, pauses occur while the worker waits for the readjustment of the tool or some slight repair or is held up for material or for some other reason. During such pauses the workers should be allowed to sit. The need for such seats is often felt more at night than by day. Much ingenuity has been shown in providing seats which occupy little space. At the machine it is often practicable to fix a seat or bar at the side of the lathe; a flap seat attached to the wall or pillar; a leather strap may be hung between the machines or other fixtures; or a suitable form of high stool provided for use while at work with or without castor wheels.

417. The intervals between spells of work should be times of real rest and recuperation. This cannot be obtained on the wooden forms without backs in canteens or mess-rooms which are too often the only seats provided. Forms with backs or chairs are generally much to be preferred. In addition comfortable chairs for women who may be overtired or faint should be provided, preferably in a rest-room adjacent to the surgery. A brief rest under the supervision of the nurse frequently enables a woman or girl to return to work recuperated for the remainder of the spell.

Weights.

418. Admittedly women and young persons are physically weaker than men. Apart from this they are more liable to strain from the lifting of weights and other analogous operations which involve sudden muscular efforts. The matter is one of special importance at the present time owing to the large number of women now employed in munition works, and the rapidly increasing extent to which they are being employed to replace men on "heavy" operations. The following tables are of interest as conveying

* On April 23rd, 1918, the Home Office published a draft Order, requiring the provision of facilities for sitting for all female workers employed in any process in turning or machining shells or shell bodies.

some indications of the amount of the weights handled in certain operations connected with the manufacture of 18-pdr. and 4.5 inch and 6 inch shells :—

Operation.	Output of Shells per Lathe per Hour.	Approximate Weight Handled by Operator per Hour.
18-PDR. HIGH EXPLOSIVE SHELL, MARK III.		
Finish recess	60	1,807 lbs.
Turn band	48	1,466 „
Face base to weight	40	1,197 „
Thread mill	30	889 „
4.5-IN. HIGH EXPLOSIVE SHELL, MARK VII.		
Centre	60	2,840 lbs.
Base to length	24	1,686 „
Face to weight and rough recess base	18.4	1,012 „
Face base	48	2,592 „
Turn band	30	1,650 „
Thread mill	30	1,650 „
8.6-IN. HIGH EXPLOSIVE SHELL, MARK XIII.		
Cut off	10	3,000 lbs.
Centre	20	6,000 „
Rough face base	15	3,195 „
Recentre	30	6,120 „
Turn band	24	4,044 „
Thread mill	30	5,040 „

419. The framers of the tables give the following explanation in regard to them :—

“The weights on which the entries in Column 3 are based were obtained by actually weighing each shell before and after each operation in a typical factory. The entries given were obtained by adding the weights of the shell before and after each operation and multiplying by the number of shells turned out per hour.

“The actual amount of work done in handling these weights depends upon the methods employed. These methods vary in different factories with the operation and the type of shell. In some cases the heavier shell are only handled by men, labourers lifting the shell in and out of the lathe for the girls; or lifting tackle of one type or another may be provided. Sometimes also there are tables along which the shell may be rolled so as to obviate the necessity for lifting the shell from the floor to the lathe at each operation. A detailed enquiry into the methods prevailing at individual factories would be necessary in order to calculate the actual work done in each case. As an illustration—the work done per hour in lifting the shell bodies from the floor to the lathe (assuming no lifting tackle to be provided and the height of the lathe from the floor to be 3.5 ft.) for the operations of centering and boring is given below.

Shell.	Boring.	Centering.
18 pounder... ..	350 ft. lbs. per hour ...	8,886 ft. lbs. per hour.
4.5-in.	367 „ „ „ „ ...	4,970 „ „ „ „
6-in.	902 „ „ „ „ ...	10,500 „ „ „ „

420. As the result of his inquiries into the causation of industrial accidents Dr. Vernon writes as follows in regard to the incidents of accidents due to strain :—

“At factory A the cuts, burns and eye accidents were only a fourth to two-thirds as numerous in women as in men. This depended on the less risky character of their work. The sprains, on the other hand, were 47 to 83 per cent. more numerous in the women than in the men, or taking the other accidents as a standard, one may say that sprains were relatively three times more numerous in the women than in the men. The majority of these sprains were wrist sprains incurred in pushing home the lever which clamped the fuse part in the lathe. Evidently this clamp was designed for men with stronger wrists, and it would be quite easy by lengthening or otherwise altering it to make it more suited to the weaker wrists of the women. Thereby a considerable number of these sprains would be prevented, and a by no means negligible amount of wasted time be saved.

“In that the work at factories B, C and D was very similar in character, one would expect to find similar ratios between the women's and men's accidents. The sprains were nearly twice as numerous in the women as in the men at factories C and D, where 9.2-in. and 15-in. shells were made, and showed a similar excess at factory B where 6-in. shells were made. Hence it is probable that the liability of women to sprains is inherent, and cannot be altogether avoided by more suitable mechanical appliances.”

421. Apart from the provisions of the Employment of Children Act, 1903, which only apply to children up to the age of 14, there are no legislative provisions imposing restrictions on the weights which



(7)

(8)

(9)

(10)

(11)

(12)

(13)

(14)

(15)



(16)



(18)



(17)

The illustrations on this page and those facing page 94, have been reproduced from the Home Office Memorandum on Protective Clothing for Women and Girl Workers.



Counter Service. (See paragraph 249.)



Canteen Dining Room.



Surgery. (See page 68.)

may be lifted by workers. The matter was considered by the Departmental Committee on Accidents who reported :—

"The danger of internal injuries to women from lifting heavy weights is a matter of great importance. To lay down, however, any detailed and definite provisions on the subject seems impracticable, as so much depends on individual cases and circumstances. The position in which the weight to be lifted lies, the shape of the burden, the manner of carrying it, the place in which it has to be carried, are all important factors. We suggest, however, that there might be some advantage in a general provision with regard to women similar to the provision in Section 3 (4) of the Employment of Children Act with regard to children. A provision that a woman shall not be employed to lift, carry or move anything so heavy as to be likely to cause her injury might be useful, chiefly, perhaps, in calling the attention of occupiers to the matter and strengthening the hands of inspectors when dealing with cases in which they judged women liable to injury from this cause."

422. The Home Office, however, in their General Order of September, 1916, prescribed that "a woman or young person should not be allowed to lift, carry or move anything so heavy as to be likely to cause injury to them." The weight which can safely be lifted depends not only on the physique of the worker but on the position in which the weight lies, its shape, the manner of carrying it, and the place to which it has to be carried. Again, much depends on the acquisition of knack. Given, however, reasonable conditions and a good physique, women and girls over 18 have been found able to handle weights up to 50 lbs. in the ordinary course of work without difficulty. Such a weight would, of course, be too great for women of less than normal strength, or if the weight is of awkward bulk or has to be raised to a special height.

423. If weights are properly adjusted to physical capacity, experience suggests that a woman can frequently perform as much work as a man owing to her capacity for quicker movement and sustained work. In order to prevent strain and to secure the best results attention should be paid to the following amongst other points :—

- (a) Adaptation of the size and shape of the burden.
- (b) The provision of labour-saving appliances, such as overhead cranes or inclined planes.
- (c) The size and shape of boxes, trolleys, or other receptacles and vehicles.
- (d) Long handles and other methods of reducing leverage.
- (e) Methods of reducing the height through which weights have to be raised, e.g., by the provision of benches for the temporary storing of shells by the machine.
- (f) Instruction in the knack of lifting weights.
- (g) Limitation of hours of employment.
- (h) Careful selection of workers.

424. If adequate attention is paid to these points experience shows that dangers of straining can be very largely obviated. As showing what may be done the following report is of interest :—

"Women are engaged in making and finishing crucibles. The heaviest handled by one woman alone weigh 57 lbs. Lifting is intermittent, occurring in the intervals of manufacturing work. The girls have been carefully chosen for their good physique and appeared to lift the crucibles with complete ease. Thus of one factory it is reported that 'the forewoman took pains to instruct the girls in the right way of handling the heavy crucibles. She said some required considerable instruction how to carry, as they often began by attempting to do the whole work with their forearms and wrists, bringing no other muscles into play and consequently quickly exhausting themselves, but practice soon helped them over this difficulty. If a girl could not acquire the knack of right handling she hurt herself and injured the crucibles and was taken off that work.'"

PROTECTIVE CLOTHING.

425. For women and girls protective clothing is essential where risk to health is involved from—

- (a) Dust, dirt or wet.
- (b) Acid burns.
- (c) Dangerous machinery.
- (d) Work involving climbing.
- (e) Exposure to excessive heat.
- (f) Exposure to inclement weather.

426. Protective clothing is desirable for all women and girls. It adds to their smartness and neatness, and so to the general appearance of the factory. It also aids discipline and promotes *esprit de corps*.

427. There are four main types of costume* :—

- (a) The overall dress, for general factory wear (see illustrations Nos. 1, 6 and 15).

* These types of costume are illustrated and described in the "Ministry of Munitions Journal" for May, 1917, pages 183 and 184, as well as in a special leaflet issued by the Ministry with the concurrence of the Home Office; this leaflet contains particulars of various types of costumes, gloves, boots, &c., which can be purchased through the Explosives Supply Department, 37-41, Old Queen Street, Westminster, S.W. 1.

A Memorandum on "Protective Clothing for Women and Girls" has been issued by the Home Office, illustrating different types of costume; a schedule is added stating in detail the type of costume suitable for different types of employment. The Memorandum may be purchased through the usual channels (see page 1).

- (b) The trouser or knicker suit with tunic, for outdoor work, climbing ladders, &c., or for very dirty work (see illustration No. 11). These suits are not suitable for machine workers as the ends of the tunic are apt to catch in the machinery.
- (c) The boiler suit, for dangerous work where close-fitting clothes are essential for safety (see illustrations Nos. 14 and 18).
- (d) The impervious apron and bib, worn with either the overall dress or the trouser suit, for protection against wet, oil, acid, or the wear and tear of friction (see illustrations Nos. 5, 7, 13 and 16.)

428. With the costume a cap should be worn for protection against dust and dirt, for safeguarding the hair from dangerous machinery, and for keeping the head dry out of doors. Accessories, such as gloves, veils, clogs, or respirators, are also necessary in the cases of certain processes, especially where there is a risk of fire or of poisoning from dust or fumes.

429. The proper selection of materials is important. Woollen materials are less inflammable and more durable than cotton, but for general use cotton materials such as drills, dungaree, or (when thin material is required) jean or linen are suitable. For resistance to moisture good waterproof cloth, oiled or American cloths, are obtainable. Aprons can be obtained of these materials, also of rubber or leather. Sound acid-resisting materials can be had for aprons, leggings and clogs, also oil-proof materials for protecting machinists from the lubricating oil which penetrates ordinary clothing. For outdoor wear in wet weather a mackintosh or perhaps preferably a good woollen coat, trousers and sou'wester hat, with leggings and strong boots are frequently provided. A corduroy suit is also suitable for all weathers, and is very durable. In some cases a mackintosh coat to wear over the cotton drill trouser suit may be enough. In explosive factories (except National Factories) the clothing must be approved by the Chief Inspector of Explosives at the Home Office, who supplies particulars respecting materials and fire-proofing. The Ministry of Munitions give advice for other explosive and filling factories.

430. Protective clothing for men and boys is equally important, especially when they are engaged in processes involving exposure to dust, dirt or wet, acids or alkalis.

431. Protective clothing should be provided by the employer. The cost of caps and overalls (within a maximum limit of price), at the rate of two to each woman worker, is allowed as a working expense for the purposes of Part II of the Munitions of War Act, 1915, and the rules thereunder. The employer should also be responsible for washing, mending and renewing the clothing.

DRINKING-WATER.

432. The Committee consider it unnecessary to elaborate the reasons why an adequate supply of good drinking water should always be available in the factory. The following extract from a recent Report issued by the United States Public Health Service is of interest :—

"Since so much body water is lost under conditions which provoke free perspiration, it is important that an ample amount of water be drunk to replenish the tissues thus deprived of their normal water content. Without this, their proper functions will be hampered and health and efficiency cannot be expected. The worker should be furnished with an abundant supply of water together with drinking facilities which are clean, attractive, and placed so as to be conveniently accessible at all times. The water should never be below 55 degrees F. in temperature, as the drinking of cold water is likely to cause gastrointestinal disorders. The jet sanitary fountain is the best drinking facility. Though under ordinary conditions the amount of heat lost in bringing the temperature of water up to that of the body is small, this amount, by judicious drinking, can be increased. Water should be drunk in small quantities and at frequent intervals, not in large quantities at infrequent intervals."*

433. An Order† has recently been made by the Home Office under the Police, Factories, &c.—(Miscellaneous Provisions) Act, 1916, Section 7, under which, in all factories and workshops in which 25 or more persons are employed, provision shall be made at suitable points, conveniently accessible at all times to all persons employed, for :—

- (a) an adequate supply of wholesome drinking water from a public main or from some other source of supply approved in writing by the local authority of the district in which the factory or workshop is situated, which shall be either laid on or contained in a suitable vessel ;
- (b) (except where the water is delivered in an upward jet from which the workers can conveniently drink) at least one suitable cup or drinking vessel at each point of supply, with facilities for rinsing it in drinking water.

434. Each drinking water supply shall be clearly marked "Drinking Water." All practicable steps shall be taken to preserve the water and vessels from contamination.

* Public Health Reports issued weekly by the United States Public Health Service ; vol. xxxii., No. 50, December 14th, 1917. Washington : Government Printing Office.

† Statutory Rules and Orders, 1917, No. 1068.

SECTION XVII.

WELFARE SUPERVISION FOR WOMEN AND GIRLS.

THE NEED.

435. The war, and all the novel and strange conditions which it has created, has served to give a new perspective to many social problems, and to none more than to the problem of improving and maintaining the health of the industrial worker. The problem has many aspects, all of which have a direct or indirect bearing on the employee. There is the health of the infant and its mother, of the school child, and of the adolescent and adult worker. Regard must be had to mental good health as well as to physical—apathy, lassitude, lack of interest in life, may be as detrimental as physical ailments and defects, and may equally involve an irreparable loss of efficiency. There is need not only for improved physical strength and power of endurance, but also for mental alertness, the development of individuality and the capacity for wise citizenship.

436. The Committee are satisfied that the interests of employer and employed are in this respect identical. Apart from physical and mental health, the worker cannot earn a sufficient livelihood or rightly use and enjoy its proceeds. Equally, the prosperity of industry is dependent upon the health and efficiency of the worker. Though the employer cannot, as a rule, directly control some of the conditions, such as housing, that affect the welfare of his workers, there is yet much that he can do to improve and humanise the conditions of their employment:—

- (a) Preceding Sections will have shown that the provision of a thoroughly satisfactory environment largely depends upon the initiative of the individual employer. Legislative enactments and Statutory Regulations, valuable though they are, can only prescribe minima. They cannot take account of the varying circumstances of individual factories.
- (b) Certain provision, *e.g.*, of canteens, overalls, cloakrooms, lavatories, or First-Aid appliances, may be of material benefit.
- (c) Even though the provision is adequate and sufficient, constant care and attention on the part of the management are essential for effective maintenance. Though Government inspection can do much, it is necessarily intermittent and cannot be sufficient in the presence of apathy or neglect on the part of the employer or workers.
- (d) Regard must be had to the individuality of the workers and to the wide variations that exist in their physical and mental capacity, and in their social circumstances and habits.
- (e) Conditions of work may exist which are prejudicial to the health of certain sections of workers in the factory on account of the heaviness of the work or the conditions under which it is carried on. Partly on these grounds, a wage system, though generally equitable, may cause unexpected hardship to particular individuals.
- (f) Conditions prejudicial to health may arise through the existence of circumstances causing avoidable irritation or discomfort either to the whole body of workers or to certain sections of them.
- (g) The surroundings of the worker outside the factory also call for consideration. Account must frequently be taken not only of conditions of housing and transit, but also of circumstances peculiar to the social or family circumstances of individual workers.

437. As has been pointed out in Section II, it is no new phenomenon to industrial life in this country for employers to desire the promotion of the health and well-being of their workers, not only because such action may be profitable to themselves as well as for their workers, but because they recognise the right of the worker, as a fellow-citizen, to be regarded not as a machine, but as a human being possessing an individuality of his own. Under modern industrial conditions, the employer usually has neither the time nor, frequently, the experience, to give the requisite personal attention to the many and complicated problems affecting the health and welfare of the workers. There has, therefore, been an increasing tendency, notably where women are employed, to appoint an Officer specially for the purpose. This Officer is generally designated "welfare supervisor" or "welfare superintendent." The idea underlying such appointments is not a new one, and it is of interest to note that in the summaries of the evidence given before the Royal Commission on Labour which was appointed in 1892, attention is drawn to the importance of securing a good moral tone among women workers; it is added—

"In those cases where women overlookers or forewomen can be employed difficulties of this nature were obviated; hence when this is possible, it was said to be a very desirable arrangement. Even where this is not possible, however, it was suggested that in all cases where a certain number of women are employed there should be a woman in a position of authority to whom all complaints concerning officials, health, sanitary arrangements, &c., can be brought in the first instance. The very natural dislike of women to approach men on these subjects was constantly brought forward by the witnesses. Were some carefully chosen woman put into this responsible position much of the danger and discomfort which is unavoidable under the present state of things would be removed and some of the chief difficulties connected with the employment of women would also disappear. This system is already adopted in a few of the best regulated establishments."

438. Previously to the war, however, appointments of welfare supervisors were comparatively rare and were practically confined to so-called model factories or particular industries.

439. For the reasons given in Section IV., the stress and strain of the war have tended greatly to emphasise the importance of attention to all matters affecting health and welfare of women and adolescents. The appointment of the Committee in September, 1915, afforded in itself striking evidence of the recognition by the State of the fact that it was a matter of national concern to secure that the personal health and physical efficiency of the worker was so safeguarded as to prevent not only immediate breakdown, but permanent injury in the future. The employment of women in new industries, the number of women engaged for the first time in engineering works, their frequent employment in places remote from their own homes, and the increasing occupation of married women and young girls, have raised urgent problems which cannot be neglected or overlooked. On the other hand, many of these problems could not be dealt with through the ordinary channels of factory management—at any rate, under war conditions—and special provision was necessary if the true causes of disability and discontent were to be ascertained and removed.

440. Such were the circumstances which led the Committee in their Memorandum No. 2 ("Welfare Supervision"),* which was prepared in January, 1916, to recommend that welfare supervisors should be appointed in all factories where women were employed. They recognised the risk involved in the rapid appointment of large numbers of persons of varying qualifications for the performance of new and largely undefined duties, but the urgency of the need made this inevitable. The policy recommended was that adopted by the Welfare Department shortly afterwards established at the Ministry. The appointments of welfare supervisors have been made compulsory in all factories where T.N.T. is used, and have been actively encouraged in all munition factories. In this policy the Committee had the cordial co-operation of the Home Office, who only permit women and girls to be employed at night where a welfare worker or a responsible forewoman has been appointed for their supervision. As the result, several hundreds of women welfare supervisors have been appointed during the past two years.

STATUS AND DUTIES OF WELFARE SUPERVISORS.

441. While the opportunities of useful work open to a welfare supervisor may be almost unlimited and cannot in all directions be clearly defined, experience shows that it is essential that welfare supervisors should possess a recognised status and equipment and should have certain specified duties†, and further, that they should be directly responsible to the general manager, should act on instructions received from him and should refer to him direct on all questions of difficulty.

442. Before setting out the various duties which may be assigned to welfare supervisors, it may be well to enter a caution against certain misunderstandings which are liable to arise as to the aim and purpose of welfare supervision. In the first place, it will permanently succeed only in so far as it receives the support of the employer and employed alike, and it will fail in so far as any endeavour is made to conduct it in a spirit of patronage or superficial philanthropy. Secondly, any scheme of welfare supervision must be based on an adequate wage system. Without this failure is inevitable. Thirdly, welfare supervision is not intended to and cannot replace trades unionism. Welfare supervisors, if they are to be successful in removing adverse conditions, must be in sympathy personally with the workers and able to keep the employer informed of their circumstances and desires, both individually and collectively. They must not, however, interfere with the work of the trades unions; they are after all the servants of the employer and cannot as such be accepted as the authorised and official representatives of the workers, even as regards matters which affect only the conditions in the particular factory in which they are employed. Lastly, welfare supervision must not be regarded as in any sense as substitutes for Factory inspection by the State, whose duty it is to secure an agreed minimum of sanitation and safety in all factories equally and to enforce a standard of hours and of intervals.

443. What duties are allotted to any particular supervisor will depend to a considerable extent upon the circumstances of the factory, and upon the age, circumstances and characteristics of the workers. They will also in some measure vary with the capacity and status of the supervisor. The following include the principal duties which have been successfully undertaken in different factories:—

444. (a) *Engagement of Workers.*—The selection of women workers as regards their general suitability should be undertaken by the welfare supervisor, persons to be employed in a particular department being if necessary subsequently chosen by a foreman or other person responsible for the work from a technical standpoint. When workers are medically examined the supervisor should be informed of any physical conditions likely to affect their work. Whatever their exact duties in these respects may be, supervisors should always have an early opportunity of getting into touch with a new worker in order from the first to establish those personal relationships upon which the success of her work largely depends. A few words of friendly conversation may be of great assistance in making the new workers appreciate the aim and the purpose of the work, and in familiarising them with their strange surroundings.

445. In the case of women and girls it is also important that the supervisors should be consulted as regards the character and general suitability as distinct from the technical qualifications of candidates for appointment as overlookers or forewomen.

* Cd. 8151.

† A pamphlet on "Duties of Welfare Supervisors for Women" has been issued by the Ministry of Munitions (see Appendix J.). Copies can be obtained on application to the Ministry.

446. (b) *Records*.—A record should be opened for each new worker containing information as to age, physical condition, home circumstances, etc. To this record should be added from time to time details of progress, ill-health, broken time, and other matters likely to prove of value. Apart from their immediate purpose such records may prove of material assistance in determining the suitability of the worker for other employment after the war.

447. (c) *Lost Time, Sickness, Low Output, Incapacity*.—All such cases should be reported to the supervisor whose duty it should be to investigate the causes and, where practicable, to take steps to remove them. Experience has shown that abnormally slow work may be due to laziness, unsuitability or incapacity, and ill-health.

448. (d) *Wages*.—Though the supervisor has no responsibility for fixing the wages, she should receive particulars of the wages earned by all workers, or at any rate by all those who fall below a certain level. The amount of the wage may afford a valuable indication of the progress of the worker. Further, low wages mean low output, and it is obviously important that the causes should be ascertained in each case. Low wages may be due to illness, fatigue, slackness, unsuitability of the worker for the job, difficulties of housing and transit, home troubles, and sometimes the inequitable operation of the wage system.

449. (e) *Dismissals or Withdrawals*.—It is a common experience of industrial firms that large numbers of workers leave work for various reasons within the first few months of their employment.* This leakage represents a serious loss of efficiency, and all cases should be investigated by the supervisor. Departure may be due to ill-health, change of residence, or marriage; or it may be due to general dissatisfaction, dislike of work, disappointment over wages, or a simple desire for change. Cases of proposed dismissal in particular should be carefully investigated in order to determine the real causes of trouble and to remove possible misunderstandings.

450. (f) *Working Conditions*.—Supervisors should always be intimately acquainted with the working conditions in the factory (e.g., hours of work, wages, ventilation, heating, seats, lavatories, rest-rooms and cloak-rooms). Any complaints or representations should be fully and promptly investigated. In some instances the remedy for defects may lie within their competence. More often it will be their duty to bring them to the notice of the General Manager or other officers, according to their nature or importance. These duties are fundamental, and the evidence shows that if wisely performed they do not, as has sometimes been feared, in any way undermine the authority of the foreman or other officials.

451. (g) *General Discipline*.—As a rule the welfare supervisor is only responsible for the good conduct of the workers apart from their technical work; though she is free to visit the shops to supervise general behaviour and to speak to individual workers, she is mainly concerned with maintenance of the necessary standard of conduct in the cloak rooms and lavatories, when going to and from the shops and at meal times.

452. (h) *Night Supervision*.—Specially close supervision of women and girls is needed at night owing to the strain of the night shift and on moral grounds, and it should form an important duty of the welfare supervisor. Ordinary factory oversight is often more difficult at night than during the day, and may become somewhat lax.

453. (i) *Home Visiting*.—Where necessary and desirable, home visiting may be undertaken. Workers who are ill may be visited in order to ascertain that they are properly cared for—a matter often of considerable difficulty in crowded areas. Apart from this, visits may usefully be paid to the parents of the younger girls and the opportunity taken to discuss with them the merits and progress as well as the demerits of their children. Misunderstandings as to wages can be removed. Parents as a rule greatly appreciate periodical reports as to progress, conduct and time-keeping. Minor offences by girls can sometimes be better dealt with by the parent than through the factory organisation.

454. (j) *Feeding Arrangements*.—The supervisor should ascertain that workers are obtaining suitable and nourishing food, and that adequate and convenient facilities are available for its preparation, purchase or consumption. Where mess-rooms or canteens are provided by the firm, the supervisor will often be charged with their direction.

455. (k) *Thrift and Benevolent Funds*.—The supervisor should assist in any scheme for encouraging thrift which may be established through War Savings Associations or by other means. The arrangements, at any rate in the case of the younger workers, are generally most successful when organised in close connection with the payment of wages. They should be such as to attract those who are not naturally thrifty. The supervisor may also be called upon to assist with the formation of sick and benevolent funds among the workers, and may also be consulted as to applications for help from such funds.

The following account has been received of the benevolent fund established at Woolwich Arsenal:—

"This fund was opened in July, 1917. The absolute necessity for the existence of such a fund had for a long time past been one of my many aims. Over and over again, I came up against the fact that with a fund to draw on, I could do a great deal to help and ease those who were working under me in the Arsenal. There are those who, through sickness of themselves or their families, get into financial and often absolutely unavoidable difficulties, as rent must be paid, and children fed, even if the mother is laid up and unable to work. To

* See Appendix D.

secure this fund, a huge fête was organised, and when all expenses were paid, there was a profit of £1,504 15s. 8½d. in hand.

"This fund does not allow gifts of money, except in exceptional cases; when a worker applies for assistance her case is thoroughly investigated, her home being visited by a supervisor, and a report sent in. If the case is satisfactory, a loan is granted, which has to be paid back, at the rate of 2s. 6d. or 5s. per week, without any interest being charged. No return is expected until the second pay day after the loan has been granted, and longer time is given if necessary. It is a rule that no claims for lost money or stolen purses or clothing are dealt with, the reason for this being obvious. During the six months July-December, 963 applications for help have been received; of these 890 were granted assistance; this has meant an outlay of £1,388 8s. 11d., and of this £319 9s. 8d. has been repaid by small instalments. All confinement cases are dealt with separately, and not financed out of the Benevolent Fund at all."

The 890 cases assisted included temporary sickness involving absence for a week or more, 233; injury and back pay delayed, 101; surgical appliances, 37; absence through infection illness in the house, 39; sending sick children and husbands to convalescent homes and sanatoria, 81; assistance to new entries, 77; railway fares for holidays in distant places or in sudden emergencies, 56; purchase of boots, 43.

456. (l) *Training and Instruction*.—Though supervisors do not usually themselves undertake the instruction of workers, they are frequently responsible for securing the establishment of suitable courses and for encouraging the workers to take advantage of them. At the present time special facilities for attendance at classes are not always easy to provide though some firms have found it practicable to do so; while others have made arrangements for new workers to be instructed in the technical methods of the work they are to undertake and for them to be given a general outline of the aim and purpose of the work of the factory. Such instruction has proved to be valuable in promoting technical efficiency and in stimulating interest. It also affords an opportunity for determining the kind of employment for which the worker is likely to be best fitted.

457. (m) *Housing and Transit*.—Supervisors should acquaint themselves with the facilities for housing available for the workers. It may be necessary to keep lists of suitable lodgings where this duty is not otherwise undertaken. The adequacy of means of travelling to and from the factory is a proper subject for the supervisor's attention, as is also the consideration of local railway or tramway time tables in relation to the hours of changing shifts.

458. (n) *Recreation*.—Facilities for indoor and outdoor recreation are of extreme importance for the health and welfare of the worker. Where existing organisations are insufficient to meet the needs, the supervisor may have to take steps to secure some provision for organised games and evening clubs. Facilities for rest and recreation during intervals of work may prove of much benefit and be greatly appreciated. The conduct of arrangements for recreation should be so far as possible in the hands of the members themselves, and the position of the supervisor should, so far as possible, be one of advising rather than of controlling.

459. (o) *Co-operation with Outside Agencies*.—For an adequate performance of their duties it is essential that welfare supervisors should possess an intimate knowledge of the agencies, educational, social, industrial, outside the factory which are concerned with the life of the worker.

460. The duties outlined above, though mainly concerned with matters of health and individual welfare, are to some extent distinct from those usually entrusted to trained nurses or the medical staff engaged to render first-aid or subsequent treatment of accident and sickness. The advantage, however, of bringing the work of the nurse into touch with that of the welfare supervisor is manifest, and in suitable cases the duties of a welfare supervisor of women and girls may be properly undertaken by the nursing staff—increased and if necessary re-organised for the purpose. When the numbers are small and full-time service is not required, the duties of a welfare supervisor may be undertaken by an existing member of the staff who possesses special qualifications for the work, and is given the time and status requisite for their proper performance.

461. The following statements will afford some indication of the present purpose and scope of welfare supervision among women. Thus a leading munition firm writes:—

"The welfare work has been organised on broad lines and its development left to the individual views of the management and welfare staff concerned in accordance with the special requirements of each factory or department and the nature of its work. Its aim has been to relieve the pressure of industrial life and protect the workers' interests both individually and collectively. The general policy has been to study, adapt, and improve existing conditions of labour on such practical lines as may be suitable to the requirements of the workers concerned, with a view to future progress and development. The North Country workers are more independent in spirit and advanced in thought than Southerners, and strongly resent any suggestion of patronage or interference with their liberties, in consequence the welfare worker must adapt herself to their requirements and not expect them to readily accept her views. The qualities most necessary to a successful welfare worker are good health, common sense, justice, loyalty, love of humanity and a sense of humour, and any training which has inculcated habits of discipline and application is very desirable, more especially shop training. The management do not allow the welfare workers to deal with any labour or wages questions or rates of pay, as they consider it essential that these should remain in the hands of the management."

"Every female candidate applying for employment at these works is taken on through a Labour Bureau who interview every girl, and obtain reference as to character. In addition, each girl is examined by a trained nurse prior to being engaged. Should the nurse be doubtful about the physical suitability of the candidate the works doctor is asked to decide."

462. A departmental supervisor at this factory describes her duties as including:—

Engagement of Labour.—Requisitions from foremen as to number of girls required, type and class of work; interviewing girls recommended by foremen, forewomen, or other workers, and placing those approved in touch with Labour Bureau; change of work if unsuitable arranged with the concurrence of the foreman concerned; transfers to another department arranged, if desirable, and approved by foremen and supervisors concerned; re-starters interviewed and approved, or sent to doctor or Labour Bureau for medical report; signing on new

starters, impressing them with the reputation of the shop for good work and conduct, and giving them useful hints; interviews with Labour Bureau respecting matters concerning employment or re-employment of women.

General.—Reporting to the departmental manager, as and when required, on any questions connected with shop discipline, and seeking his advice if any extreme difficulty or question of principle arises; consulting with shop managers, and taking instructions on all matters concerning shop discipline; interviewing head foremen, forewomen, and others in reference to various matters concerning the girls, taking care that no action is taken by any supervisor without proper consultation and agreement with the executive authority concerned; investigating all serious complaints personally, and keeping in close personal touch with grievances, real or imaginary; receiving reports from and advising subordinate supervisors on matters concerning the shifts for which they are responsible; advising girls on any question, on her own application or through the supervisor in charge of her shift; interviews with medical officer of works re medical points arising; investigating, consulting, advising, and dealing with all kinds of problems, moral or otherwise, some petty but irritating, others of importance and affecting principle or precedent; visiting any special cases in Infirmary, or at home.

Social.—Attending committees of the girls re entertainments, and where required, assisting in their organisation. Seeking out and recommending cases for rest home or other assistance.

Office.—Organisation and supervision of various records concerned with the girls, their overalls and other clothing, and of War Savings Associations and other thrift funds. Countersigning all requisitions for clothing, cleaning, or other materials from stores.

Inspection.—Of shops, cloak rooms, dining rooms and cook houses, to see everything is in proper order; of shop supervisors' registers and records; of ambulance room records to see what girls have met with accident, or were passed out sick; of medical certificates from absentees; of time keeping records, and lists of absentees.

463. The following statement received from another important firm affords some idea of how the work has developed during the war:—

"Taking up my duties on August 10th, 1914, there were 13 girls employed in the factory on aircraft work. At that time the accommodation for girls consisted of one spacious cloak room, 20 hand basins and 30 lavatories, and this for the first six months became my headquarters, and as we possessed only a small dingy mess-room, which was used by the men, the cloak room became office, mess room, sewing and ambulance room. In February, 1915, a small portion of the men's mess room was partitioned off for the use of the girls, and at the same time a room was taken over and converted into a rest room and surgery, and this proved very valuable indeed, as just at this time we experienced much difficulty brought about by Dope poisoning; in fact, two girls died as the result of poisoning. Therefore, a strict watch had to be kept on the health of the workers, helped by doctor's inspection once a fortnight. In addition we had by this time another large cloak room consisting of four hand basins and 30 lavatories, fully equipped with the necessary sanitary arrangements. In our new building we now have a cloak room in every department where girls are employed. This prevents waste of time, and sickness is also prevented as the girls are not compelled to leave a heated shop. In September, 1916, a large drawing office was converted as follows: Rest room, waiting room, surgery and office. In January, 1917, the sewing room was enlarged and we are now able to employ girls who may be temporarily unemployed by strikes or breakdown of machinery, and in numerous cases when the girls are indisposed but not ill enough to go off work. Since September, 1917, we have had in use a girls' recreation room, where they may spend their time when not on duty, that is meal times both on day and night shift.

"In addition, we have a female labour bureau consisting of waiting room and interviewing room. We have for the benefit of the workers benevolent and hospital funds, girls' savings bank or holiday fund, clothing club, and have recently organised a girls' welfare fund. With reference to the social side, there are various organisations—girls' gymnasium class, tennis and hockey club, football team, home nursing and first-aid classes, and we now have a girls' ambulance corps trained at the works to render first-aid in the shops. These are also on duty during air raids. On January 22nd, 1917, the new club and mess room was opened with accommodation for approximately 600 girls. There is also accommodation for 300 girls in the Y.W.C.A. A new feature which has been recently introduced—the want of which has been sadly felt—is that help should be given to employees whose wives are laid up owing to illness or childbirth. We have engaged the services of a couple of women whom we send out to do the housework in these cases."

464. Thirdly may be quoted the following extracts from an account supplied by a welfare supervisor of "A Day of my Life as a Welfare Supervisor":—

"One of the chief advantages of a welfare supervisor's life is its variety. Each hour brings its own difficulties, each day produces fresh problems, and each week opens up new possibilities. The scope of the work is limited only by imagination and ability and things accomplished serve as milestones on an endless road of possibilities. This variety makes the task of describing a welfare supervisor's day a difficult one.

"At 9 a.m. I clock on (we all do this from the manager downwards) and start dealing with letters. These are of all kinds: post cards returned by absentees explaining why they are away from work, letters from other factories asking for the characters of women who have left us, letters from solicitors and the Finance Department of the Ministry of Munitions about compensation cases, letters from women and girls asking for work.

"I read the report left by the assistant supervisor on night duty. Perhaps the shop has been too hot or too cold, there has been a theft in the cloak room, an operator and a viewer have had a quarrel, a pipe has burst in the lavatory; there are also several complaints that the train from W—— arrives so late that the women have to run from the station to be at the factory before the gates close, and reach their work in an exhausted condition

"The next business is to deal with absentees. Every morning a list of the previous day's absentees is sent from the time office and the cards are taken out of the current index and filed in a special drawer. After three days' absence each case is either visited or written to, and by the end of seven days we are in a position to know whether the worker is coming back or not. The assistant supervisor goes through the absentees each day, and decides which are to be written to and which visited, and in the first case sends reply post cards asking for an explanation of absence and in the second gives the welfare visitor the cards of those who are to be visited. Before going off every morning, the visitor discusses with me points arising out of her visits of the previous day, and in many cases we decide to ask for help from the Welfare Committee. This committee is a kind of benevolent society to which all workers subscribe and which gives grants in cases of necessity, hospital notes when special medical attention is needed, convalescent changes, &c.

"Choosing labour can be a very skilled work when there is an ample supply to choose from, and no great hurry in filling vacancies. Each worker should be just the right type for the work she is put to; she should be examined medically and her references taken up, or in the case of young workers, her character from school inquired into. Few Labour Offices, however, are able to carry out this régime at the present time, and engaging is often reduced to eliminating the least fit. One rejects the old, the infirm, the undersized, the short sighted,

the dirty, the flashy, the anæmic and the corpulent, and the remainder are taken on for the jobs for which they are most suitable.

"I must explain that ever since I came in at 9 o'clock there has been a constant stream of women from the shop with questions and complaints, and that to write one letter or engage one person without interruptions is quite unusual.

"Mrs. A— wants a job on days as her husband is ill and cannot be left at nights; Elsie B— complains that the charge hand is always 'shouting' at her; three viewers state that their rises are due but have not been given; two operators are not satisfied that their wages are correct, and the matter has to be thrashed out. In the one case I show the girl that she has calculated wrongly, and that she has been paid correctly; in the other I think the wages office has made a mistake, and I promise to see to it. . . .

"Although I have not been in the shop however, my assistant has been there off and on all the morning since the shift started at 8 a.m., either in the little works office or walking about the shop. The women know they will find her in the office between 10 and 11 o'clock, and they go to her with difficulties and complaints and to get badges, &c. The forewomen, too, go to her for advice, and she is in close touch with superintendents and foremen, helping them to smooth over the many difficulties arising out of the employment of large numbers of both sexes. When she is not in the office she is walking round the shop seeing that the girls are behaving well, wearing their caps, and are not loitering about the cloakrooms and lavatories, also that the latter are well supplied with towels, soap, &c.

"I take with me into the shop notes of the matters I have to discuss with the superintendents and works manager, and when I have seen them I walk round and note new developments, the drinking fountains for which I have agitated and which are being put up—a new pattern of seat which is being fixed to the machines—a big draught from an opening which might be closed up, and the extra high sides for the slurry pans on the drilling machines which have been made and are giving great satisfaction to the operators.

"On my way back to the office I call at the ambulance room and see that all is well there. The sister in charge tells me of a woman who has been in with bad varicose veins who should not be standing at her work; she tells me that one of the nurses wants to leave, and warns me that a woman has been in with an old wound which has broken out again, but which she is claiming to be a fresh injury for which she requires compensation. The ambulance room is in my charge, but it carries on mainly on its own.

"My assistant comes back before 1.30 so as to be free during the last half of the dinner hour. Sometimes she has arranged a concert and sometimes the members of the military band or the orchestra bolt their own meal so as to entertain the others, but none of these things happen as often as we would like, as unfortunately our canteen does not lend itself to entertainment. Occasionally we have a War Saving or other meeting, but here again we are hampered by the unsuitability of the building.

"A little before 6 o'clock the matron comes down and speaks to me about towels and soap and overalls, and other domestic details. She acts as a kind of chief forewoman and frees the assistant supervisors and myself from a good deal of necessary work which does not require careful handling.

"At 6.15 p.m. there is a meeting of the Sports and Recreation Committee. Having held a most successful dance the night before (which, by the way, kept me up until after 11 o'clock though I was only a wallflower) we decide to organise a series of whist drives for the various sections of the works, followed in each case by a few dances. The football section sends a report on the first half-season's play, and we get a satisfactory account from the Choral Society of the financial result of their performance of the concert version of 'Merry England.' A discussion on finance follows, and it is after 7.30 when we get away. If this imaginary day is a Tuesday, Wednesday or Thursday, I am now free to go home, but two nights a week I go back to the factory after a hasty dinner and stay until 9 o'clock seeing the new people who are turning in for the night shift and making a final tour of the shop before the night supervisor takes over the work.

"In conclusion, it may perhaps be of interest to note that the Welfare Staff consists, besides myself, of two shift supervisors, a matron and a welfare visitor, one adult clerk, a stenographer and two office girls. In the ambulance room are a sister in charge, two fully trained and two partially trained nurses, and a clerk. The number of women we deal with is just under 3,000. It is only possible to manage with such a small staff of welfare supervisors owing to the presence of forewomen. There are eight of these, and they act as kind of liaison officers between the welfare supervisor and the works. They are only appointed with my approval, and I find that in many ways there are advantages in making use of them instead of increasing the staff of supervisors."

QUALIFICATIONS AND TRAINING OF WELFARE SUPERVISORS.

465. The duties of a welfare supervisor are many and difficult; she requires to be possessed of strength of character, tact and broadmindedness, such as will fit her for responsibility and will command the respect of workers and foremen. She should be of good standing and education, and should possess a good understanding of industrial conditions. Apart from these broad essentials much necessarily depends upon the conditions of work, the size of the factory, the nature of the management, the type and characteristics of the workers, the nature of the industry and the conditions under which it is carried on. The duties of the supervisor may have an industrial or an ameliorative bias. Provided only that they possess the requisite qualifications, welfare supervisors can be and are drawn from all classes of the community. It has been suggested that there are five essentials for the work of a welfare supervisor:—

- (a) An intimate knowledge and sympathy with women and girls. This can best be acquired by such methods as teaching in a primary school, life in a settlement, work in a women's trade union office, living at the same time in a poor neighbourhood. Without this fundamental experience no one should take up welfare work.
- (b) A careful study of industrial problems which affect women's labour—such problems as the displacement of men by women, married women's work, the educational needs of "young persons," the home life of women and girls, the working of such Acts as the Insurance Acts and the Workmen's Compensation Act.
- (c) A knowledge, both theoretical and practical, of the health of women and girls, and how it is affected by speed of output, the kind of commissariat provided, the questions of ventilation and heating, and questions of housing accommodation.

- (d) A knowledge of the technical side of the work, indexing, filing, account keeping, domestic arrangements in rest rooms, cloakrooms, the organisation of a factory, and the relations between general managers, managers, foremen and forewomen.
- (e) A conception of the right relation between the life of the factory with all its agencies for good, and the life of the community, the inter-action of each upon the other. This involves a serious study of the social structure of the community.*

466. The previous experience and knowledge possessed by persons desiring to become welfare supervisors will necessarily vary. Their experience may be mainly practical or mainly theoretical. Though there will be exceptions it will generally be desirable that candidates should undergo a special period of training. During the past two years the Universities have provided a number of courses of training of a few weeks' duration which have been attended largely by persons already provisionally selected by the Ministry of Munitions as suitable for employment and in some cases in receipt of special allowances from the Ministry. While these courses have been of practical value in meeting the temporary emergency, they have admittedly been provisional in character. The need for such emergency courses is, however, rapidly passing; and the Committee desire to express the opinion that longer courses of not less than one year's duration should at an early date become the established minimum of training. They recognise the difficulty of persuading candidates to equip themselves by longer training as long as emergency courses are still in existence.

467. In considering the scope of courses of training it cannot be too strongly emphasised that welfare supervision as it is known to-day is only a phase and possibly only a temporary phase of a much wider movement towards industrial betterment. The present time is essentially one of change and development. The welfare supervisor of the future may not be an officer appointed *ad hoc*. She may in future be a manageress or forewoman or hold some technical position in the executive. Account must also be taken of the developments which may arise from the proposed establishment of Joint Industrial Councils† of employers and workers. Apart from this, allowance must be made for the wide variety in the types of post which the supervisor may be called upon to undertake. In any case the essential object must be a right outlook upon her future work; for its absence no knowledge, however large, of technical detail will compensate. The Committee are accordingly of opinion that it is essential that any course of training should, while allowing for a special study of welfare problems, be grounded on a wide study of social questions. Subject to this institutions may properly be encouraged to elaborate their courses according to what each may conceive to be best for their students, regard being also had to the special bent of the teachers available, and the particular sphere for which they are preparing. The Committee generally concur in the recommendations on this subject contained in the report made by a Committee of University representatives in July, 1917, upon "The Selection and Training of Welfare Supervisors in Factories and Workshops."‡ This report suggests that the course of training should fall into three main divisions, viz. :—

Lectures and Class Teaching.—The subjects to be dealt with would include some study of industrial history, the outlines of social economics and local government, modern institutions such as trades unions or the co-operative movement, industrial law, including some knowledge of Factory Legislation, hygiene, the health of the individual worker, and Workmen's Compensation. Special attention should be paid to the general organisation of a factory, the duties of managers, the principal types of production and the methods of remuneration, relation of factory organisation to problems of continuation school education. Some at any rate of the instruction on the duties of a welfare supervisor should be given by those who are actually engaged in the work.

Visits of Observation.—These would have regard to public health, housing, conditions of factory life, poor law, hostels, employment exchanges, &c.; they would be supplementary to and explanatory of the lectures.

Practical Work.—At least half the time of a social student should be spent upon practical work. This should be divided roughly into two sections—the first section aiming at giving the student an acquaintance with normal working class life; in the second the future welfare supervisor should visit a considerable number of factories in which welfare work is carried out and should, where this can be arranged, work under a welfare supervisor. Finally, it is desirable that wherever possible students should gain some actual experience of life as a wage earner in a factory.§

468. At a recent Conference** of welfare supervisors a speaker thus described the object of training :

"Part of the real object of training, combined with association, was to make a standard of work and worker which would endure, and which would be a guarantee of good work in the future. The standard required was not merely one of expert administration, but of breadth of judgment, wise understanding, good sense, and all that general combination of qualities which belonged to the educated man or woman. Efficiency merely would not give the standard. Some professions had got efficiency but not the standard—for instance, nursing. Others had both efficiency and the standard, as the medical and legal professions. These had not been obtained by tests, examinations, or difficulty of training, but by pattern and length and character of the training. Some parts of the training might be necessary merely to compel thinking. The shortness of

* "Industrial Welfare Work," by Miss Hilda Cashmore; Geo. Gordon & Sons, Old King Street, Bristol. Price 6d.

† See Interim Report on Joint Standing Industrial Councils by the Sub-Committee of the Reconstruction Committee on Relations between Employers and Employed. Cd. 8606, 1917.

‡ Published by P. S. King & Son, Ltd., Orchard Street, Westminster. Price 3d.

§ Courses of the kind here contemplated have been, or are being, organised by or under the auspices of the Universities of London (School of Economics), Birmingham, Bristol, Belfast, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Sheffield and elsewhere. Provision is also sometimes made for short or part-time courses. Prospectuses of the courses can be obtained from the authorities of the Universities concerned.

** Central Association of Welfare Workers," Notes of Addresses given at the Conference on January 12th and 13th, 1918, price 1s.

the training made it all the more necessary to include something which would bring out the capacity to think. Perhaps next to good judgment and tact, power to think quickly and sympathetically was most important. Only by contact with the mental struggles of other people could be obtained that sense of the relation of class to class, of the attitude of working people to social usages, their feeling about this or that. Only the study of the most human questions, i.e., mind (psychology), of aim (philosophy), of the struggle to make the best of life (social economics), could give this sense. . . . By training, much of the shortsightedness and narrowness which spoiled social work could be avoided."

469. If the Committee are correct in their view that courses of training should be primarily based on a wide study of social problems, it may be anticipated that a large part of the course will be suitable for all students who are desirous of taking and are qualified by attainments to take a course of social study; and the Committee would not favour an attempt to limit admission to any part of the course to persons who had been previously selected as likely to prove at the end of the course suitable candidates for the posts as welfare supervisors. Further, while particular candidates will doubtless from time to time be assisted from private funds to undergo a course of training with a view subsequently to taking up employment as a welfare supervisor, perhaps in a particular factory, the Committee would be opposed to any scheme of granting financial assistance from public funds to candidates who undertook as a condition of the assistance to take up such an appointment on the completion of the course. Such a restriction is only justifiable (except to meet a special and temporary emergency) where the numbers required are large and the prospects of permanent employment are substantially secure.

SELECTION OF WELFARE SUPERVISORS.

470. Though the State may properly undertake responsibility for satisfying itself that adequate provision is made for supervision, and may require modifications to be made where they are not so satisfied, the State cannot in the opinion of the Committee itself undertake responsibility for actual appointments, if only because it cannot possess a sufficiently intimate acquaintance with the particular conditions of individual factories. Apart from this the State would only be justified in itself making appointments if it paid for the supervision provided; and it would appear obvious that welfare supervision—at any rate as it is at present conceived—could not be successfully carried out by a paid agent imposed on the factory from outside. Up to the present the welfare supervisors have been appointed and paid by the employer, and it seems probable that for some time to come at any rate the employer must ordinarily continue to accept ultimate responsibility if only that upon him rests the duty of securing that the conditions of employment within his factory are satisfactory. It may be anticipated, however, that the workers, whose confidence and support are essential to success, will to an increasing extent seek some voice in the selection.

471. The peculiar conditions which have justified the making of several hundred appointments of women welfare supervisors within the last two years, necessitated that some organisation should be established through which employers could obtain information as to suitable candidates. To meet this demand the Ministry of Munitions established a special Panel. Though this Panel has undoubtedly served a useful purpose, the Committee are not satisfied that it is desirable as a permanent arrangement. If admission to such a Panel were at all narrowly limited it would probably fail to secure the confidence and support of employers. Apart from this, the fact that a particular supervisor had been selected from the Government Panel might subsequently prove an embarrassment if it became necessary to comment adversely on the provision made for supervision at the factory in question. Any agency established should in the opinion of the Committee be entirely free of all Government control.

CONCLUSION.

472. The time has not yet arrived when any definite judgment can be passed on the developments of welfare supervision during the past two years. Still less can prophecy safely be made as to the future. For permanent success welfare work must gain the confident approval and support of the workers. At present their judgment is in suspense. The old antagonism of "capital" and "labour" makes the motive of the employer in appointing a welfare supervisor subject to the suspicion that he is seeking profit at the expense of his workers. Again, there is the natural objection to anything savouring of philanthropy. The demand is for justice not for charity. Fussy interference represents another danger. As a prominent employer has pointed out—

"It would be a great mistake for employers to force themselves into the lives of the men whom they employ. We must avoid smothering them with our good intentions . . . The point is that men must have a definite responsibility of their own, and we must not try to interfere with that in any way."

473. Further, there is the fear that the movement, whether deliberately or not, may be opposed to the development of the aim of trades unionism. On the other hand, the following remarks of a representative trade unionist at the recent conference already referred to, show a more favourable attitude:—

"Wages and hours, though of primary importance, were not the whole matter. Tone and atmosphere might still be wrong. There was still the relationship between the sexes in a factory to be considered, and also the shameful fact that there were still many men supervisors who were in charge of women in every respect. Also, though good wages and good hours always tended to raise the standard of life and manners, the connection was not always immediate. For instance, in the Lancashire cotton trade, where before the war, women were best paid, standards of comfort were deplorably low. After all had been done in respect of wages and hours, there still remained something to do."

"There would be a great many other matters—for instance, dismissal and engagement of workers. Engagement was of most far-reaching importance, because bound up with the extraordinary difficult question of the

slow worker, who was often slow because in an unsuitable trade. The Welfare Worker would, after a time, be able to select people with the precise qualifications necessary for the particular trade; would probably get rid of, substantially at any rate, the problem of the slow worker. Again, there would be questions like the lifting of heavy weights, the danger of particular processes, &c. The Welfare Worker would be the intermediary between employer and employee. Any Factory Act, or any observation forced upon employers by the Trade Union, could only be a minimum. The conscientious employer would still have to decide how far he could go in advance of the minimum, and would more and more need the expert advice that a trained Welfare Superintendent could give him.

"The supervisory powers which, by degrees, the Welfare Worker would attain to, were very valuable. Canteens, rest rooms, clean water, overalls, &c., were invaluable, but would mean nothing unless there was somebody to see that each of these things was what it ought to be. In those things was the basis of welfare work. It was part of the functional management of a great factory. Sidney Webb had appealed for frankness. It should be known that the Welfare Worker was there for efficiency; she represented the management and not the worker. There was no shame in working on the side of efficiency, and in any system of industry efficiency would be necessary. The Welfare Worker who came forward in the name of efficiency, and to do what she could for the workers, would incur no misunderstanding or resentment on their part. If she were also able to work cordially with Trade Unions and direct people to join Unions, any barrier between her and the workers would be broken down."

474. Considerable interest attaches to the following constructive proposals which were recently put forward in a memorandum* prepared by the Joint Committee of the Woolwich Trades and Labour Council and the Woolwich Labour Party:—

The statement of the duties of Welfare Supervision contained in Memorandum No. 2 ("Welfare Supervision") of the Health of Munition Workers Committee may be taken as a working basis for the purposes of welfare supervision. The Memorandum states that "the duties here outlined are chiefly concerned with matters of health and individual welfare which are of immediate urgency to-day." Modification of or addition to these duties will doubtless be brought about by increasing experience, and by the changes which are likely to arise in the industrial system after the war; but we submit that the following conditions are essential to any scheme of welfare supervision that is to win the full confidence and support of the workers:—

- (1) Welfare supervision must aim primarily at promoting the welfare of the workers, and not at increasing the workers' output.
- (2) In the interest of welfare supervision and of the workers, duties which conflict with welfare supervision must not be included in the work of welfare supervisors.
- (3) Welfare schemes and supervisors must be under a democratic system of control in which the workers shall have equal participation with the employers.
- (4) The established field of operations of Trade Unions and their officials must be clearly and loyally recognised by welfare schemes and supervisors.
- (5) Welfare supervisors should be drawn, as far as possible, from among the workers.
- (6) Welfare supervisors should not be appointed without preliminary training or experience, such training to include a knowledge of Trade Union aims and methods.
- (7) The remuneration and hours of all assistants in welfare supervision work (e.g., canteen workers) must be of a Trade Union standard.
- (8) If Government control of welfare supervision is maintained after the war, such control must be transferred from the Ministry of Munitions to the Ministry of Labour.

We submit further:—

- (9) That there should be the maximum of efficient co-operation among local welfare schemes, especially with regard to small factories.
- (10) That there should be the maximum of efficient co-operation between local welfare schemes and the municipality, especially with regard to health, housing, transit and recreation.
- (11) That as welfare supervision will probably become a permanent and extending element of the industrial system, there should be held in each industrial centre, one or more conferences, convened by the Trade Council, or, where there is also a local Labour Party, both bodies jointly, for the purpose of considering the aims, scope and methods of welfare supervision; and that such local conferences should be followed by a joint conference of the Trade Union Congress and the National Labour Party.

475. The Committee cannot escape the conclusion that unwise and unsatisfactory appointments have been made, that friction and misunderstandings have been created, and that complaints have at times been considerable in volume and extent. Further, it may be freely granted that many of these complaints were well founded, though their extent and importance must not be over-estimated. More is frequently heard of one failure than of many successes. The problems at issue cannot be solved in a day. If not entirely new they are now for the first time becoming of direct interest and importance to any large section of the industrial community. Allowance, too, must be made for the limited experience of industrial conditions inevitably possessed by many of the welfare supervisors when first appointed, and also for the difficulties due to the newness of many of the conceptions of industrial organisation involved in the work, and to the absence of any substantial body of experience or tradition to guide welfare supervisors in their work. Failure where it has occurred has quite as often been due to slowness of the management or the workers to understand the aim and purpose of welfare supervision as to the incapacity or unsuitability of the supervisor. On the whole the Committee are convinced that it can at least be said that the conditions of employment of women workers have been substantially and widely improved and that they are as a rule to-day greatly superior to those usually existing in industry before the war. The fact that in spite of the strain of the last three years there has not hitherto been a general breakdown of health is in no small degree due to the work of welfare supervisors. There can too be no doubt as to the advantage derived from the presence of a person whose special duty it is to give constant attention

* Reprinted in the "Woolwich Pioneer" for February 22nd, 1918.

to many matters which, though often trivial in themselves, are yet vital to the maintenance of a healthy environment. Again, it cannot but be of service to the solution of future industrial problems that there should exist a large number of persons who are daily devoting their attention to an aspect of these problems which has too frequently been overlooked in the past but which cannot safely be neglected. The experience and knowledge now accumulated must certainly prove a notable contribution to the wise handling of many questions vitally affecting the future prosperity of the nation. The Associations* of Welfare Supervisors now being established should do valuable work in collecting and focussing information. The Committee in fact are satisfied that the experiment of the last two years has been of inestimable benefit to the nation, and that in one form or another welfare supervision should certainly continue to play an important part in all future schemes for the industrial betterment of the race.

SECTION XVIII.

WELFARE SUPERVISION FOR BOYS AND MEN.

WELFARE SUPERVISION FOR BOYS.

The Need.

476. The problems involved in the welfare supervision of boys, though in some measure similar to those which arise in the case of women and girls, are in certain respects distinct, and call for special consideration and treatment. The employment of boys in engineering and other munition works, unlike that of women and girls, is not a new development arising out of the war. Nearly every firm has employed boys before the war. The war has not introduced a new form of labour for which employers might expect to be asked to provide new conditions, nor, again, has the war introduced difficulties in regard to boys which did not exist before. The war has only magnified the difficulties, it has not created them. High wages in certain occupations; large demands for boy labour; restlessness and the habit of wandering from one employer to another; the trouble of securing proper control; all these were boy problems during times of peace, but war conditions have emphasised the difficulties, while the need for conserving all possible labour has made their solution a matter of national importance.

477. The first and most essential object of welfare supervision among boys is to bring to bear upon them through the management a definite personal influence. They are at an impressionable age when the influences to which they are subject will largely determine their ultimate outlook upon life. They are not adults; many are as young as 14, some are even younger. They are not old enough to be allowed unguided to control their own destiny. At the same time, existing conditions, such as high wages, the absence of the father or the elder brother, have tended to relax home control. Hours of work frequently prevent attendance at clubs or classes, and healthy out-door recreation is too seldom available. As might be anticipated under such conditions, the conduct of the boys is the subject of frequent complaint. From whatever aspect the matter is viewed, it is essential that the causes of alleged ill-behaviour and conduct should be ascertained and appreciated. It is only by such means that improvement can be obtained.

478. While at school, boys have been accustomed to a sympathetic discipline and friendly interest. Similar discipline and interest should be present also in the factory. Where these are not assured, it is, as a rule, useless to secure the provision of what may be called the material apparatus of welfare. Facilities alone are inadequate, the boys must be led to avail themselves of the opportunities offered. Experience shows that canteens and mess-rooms may be erected, but boys, in many cases, have not used them, preferring to consume "carried" food in some corner of the factory. Similarly, washing apparatus has been supplied, but left neglected or abused; towels have been converted into footballs and soap used as a handy missile. The First-Aid arrangements may be excellent, but for minor injuries the boys will not trouble to make use of them. There are, of course, exceptions to these statements, but they are not sufficiently numerous to modify the conclusion that what the boys need most is definite personal influence.

479. Such personal influence can, in general, only be secured where definite duties with regard to the boys are delegated to some one individual. Collective and indiscriminate responsibility is unsuccessful. The mixed method, usually the practice, of leaving the boys to the control of the manager and foremen has been proved a failure in actual experience. The manager, even when possessing the necessary qualifications, has not the time to carry out the work. The foremen, not infrequently keenly interested in the boys, lack the requisite breadth of outlook and training. Their immediate concern is "output," and they tend to regard only the obvious and often superficial effects as distinguished from the more important but less arresting consequences of any action on their part. To take a single example:

* The aim of the Central Association of Welfare Supervisors is defined in the Constitution as being—

"To promote the well-being of the workers by securing, in the co-operation with employer and employed, the best possible conditions of work. To help all efforts, inside and outside of the factory, to place the industrial relationship on a basis of goodwill and understanding."

The Secretary of the Association may be addressed at the School of Economics, Clare Market, W.C. 2.

District Associations are also being formed in London and other industrial areas.

The Association has upwards of 600 members.

experience has shown that boys are ill-suited to stand the monotony of purely repetition work. To keep them long to one operation is to injure output by increasing lost time and frequency of leakage. But the foreman knows that a boy, when transferred to a new job, requires time before he becomes expert and that temporary loss of output is the result of transfer. He fails to appreciate that in the absence of such transfers output suffers more seriously. It is not possible, therefore, to count on securing the necessary personal influence from either the manager or the foremen. In small Works, employing 30 boys or less, where the management are interested in the boys, this personal influence can often be secured without delegation of responsibility to an individual. Occasionally, in large factories, where welfare work has been of long standing and created its own atmosphere, the same may hold good. But such cases are rare, and, in general, and certainly where welfare work is being introduced, success depends on the presence of a definite individual, termed a welfare supervisor.

480. As a recent speaker has pointed out :—

"You cannot expect a shop manager or the manager of a works to have any particular and peculiar intimate knowledge of one special section of his staff of employees. Therefore it seems to me only natural to demand that the boys' case shall be stated first of all to the man who understands them, who has made it his special business to know all about them and to go intimately into a study of their nature . . ."

481. The Committee, in their Memorandum No. 2, on "Welfare Supervision," recommended the appointment of a Welfare Supervisor, wherever 100 boys are employed, and experience has shown that where there is this number, a whole-time officer can be usefully employed. It is, however, only a minority of factories, in which so large a number is employed, and it is, therefore, a matter of considerable practical importance to devise means for providing for welfare supervision in the numerous factories, where only about 30 to 100 boys are employed. Various alternatives have been adopted in practice :

- (a) A special whole-time officer is appointed, and his services shared by two or more firms ;
- (b) A special officer is appointed, who gives part of his time to other duties in the factory ;
- (c) An existing officer is relieved of part of his other work in order to give time to welfare supervision.
- (d) The boys may be placed under the charge of the welfare supervisor for women.

482. A problem of great difficulty arises from the practice still prevalent in some districts, under which the boys though nominally in the service of the employer, are for all effective purposes in that of the men, for whom they work, and who engage them, dismiss them and pay them. Their work is sometimes casual ; the employers know little of their conditions and are inclined to contend that they have no responsibility for their welfare. It is, however, hoped that in two centres the experiment will shortly be started of a special institute for such boys in charge of a welfare supervisor. It is suggested that the institute should act, not only as a centre of recreation, but also as a kind of labour bureau dealing with the difficulties arising out of the casual nature of the employment.

The Duties of the Supervisor.

483. While the duties* of a welfare supervisor of boys may usefully include most of the various matters specified in the preceding section for welfare supervisors for women, there are certain aspects which need to be particularly emphasised. It is essential that a wide view should be taken of this sphere and influence. He is concerned with boys in their critical stage of growth and development, and nothing which makes for their well being should be regarded as alien to his duties. From his presence inside the factory he occupies a unique position for guiding effectually the careers of the boys under his charge, and experience shows that the wider his outlook the stronger his position. The following scheme prepared for a Government factory, illustrates the point :—

"The Boy Visitors' work is directed to improving the boy workers' moral and material well-being and to reducing the difficulties which slackness, ill-discipline, &c., cause the factory staff.

"The present abnormal conditions of work, high wages, lack of healthy recreation, and in many cases the absence of the father, tend to thriftlessness, ill-discipline and other evils.

"In fairness to the boy it should be said that bad time-keeping, &c., may be the outcome of genuine fatigue, illness, home troubles or discontent. It is the business of the Boy Visitor to get at the root of these troubles by personal work amongst the boys and to inform the factory officials of the knowledge which his investigation of the boys' circumstances, home life, &c., will give him.

"The Boy Visitor will, by personal guidance, work towards getting contented, well-disciplined boy worker, and the information he gathers will always be available to assist the staff in the smooth working of the factory.

"(1) To meet new boys on entry and keep a record of the boys' progress and career in the factory.

"(2) To deal with absentees and bad time-keepers—first with the boy, then, if necessary, with parents.

"(3) To see boys before dismissal or leaving and if necessary to see the parents.

"(4) To investigate shop and police reports and make recommendation thereon.

"(5) To keep an eye on the feeding arrangements, dining halls, lavatory accommodation, &c., and to report and make suggestions thereon to the Welfare Supervision Department.

"(6) To enquire into and discuss with the boys their complaints and troubles, and, where necessary, present them on behalf of the boys to the proper authorities.

"(7) To overlook the general conditions and health of the boys, and, where necessary, arrange for medical inspection.

"(8) To suggest suitable candidates for convalescent homes after sickness or injury.

"(9) Where necessary, to visit the homes of the boys who are evidently ill-cared for, and report upon the home conditions, &c. To note specially the state of clothing and boots of boy workers.

"(10) To encourage and arrange recreation, sports, &c., at spare times.

* The Ministry have issued a memorandum on the duties of a welfare supervisor for boys. Reference may also be made to "The Boy in Industry" and "Report of a Conference of Boy Welfare Supervisors." All of these documents may be obtained on application to the Ministry.

"(11) To keep in personal touch with the boys by means of individual talks, meeting them at meal times, &c., and advising them in difficulties, encouraging them to thrift and well-doing.

"(12) To gather information as to boys' characters and progress and capabilities for promotion and for post-war employment.

"N.B.—The Boy Visitor has no executive authority and his function is to assist the boy when he is in difficulty or trouble and to place his case in a very tactful way before the foreman or manager. It is emphasised that great tact is necessary in the relations of the Boy Visitors as the boys' friend with the foreman and officials. The Boy Visitor should clearly show to the officials that his work will not in any way reduce their authority, but will strengthen it and help to secure efficiency and discipline in the factory."

484. The first essential of success, is that the welfare supervisor should gain the confidence not only of the boys and the management, but also of the foremen and local Trades Unions. He should keep in touch with all other persons and organisations in the district which are concerned with the well-being of the boy. He should establish friendly relations with the School Authorities and the Employment Bureaux, also with any club organisations which may be available for providing healthy recreation. In order to encourage the interest and influence of the home, he should be in touch with the parent. Lastly, he should recognise a responsibility for boyhood in general, and not merely for the boy while still in his factory. Boys are continually leaving through the unsuitability of the work, reduction of staff, or other causes. He must regard his responsibility as continuing until the boy has found other occupation. Deterioration, now so common, can only be prevented by recognising this continued responsibility.

485. *Recreation.*—The boy is in special need of change and variety, and adequate facilities for recreation are accordingly of primary importance. Where it can be arranged for recreation during the dinner hour is valuable in the form of games indoors or football or cricket on some odd piece of ground adjoining the factory. In the main, however, the boy must rely for recreation on leisure time outside factory hours. Where, as is most frequently the case, local clubs are insufficient to meet the need, special provision should be made. In some centres schemes for the whole district are being organised largely on the initiative of the local welfare officer of the Ministry of Munitions, the organisation being in the hands of a local committee, and are supported by contributions from employers on a capitation basis. Such schemes have much to commend them when they can be arranged. More often, however, if recreation is to be provided at all, it must be by one or more employers independently of any local club. Indeed, practically every welfare supervisor has in operation some recreation scheme for his own boys. The provision should include not only indoor games and amusements, but also football, cricket and cadet corps. Week-end camps have been organised with success.

486. *Training and Instruction.*—Training and instruction are needed both for the immediate purpose of increasing the boy's interest in his work, and so relieving its monotony, and also for improving his technical efficiency, and his capacity for undertaking his future responsibilities as a man and a citizen. It is very desirable that boys on appointment should be instructed in the best method of performing their work, and, if possible, also in its aim and purpose. By such means they would not only become more quickly efficient, but interest may be stimulated and monotony relieved. Boys have normally entered on an occupation in which when men they hope to find a definite career. Their technical training—whether from the point of view of the Nation or themselves—is a matter of importance. On the other hand, war conditions and the great increase of repetition work have not proved favourable to such training. There has been a tendency to keep the boy on the performance of a single operation. Certain employers, however, to the benefit of both output and the boy's training, have found it possible to vary the work, and so provide at least some training. To an increasing extent also facilities are being given for attendance at Technical and Continuation Classes, both during the day and in the evening. In such cases boys are generally allowed time off from the factory without loss of pay, and the fees for their instruction are paid by the firm. Thus, one welfare supervisor is able to report:—

"I have succeeded in getting every apprentice to attend evening technical classes two or three times per week. The managing director was very sympathetic towards this and readily granted concessions which enabled me to obtain this splendid result. The boys are allowed to miss a quarter without loss of pay the next morning after attending evening school. When on night-shift they go to school and then come on to work thus missing a quarter. The employment of boys on night shifts is a difficulty we are up against all the time. Many of the other lads are attending evening classes with similar concessions. . . . I am arranging a series of lectures in scientific and general subjects and physics."

487. *Thrift.*—While the high wages now generally earned have undoubtedly been beneficial to health to the extent that they have brought good food and suitable clothing within the reach of all, they have undoubtedly encouraged some undue indulgence and extravagance. The possession of a large amount of pocket money is a serious temptation to indulge in thriftlessness and gambling. The need for saving against periods of sickness or other future difficulties is seldom appreciated. It is therefore of urgent importance that saving should be encouraged and its national as well as its personal aspect emphasised. The arrangements should be so organised as to attract the support of those who are not naturally thrifty. The rules should be few and easily understood. The collection of deposits should be made in close connection with the payment of wages, and should ordinarily be in the hands of the welfare supervisor who through his acquaintance with the boy and his home can advise him as to the amount which he can properly put by. Upon the wisdom and tact of the supervisor rather than upon formal regulations should the restriction of improper withdrawals depend. If a boy thinks that he cannot get his money out whenever he wants to he may hesitate to deposit it.

488. The wide scope and variety of the duties which may be undertaken by a welfare supervisor are well illustrated by the following account by a welfare supervisor of how his time is ordinarily occupied :—

"Arriving at the factory in the morning, the welfare supervisor usually finds several boys waiting to see him in the hope of finding employment. Of these, some have probably been sent by the Employment Exchange either in response to previous requests or on the chance of a vacancy existing. A glance at the notification of vacancies in different departments received from the foremen concerned, enables the boys to be roughly classified according to suitability for the jobs for which they may be needed. They are then interviewed separately and questioned closely. . . . His answers give some indication of his mental ability and intelligence and may prevent a dull boy from being set to work which requires thought, or a bright intelligent boy from being allocated to a task which could as well be performed by one who is mentally dull. Each boy is required to give some account of his health. . . . If he has not just left school, he is questioned as to his previous employment, the number of changes he has made since leaving school, his wages and reasons for leaving. . . .

"Full particulars of the boys engaged are entered on special record cards which provide also for entries dealing with their careers while at the factory.

"The supervisor's attention may now be given to the weekly forms showing the time lost by the boys in the various departments. He probably finds that some have lost several quarters or have been absent during periods ranging from one day to a week. Where he is unaware of any reason, he makes a note so that the matter may be investigated later. Similarly the reports on attendance received from the local evening continuation or technical schools are dealt with.

"The supervisor may now make a visit to the various shops, bearing in mind any boys whose timekeeping or irregularity at evening classes call for inquiry. He looks out for boys who have been recently engaged and makes a friendly inquiry as to their progress. Other boys are on the look-out for him, being anxious to make inquiries or complaints which perhaps would seem trivial to the foreman, but which the supervisor knows may be of real importance to a boy. The foreman also may have complaints or suggestions to make. If these matters cannot be dealt with speedily on the spot, arrangements are made for special interviews. Such interviews take up a portion of each day. Every case of dismissal or of a boy giving notice is a matter for inquiry on the part of the supervisor and he is frequently able to adjust matters so that both boy and foreman are satisfied.

"The weekly visit of the Home Office Certifying Surgeon calls for the supervisor's presence, especially when boys are examined as to their fitness for night employment. He is in a position, from the knowledge gained at his preliminary interviews with the boys, to draw the doctor's attention to any physical weakness which while of little importance in itself may prove a danger to the boy as a result of his employment. He can arrange for a re-examination of boys whose health seems to be affected by working at night and keeps a record of all cases where boys are declared unfit for any work other than in the daytime, so that arrangements may be made, if necessary, for the transfer of a boy to a department where there is no night employment.

"On most days the supervisor has visits to make. These may be to local schools or members of care committees, but generally they are visits to the boys' homes made in order that parents may be consulted, and made aware that an interest is taken in the boys and that the co-operation of the parents with the supervisor is desirable. Matters of health, wages, timekeeping, progress, companionship, call for such visits which are made not for the purpose of lodging complaints, but in order that friendly inquiry may help to make things better for the boy and prevent him going astray at a critical period of his life. Experience shows that such visits are welcomed by the parents while the boys sometimes ask the supervisor to call at their homes in order that the parents' consent may be given to some change which the boy desires.

"In cases of accident or sudden illness, the foremen send for the supervisor to whom they leave the responsibility of seeing that proper treatment is given, either in the works ambulance room or, if necessary, at the local hospital.

"After the night turn has commenced, the supervisor makes another round of the shops with the same objects in view which called for his earlier visit. He will also have been sought by some of the boys engaged on night work before they entered the shops.

"In the evenings, the boys' club calls for the supervisor's time. Football or cricket committees ask his advice or help; he has to see that the fixture list is kept full; he arranges evening concerts, billiard matches or contests for which the club has facilities. It is here that he gets to know the boys well. . . ."

489. The following statement recently received from a large munition works is also of interest :—

"In the early part of last year a Cadet Corps for lads between 16 and 18, and a Boy Scout Troop for boys between 14 and 16 were started, and in both cases were restricted to lads employed in the factory; over 100 are enrolled in the former and between 60 and 70 in the latter. Some of these scouts have gone through a primary first-aid course, and several of them are learning the duties of auxiliaries to the Fire Brigade. They also render every assistance in their power on the occasion of any social or athletic event.

"Whilst on the subject of boys, we would point out that every boy, on being engaged by our Labour Bureau to work in this factory, receives a notice asking him to call at the Welfare Department to see our welfare supervisor, who takes full particulars of the boy's circumstances and points out what facilities are suitable in each case, e.g., Scouts or Cadet Corps, Technical Classes, &c.

"At the present moment about 300 of our boys, as well as a good many girls, are attending evening classes. These boys are given facilities for getting away in time to attend such classes.

"Every new boy is medically examined after he has been at work in the factory for a fortnight. At the Y.M.C.A. a gymnastic class is held for youths every Friday and Monday evening, and every Sunday afternoon a youths' Red Triangle Club and Tea."

Conclusion.

490. For the reasons already stated the need for the welfare supervision of boys has not been so readily recognised as in the case of women and girls, and progress has been slower. Time has been required for securing appreciation of the need by the foreman and the local trades unions as well as by the employer. Apart from this under existing conditions it has been a matter of considerable difficulty to find suitable candidates for posts as they were established, though this difficulty has grown somewhat less as the need has become better known.* Over 150 appointments of welfare supervisors are known to have been made up to the end of April, 1918, and the Committee have little doubt that the movement is now steadily gaining force.† As in the case of the welfare supervision of women it is as yet too early to

* For the assistance of employers the Ministry have established a panel of suitable candidates.

† An association of Boy Welfare Supervisors is being formed. The acting chairman is Mr. C. W. Hodder, Messrs. Denny & Co., Dumbarton.

form any final judgment as to the work now being done or as to the lines on which it is likely to develop in the future; the Committee have however substantial grounds for the view that the work has commenced on sound lines. The need for overcoming initial indifference or opposition has not been without its compensating advantages, since it has tended to prevent hasty and ill-considered schemes or appointments, and thus to reduce causes for misunderstanding and suspicion.

WELFARE SUPERVISION FOR MEN.

491. Though the Committee in their Memorandum No. 2 on "Welfare Supervision" recommended the appointment of a welfare supervisor for men wherever 500 were employed, they have always recognised that the problems involved were much more difficult than in the case of women or boys, and they did not anticipate anything but a gradual development, even had the difficulties in the way of obtaining suitable men for the work been less insuperable than they are, and must continue to be, so long as the war continues. The whole question is intimately connected with that of the establishment of Works Councils, and it is interesting to note that so recognised an authority as Mr. Sidney Webb has recently suggested that—

* "Such subjects as the cleanliness, ventilation, lighting, and temperature of the workplace (upon which maximum efficiency depends much more than managers commonly realise); the hours of beginning and ending work; the intervals for meals; the dates of holidays; the welfare arrangements, including especially the accommodation for meals; the precautions against accidents; the benevolent funds; the workshop rules; and any arrangements about fines, deductions for breakages or inferior work, or charges made for requisites of work, or for hot water, &c., together with any alleged infringements of workshop rules or district agreements as to wages or hours, might all be considered with advantage by such a workshop committee, and brought to the notice of the management at a joint conference."

492. In the immediate future at any rate it appears probable that any welfare work among men will generally grow spontaneously out of the work of the welfare supervision for boys. In several instances already a boy welfare supervisor, usually at the request of the men themselves, has found himself called upon to deal with matters affecting their welfare. He naturally sees much of them, and if of the right type soon establishes friendly relations with them. If a men's recreation club is started, he is likely to be asked to assist in its organisation, or he may be selected to act as secretary of a workshop committee or works council. Often he is in charge of the first-aid arrangements, which are available for men as well as for boys. He is not infrequently consulted by men in regard to personal difficulties, and one welfare supervisor reports that he has had over 200 such inquiries in a few weeks.

SECTION XIX.

WELFARE OUTSIDE THE FACTORY.

493. In previous sections the Committee have dealt mainly with the health and welfare of munition workers as affected by the conditions of employment inside the factory, and have only referred incidentally to other conditions of almost equal importance outside the factory, such as housing, transit and recreation. The demands for labour in munition areas have involved the employment of large numbers of workers at places remote from their own homes, and have thus raised problems of first importance for the physical and moral welfare of the nation, and especially of women and girls. In the earlier stages of the war these problems were mainly left to the energy and initiative of private bodies and of individual firms, who took steps to provide hostels, to find lodgings, and to provide facilities for recreation. The local Advisory Committees appointed by the Central Advisory Committee on Women's War Employment (Industrial) though primarily established to assist the local Employment Exchanges in the recruitment and distribution of workers, found themselves concerned with problems of transit, housing and welfare. Much valuable work was performed through the agency of these various bodies and committees, but their usefulness was frequently limited by the lack of the requisite organisation and funds. They were dependent for funds upon voluntary sources, but the localities, in which by the action of the State the munition workers were concentrated, were not always willing to contribute to what they often not unreasonably regarded as a matter of national rather than of local concern.

494. The Committee in their Memorandum No. 17 ("Health and Welfare of Munition Workers outside the Factory") which was submitted to the Ministry in January, 1917, thus summarised the position:—

By the agency of the State women and girls are being exported from their homes and imported into munition areas;

By the agency of the State the liberty of the individual to throw up her work and to take her labour elsewhere is restricted.

495. On the State therefore the responsibility lies not only for suitably housing these transported workers, but also for securing the safeguards needful for their health and morals, the maintenance of which is essential to the nation.

496. Though the restrictions on the movement of labour have since been removed, the proposition still holds good that it is the duty of the State to determine the nature and extent of the provision to be

* "The Works Manager To-day," by Sidney Webb; Longmans Green & Co., 1917.

made in each area, and to take such steps as are requisite for its attainment. Every advantage should be taken of existing facilities and experience possessed by local bodies, whether voluntary or statutory. In the opinion of the Committee the aim should be not to supplant the work of these bodies, but to supplement and co-ordinate. In submitting the Memorandum to the Ministry, the Committee suggested that it was necessary not only to provide or aid the provision of hostels, maternity homes and facilities for recreation, but also to arrange for the appointment of local officers, whose duty it would be to organise outside welfare in all its aspects in their particular locality. It was added that these officers were likely to need assistants for the inspection of lodgings, organisation of recreation and other similar purposes.

497. Though various Departments of State—as, for example, the Ministry of Labour and the Home Office—are in various degrees concerned to secure a proper solution of the problems at issue, it is clear that the primary responsibility must rest upon the Ministry of Munitions as the Department responsible for creating the need. In March, 1917, the Ministry of Munitions definitely recognised their responsibility for outside welfare, and through their Welfare Department arranged for the appointment of a number of extra-mural welfare officers. As present there are about 20 of these officers, who are stationed in the principal centres of munition work. Their duties to some extent vary according to the needs of each locality, but they are normally concerned with the following matters:—

- (a) Provision for meeting girls and providing them with suitable lodgings;
- (b) Registration and supervision of lodgings;
- (c) Care of sick and stranded workers;
- (d) Day nurseries for children of munition workers;
- (e) Transit facilities; and
- (f) Provision of recreation facilities for women and girls, and occasionally for men also.

498. As in the case of welfare supervision inside the factory, experience shows that these officers have many opportunities for useful work outside their specified duties. There is little doubt as to the valuable effects produced in a locality by the presence of a definite person to whom women and girls can apply for help in a moment of difficulty or emergency.

499. The problems connected with the welfare of the worker outside the factory may be roughly grouped under four heads:—

- (a) The recruitment of suitable workers;
- (b) Housing accommodation and transit;
- (c) Sickness and other personal questions; and
- (d) Leisure.

500. It will be convenient to set out shortly the problems which fall under each of these heads, and to state briefly what is being done, and what, in the opinion of the Committee, should be done to meet them.

The Recruitment of Suitable Workers.

501. The problems involved in the recruitment of suitable workers and their conveyance to the place of future employment are primarily the concern of the Ministry of Labour.

502. *Only normally healthy, clean and wholesome-minded women and girls should be exported.*—In some cases women and girls received in lodgings and hostels have been found to be in such a condition of person and clothing that the assistance of the sanitary authority had to be invoked for cleansing or disinfection. In other cases women and girls have been imported who suffer from physical disabilities, or are in an unsuitable physical condition. In some instances women of bad character have been associated in lodgings or hostels with respectable women and girls. Such instances, even if not numerous, exert far-reaching effect, and rumours spread quickly through a neighbourhood, losing nothing by repetition, and cause many housewives to close their doors against munition workers as lodgers.

503. The Committee accordingly suggest that all women and girls, before being exported, should be examined by a doctor or by a nurse working under his supervision. They are glad to learn that arrangements to this end have been made by the Ministry of Labour with the help of the Ministry of Munitions.

504. *Mothers of infants or of families of young children should not be exported.*—The arrival of mothers in a town accompanied by quite young infants, or three or four young children, having travelled long distances, is by no means uncommon—the mother is attracted, in the absence of the father on active service, by the prospect of high wages in munition works, and brings her baby or children with her. To find lodgings where these are not unwelcome, and where someone will undertake the care of the children while the mother is out at the factory, is no easy task. The Committee consider that this practice of taking children across country by train to some distant munition area, and leaving them to strangers all day or all night, should be discouraged, and they suggest that inquiry into such matters should be made at the source of supply by the nurse mentioned above, or by voluntary helpers of experience.

505. *No woman or girl should be exported without a sufficiency of clothing or of money.*—Women and girls frequently arrive at munition centres without luggage or any clothing except what they are wearing, and without any money; they are often hungry and thirsty, having had no food on a long journey. In some cases poverty is the cause, in many others the reason given has been that they had heard that everything necessary, including the first week's lodging, was provided free. As the first wages are not due for a week, and frequently are not paid until after 10 days or a fortnight (the first week or a few days' wages being kept back), the plight of these women and girls in a strange town is not only uncomfortable, but a serious danger.

506. The Committee accordingly suggest that information should always be given at the Employment Exchange, verbally and by printed notices, that sufficient change of clothing, as well as money for emergency expenses on the journey, must be taken. When the need is proved, financial help should be forthcoming from a fund administered locally, safeguards being taken for the refunding of the loan out of wages. The practice already sometimes adopted of giving advances pending the first payment of wages might be extended.

507. *Travellers across country should be seen off and met at the station.*—The need for this protection of those unaccustomed to travel, especially if the distance is great, is well recognised. Where such services have not been organised, serious inconvenience and evil has arisen in many instances. To meet these difficulties, arrangements are generally made for local agents to see the women and girls off by train, receive them at the station on arrival, and direct them to their Employment Exchange or lodging. In some cases arrangements have been found necessary for meeting parties in the course of their journey, when they have to change stations or trains. The Ministry of Munitions have made an arrangement with the Travellers' Aid Society for meeting workers at junctions, and also on arrival, and conducting them to their lodgings. Where necessary light refreshments are provided. At one junction a special canteen has been established by a local Committee.

Housing Accommodation and Transit.

508. Suitable and sufficient board and lodging should be provided for all exported women and girls not otherwise provided for. For this purpose there should be provided:—

- (a) Reception or clearing-houses;
- (b) Lodgings;
- (c) Hostels; and
- (d) Convenient means of transit.

509. *A reception or clearing-house* should be provided for any women and girls arriving without having secured lodgings, and for whom such cannot be found before nightfall, or whose circumstances or condition make it difficult to allot lodgings without further inquiry. Such a clearing-house has already been provided in some districts, generally with the help of the Ministry of Munitions, and is, indeed, essential in localities where large numbers of women and girls arrive by train from distant places, often late in the day, without any arrangements having been previously made for lodgings. The house needs to be suitably equipped for receiving all classes. It should be under the charge of a lady superintendent with considerable experience in dealing with women under any emergency; she should preferably have had some nursing training, and be a person of kindly, tactful character. The inmates should have separate cubicles, adequate washing and bathroom accommodation, and facilities for washing clothing should also be provided. Good plain appetising food and a cheerful warm sitting-room are necessary. A homeless woman or girl, full of vague fears at taking up unaccustomed work, especially in an explosives factory, may spread uneasiness and even alarm among her associates. Depression and fear are contagious, and have been known to cause many to return home the day after arrival. But cheerfulness and courage are also contagious, and the influence of a lady superintendent or voluntary helpers among new arrivals at a reception hostel is of great value. The stay is generally only for night or two—a week should, unless the case is exceptional, be the maximum—the inmates being found suitable lodging at the earliest moment. At some of these reception hostels arrangements are made with the factory to refund the cost of board and lodgings from wages on the first day by consent of the employee.

510. *Lodgings* with or without board in a family is the readiest and generally the most acceptable arrangement for women and girls. In most centres of munition work some efforts have been made to obtain information as to possible lodgings, visits being paid and lists of lodgings prepared. To begin with voluntary effort was mainly relied on for this purpose working under a Voluntary Organisation or local Advisory Committee. Experience, however, proved that for an efficient list constant visiting was necessary in order to secure up-to-date information as to lodgings actually vacant, and as to those which were suitable in character. Difficulties also sometimes arose from overlapping of different agencies, and in their Memorandum No. 17 the Committee, while cordially recognising the value of the work being done, suggested the necessity for a larger and more elaborate organisation than could be carried out by voluntary effort, and they urged the desirability of establishing some system of billeting analogous to that employed for Army purposes. During the past twelve months the Ministry have established special lodgings committees in eight of the principal munition districts, and 100 lodging

inspectors have been employed in dealing with the many problems involved in the satisfactory housing of large numbers of girls in lodgings.

511. On the 24th May, 1917, the Billeting of Civilians Act, 1917, was passed "to make provision for the billeting of persons engaged on work of national importance for the purposes of the present War." A Central Billeting Board was established, consisting of representatives of the Government Departments concerned and of other suitable persons.

512. The method by which the Board proceeds is to set up a local Billeting Committee on which are represented the Local Authorities, the Local Lodgings Committee (if one already exists), the employers and the workers. An executive officer (who may be a man or woman) is appointed, who with the assistance of investigators makes a house to house canvass of the town and afterwards as an officer of the committee adjusts as far as possible any complaints which arise between landlady and tenant. Where the problem is chiefly concerned with men a male officer is appointed; where it is chiefly concerned with women there is usually a woman officer. The local committee has power to fix scales of payment for lodging and accommodation subject to the approval of the Central Board, and to guarantee payment, up to a reasonable extent, of charges incurred by defaulting lodgers. Machinery is in operation for recovering such charges from the defaulter, but in no case has it yet been found necessary to prosecute under the Act. No compulsory billeting has yet taken place, and though compulsory powers are contained in the Act, they are probably unworkable in practice.

In the areas referred to them, the amount of accommodation which would be obtained by compulsory billeting is, generally speaking, so slight as to be negligible, practically all the available lodgings being obtainable by voluntary means when once the payment of rent is guaranteed. A surprising number of voluntary lodgings has been forthcoming even in the most congested areas when once a house to house canvass has been made, and on one side the patriotism and good feeling of the people as a whole has been appealed to, and on the other they have been secured against loss. In one of the most crowded centres 900, and in another 1,500, additional lodgings were found to be available after such a canvass. In one area, where the importation of additional labour has decreased, it has been found possible, in conjunction with the Medical Officer of Health, to relieve the worst cases of overcrowding. This, of course, is only possible in cases where the supply of billets exceeds the number required to satisfy the demand of imported workers for accommodation.

In cases where the Ministry of Munitions has already been employing Lodgings Investigators under the Extra-mural Welfare Officer a certain number of these investigators are usually transferred to the Billeting Board. An arrangement is come to whereby cases of hardship and distress which the Billeting Officer comes across in lodgings are referred to the Welfare Officer for assistance, and she retains one or two of her original staff to assist in dealing with these. The Billeting Officer and the Welfare Officer are therefore in close touch in all questions relating to lodging accommodation and are often able to be of considerable use to each other.

513. *Hostels.*—In most areas, however, the problem is one not of lodgings but of housing. The towns were under-housed before the war, and the importation of large numbers of munition workers has simply served to accentuate a problem which already existed before the war. In a number of areas the Ministry are accordingly assisting Local Authorities and private firms to carry out new schemes for increasing the permanent housing accommodation of the locality. But such schemes are not in themselves usually sufficient, and it has been found necessary to supplement them by the provision of temporary dwellings, hostels and hutments. Prior to the war hostels were provided by firms for the accommodation of their workers. A number of boarding houses for educated working women and for working men were also in existence. In addition voluntary bodies and private persons had provided hostels intended to afford decent accommodation for girls with low wages; these were of necessity not run on a commercial basis. Conditions arising out of the war have led not only to increased provision by voluntary bodies, but have caused the Ministry of Munitions, acting either directly or through private firms, to erect temporary hutments providing in some instances for many thousand workers. Such provision is not to be regarded as in any sense a permanent solution of the housing question, but simply as a temporary measure essential for the health, comfort and efficiency of the workers, who have been temporarily imported, not only into manufacturing towns, but also into villages and rural districts. The following account of the experiences of a single district represents conditions which are by no means unique :—

"Owing to the great influx of workpeople into this comparatively tiny village, it soon became apparent that housing would have to be arranged; we therefore centred our efforts on this, with the result that we caused houses to be built on the Garden City principle, and there are now houses standing which were built by our own instigation, to the number of 625 on one estate, and on the other 100. In addition to this we scoured the neighbourhood and rented as many large unoccupied houses as we could lay our hands on; in this way we are now in possession of over 70 hostels, where we house 1,600 people. The state of affairs at present is such that we have a long waiting-list of people who desire to reside in the place. As soon as sanction is obtained we shall immediately start building houses, of which quite 1,000 are absolutely necessary."

514. For various reasons hostels have not always been popular. The objections most commonly put forward by women and girls and by their trades unions have included the following :—

- (a) Girls dislike the idea of living in large communities or of spending their leisure hours with the persons with whom they work and with whom they may have no sympathy or social affinity.
- (b) However well organised a hostel may be, some restrictions on personal liberty are inevitable.

- (c) Where a hostel is provided by a private firm the girls are subject to the control of the firm during the whole 24 hours. If they lose their job they are likely at the same time to lose their place of board and residence.
- (d) Hostels are not always self-supporting, and girls object to being "beholden" to anyone, most of all to the firm by whom they are employed.

515. More recently the numbers seeking admission to the hostels have steadily increased. It is not easy to determine how far this increase is due to a change of attitude in regard to the above points of objection, or, on the other hand, to improvements in the organisation and management of the hostel and to the greater difficulties attending housekeeping in lodgings. In any case there can be no doubt of the essential importance of special care and attention being bestowed on the planning, equipment and management of hostels. Some detailed suggestions on these points are given in Appendix F and only one or two points need be referred to here.

Much depends upon the personality of the superintendent and upon the character of her assistants and staff, who should be carefully chosen and controlled. As much freedom as is compatible with good order should be allowed; the inmates are independent workers not living under any community rule. The bedrooms should be separate self-contained cubicles. The dining and recreation rooms should be bright, airy, and well warmed. In addition the need should be recognised for rest and companionship of a few friends, and should be met by the provision of a sufficient number of small sitting rooms. The absence of these has doomed otherwise satisfactory hostels to failure, since many women and girls soon tire of organised recreation night after night, and having worked hard in a factory for many hours crave the quiet rest of a room more nearly resembling home.

516. *Transit.*—The suitability of the lodgings and housing accommodation of a district is closely affected by the existence of reasonable facilities for travelling between the place of residence and the factory. The Committee have been greatly impressed with the extent to which health, temper, time-keeping and output suffer, when to the day's work is added the discomfort and fatigue of long walks in bad weather or in darkness, the long waits resulting from inconvenient services, overcrowded railway carriages, trams and buses. Admittedly the problems involved in the conveyance of large numbers of workers at particular times of day are not easy of solution and are increased by difficulties of staff and rolling stock created by the war, but experience conclusively proves that additional and more conveniently timed services can be provided; shelters at tram and omnibus termini have been erected. In some districts special fleets of char-a-bancs have been provided. In the darkness of early morning and at night, if no lights are allowed on the railways, workers should not be crowded together in the darkness, and separate compartments for women are desirable.

517. To sum up the evidence collected by the Committee and the results of their medical inquiries have emphasised the large extent to which the capacity and efficiency of the worker are affected by unsatisfactory conditions of housing and transit—conditions which frequently existed before the war, though they have undoubtedly been accentuated since. Sufficient attention does not appear to have been given to the matter in the past, but it is essential that these factors should be taken into account in determining the best conditions of employment in different factories and areas. There can be no doubt that provision of better housing accommodation and of more rapid and convenient means of transit would have a beneficial effect on the industrial efficiency of the country.

Sickness and other Personal Questions.

518. *Arrangements for Sickness.*—Large hostels have, as a rule, a small hospital with a nurse. Smaller hostels should be provided with sick rooms to which the patients may be removed if nursing and attention are needed beyond what the servants can render. But illness, even of quite a temporary character, presents more difficulty among women and girls in lodgings in a strange place. For lodgers living with the family and sharing a room or a bed with other lodgers illness is a great misfortune, and may through neglect become very serious; it may, if infectious or contagious, be a source of danger to others and cause absence from work of many who are needed at the factory. Home visiting by the factory supervisor and the better organisation now generally established have undoubtedly served to bring such cases to the notice of welfare officers and to secure suitable treatment. They have also served to bring to light cases of girls who are sufficiently unwell to be out of work for a few days or sometimes longer, but who are not ill enough to require hospital treatment. Here again action is necessary to prevent hardship and distress. In one instance an arrangement has been made with a Government hostel, under which a certain number of beds are reserved for these cases and are filled on the recommendation of the outside welfare officer by girls who need rest and good food for a day or two. A certain number of rest homes have been established to which workers can be sent, and special provision for sending them to convalescent homes has also been made.

519. *Stranded workers.*—A certain number of girls come to munition centres not through the agency of the Employment Exchange and are either unable to obtain work or have after a short experience proved unsuited to the work and become stranded, often without money enough to return home. Such girls frequently require assistance to obtain other and more suitable work or to return home. Where girls are dismissed through no fault of their own they are under certain conditions provided through the Ministry with repatriation railway warrants.

520. *Maternity cases.*—The numerous and urgent problems involved in the care and treatment of maternity problems have already been discussed in Section IV, and need not be again referred to. The question involved in the provision of day nurseries for the children of munition workers are also discussed in that Section.

Leisure.

521. *Recreation.*—Emphasis has already been laid on the importance of recreation in providing the relief from monotony and the change of environment which are essential aids to recovery from fatigue. The question is one of special importance in areas where large numbers of workers have been congregated, and are thus deprived of the means of recreation to which they are accustomed. Especially should the leisure of the week-end be provided for. This important matter cannot be left to chance. If opportunities of wholesome amusement, refreshment and recreation are not provided, the public-houses and less desirable places of entertainment may benefit, but everybody else suffers.

Until recently there has not been in any munition area a systematic attempt to cope with the problems of industrial recreation, or even to co-ordinate the activities of such organisations as exist. The Committee are however, glad to recognise the increased attention now being paid to the subject. The clubs established are very varied in character and provide for men and women, as well as for boys and girls. In addition to the usual games, indoor recreation includes concerts, dances, theatricals, lectures, cinemas, classes of various kinds, including physical exercises, dancing, and dressmaking. Open-air provision includes games, swimming, and open-air camps. Mixed clubs for men and women are increasingly popular, and most of the central schemes referred to below contain at least one mixed club. The need should not be overlooked for providing small clubs easily accessible to tired workers, who desire quiet occupation, and may not wish to journey to more central institutions. In more than one instance, it has been found practicable to arrange for well-to-do residents to offer hospitality in their own houses during Saturday and Sunday to parties of women and girls, and to allow the use of their gardens in summer. Such facilities are greatly appreciated, and may do much to remove class prejudices and misunderstandings.

Recreation schemes are generally of one of two kinds: central schemes available for all workers in the district, and factory schemes which are confined to the workers in a particular factory.

522. In a considerable number of areas, *central recreation schemes* have been set on foot through the co-operation of the civic authorities, existing agencies, the employers and the workers. It is indeed an essential of the success of any recreation scheme that the workers should take a large share in the management, and that care should be taken to provide what they themselves desire. Arrangements have been made for co-operation with the Juvenile Organisation Committees, which are being established throughout the country by a Central Committee under the auspices of the Home Office. These Committees are being encouraged to deal with adults as well as juveniles, and so to facilitate the establishment of schemes embracing the whole industrial population of a town. Under certain conditions (*see* Appendix K), contributions by employers to recreation schemes may be written off as a working expense.

The most detailed Central Scheme which has yet been worked out is that of Birmingham. There is a Finance Committee, of which the Lord Mayor is Chairman, an Executive Committee on which are represented various organisations and individuals interested in recreation. The city is divided into 14 areas, each of which has its own Area Committee consisting partly of employees; each Committee has a representative on the Central Executive Committee. The Finance Committee has complete control over all the funds raised and applications for funds come to it from the Executive Committee which is responsible, for weighing the various claims of the different areas or different organisations one against the other. Girls' and boys' clubs, recreation halls, playing fields, and open air concerts are among the activities supported. The following statement by the welfare supervisor of a local factory affords some indication of the value of the work:—

"Welfare work in Birmingham is very much helped by the extremely good clubs started by the Civic Recreation League. There is one near our factory to which a large number of our girls go, and I have found it the very greatest help to me in my work. In this club the girls have drilling, dancing, singing, embroidery, dressmaking, millinery, dramatic, and shorthand classes and, in summer, rambles, cycle rides, swimming and tennis in connection with it. I go myself regularly. A club of this sort is more satisfactory than one belonging, and limited to employees of the works: it is more of a change for the girls. They can meet friends who go to other factories, with larger numbers it is possible to run a greater variety of classes. I cannot speak too strongly of the importance I attach to these clubs, and any success I have had in my work I attribute largely to the very pleasant conditions under which I got to know a large number of girls out of work hours at the Civic Recreation League Club. It is neither comfortable nor good discipline to talk to the girls more than is absolutely necessary in work hours, and unless one does talk to them they will never dare to come for help and advice on the many small points that are always cropping up in a large factory. One shop has a ladies' football club, but I am hoping that next year the Civic Recreation League may have started hockey and netball teams and that the girls will join those instead. I feel most strongly that the 'playing of game' idea is in many cases lacking and any possible kind of organised game should be encouraged in every way."

In other centres, instead of one big comprehensive scheme being set on foot at once, a small central club has started as a nucleus, and from that developments have gradually sprung. In one case a girls' club was first set on foot, a boys' Cadet Corps speedily followed, and the town in question is now contemplating an ambitious scheme for a peoples' palace. A most encouraging sign has been the interest and co-operation of the Trades Unionists, both men and women, in certain areas as soon as they have realised the elasticity and freedom of the schemes."

523. Central schemes are, on the whole, to be preferred where they can be established, but, in many cases, owing to the isolated position of the factory, the lack of local initiative or other causes,

provision for recreation can only, or, at any rate, can most conveniently be made in connection with a particular firm. It forms, indeed, a natural development of the work of the welfare supervisor, and the Committee are convinced that their activities have proved of the highest value and have been widely appreciated. Factory schemes are, however, liable to be objected to by the workers on the ground that they represent an endeavour on the part of the employer to bind them to the firm, or because they object to being tied to the works during their leisure time. Apart from this, a proportion of the employees may live at such a distance from the factory that they are unable to avail themselves of factory clubs. In such cases employers have sometimes found it desirable also to contribute to central schemes if they exist.

524. The following account has been received from a firm whose works are situated in an isolated position :—

"On the social side everything possible is being done to interest and amuse our employees after working hours. We have a good works orchestra and our brass band is being re-organised as there is plenty of talent in the factory. This neighbourhood suffered a very severe blow when the theatre was burnt down. We are compelled to fall back upon a cinema annexe (which is merely a large draughty marquee) and our Y.M.C.A. hut as the only available buildings outside the factory in which to hold entertainments. Our two mess rooms are in constant demand for 'Socials' and dances and whist drives, which are held almost every Saturday night, the proceeds from which are always devoted to some charitable object, such as the entertainment of wounded soldiers and sailors, &c. The employees support most generously any collection lists which are sent round the factory for charitable purposes. We had a four weeks' collection for Christmas parcels for soldiers and sailors on active service, which realised over £600. We also raised over £400 for the Victoria Buffet Fund, and at the end of last year £438 was collected to entertain the wives and children of men from the neighbourhood who have gone to the front. This enabled us to entertain 1,800 mothers and children on the two consecutive Saturdays, January 26 and February 2. A visit from the Coldstream Guards Band was very much enjoyed by our workers a few weeks ago, and a novelty in the form of a recital by Mark Hambourg and the Gresham Singers last Sunday afternoon was highly appreciated by some 600 of our employees. At the Y.M.C.A. hut we have a concert every Thursday evening and a lecture every Tuesday evening and a mid-day lecture every Wednesday.

"Club.—With regard to sports, our athletic club was thoroughly re-organised last spring. The following sections are now in full swing :—Cricket, football, harriers, hockey, gymnastics, wrestling and boxing, and rifle club. We also hope to start in the near future bowls, tennis, quoits and a swimming club. Ladies and boys are included in these sections as well as men. For instance, the rifle club has a membership of 490 men, 53 ladies and 51 boys, and the football section 492 men and 60 boys. We also run a ladies' football team. There are also about 80 lady members of the hockey section. Altogether we have about 1,400 members of the athletic club. We are at present running an Association Football League in the factory in which 18 teams are competing.

"A new sports ground has just been acquired, and we should, in the near future, be fully equipped with good playing grounds for the various branches of sport. Throughout, our chief difficulty has been the securing of sufficient grounds for play. The above-mentioned grounds are a desirable estate situate close to the church comprising about 45 acres in all, with a large private residence; the latter we intend fitting up as a maternity home (should we obtain the necessary grant from the Ministry). The circumstances surrounding the purchase of this ground are extremely gratifying, inasmuch as we have the assurance of the workers here that the whole of the money will eventually be contributed by themselves. Not only is the proposition one of welfare from an athletic point of view, but a good housing venture, as it is proposed to build in due course.

"Magazine.—In July last we started the Works Magazine, with the double object of (1) saving paper and labour by avoiding the printing and circulation of notices on every variety of topic throughout the factory; and (2) giving the employees some idea of what is going on in their midst and to keep before them the facilities that are offered them for recreation, &c. The Magazine seems to be answering its double purpose very satisfactorily; 8,600 copies of the special Christmas number were sold, and the sales in an ordinary month are now between 7,000 and 8,000 copies. An abundance of subject matter is contributed from all parts of the factory, and the advent of the Magazine is eagerly looked forward to each month, proving the need of such a channel to break down class prejudice and build up co-operation."

525. The following statement gives some account of what is being done for the women workers at Woolwich Arsenal :—

"About 18 months ago, bearing in mind that many of the women and girls employed in the Royal Arsenal were living in hostels or lodgings away from home, I drew up and inaugurated a scheme to provide for them, social and educational facilities out of Arsenal hours. The result has more than passed my expectations; as, during the above-named period, some hundreds of the women workers have availed themselves of the opportunities offered. As many of the workers are engaged in processes necessitating a sitting position while at work, it seemed to me that provision should be made to counteract any ill-effects that might accrue from long hours of sedentary work: therefore I arranged that gymnastics, physical exercises, Morris and country dancing be included in the scheme. During the summer months, swimming is also included. I am sure that it is far better for women and girls to perform health-giving exercises under wise and trained supervision, than for them to walk about the darkened streets of the neighbourhood, aimlessly. Many workers are engaged in purely mechanical processes and for these, I felt that opportunity should be given for them to use their reasoning powers and to develop their intelligence. Therefore, I arranged for classes in dramatic literature, and elocution, thus giving students a taste for good reading.

"A large proportion of the women being engaged on more or less dangerous work, I felt it would be wise for them to have some knowledge of first-aid, home nursing, &c. These classes are most popular and have attracted large numbers, many of whom presented themselves for special examination and were granted certificates of proficiency by the London County Council.

"I desired to launch my scheme without incurring expense or increased liability on the part of the Ministry of Munitions. I applied to the London County Council for the loan of a neighbouring school, and met with a ready response. On guaranteeing a sufficient number of students, the Council offered to provide and remunerate instructors and instructresses and even appointed a responsible mistress to take charge of both the teaching staff and students, and to keep in close touch with me as regards the carrying out effectively the details of my scheme. A charge of 1s. per student per subject is made for each session. In order that the hours of work at the Arsenal are not in any way interfered with, I arranged that classes should sit both

shifts, the hours of instruction being from 5 to 6 for the night shift, and from 8.15 to 9.15 for the day shift. The curriculum includes such subjects as gymnastics, physical exercises, Morris and country dancing, singing, dress and blouse making, &c. I may add here that the men employed in the Arsenal are permitted to join the singing and the addition of their voices enables the class to enjoy the rehearsal of four-part glees, choruses, &c. This class also has rehearsed Elgar's 'Banner of St. George' and assisted in the chorus of the mystery play, 'Eager Heart.'

"At varying times the students arrange social gatherings on Saturday evenings; each member of the class is allowed to invite a non-member, and the girls are specially encouraged to introduce their male friends. In addition to the monthly socials, twice at least during the season, the members of the gymnastic classes give displays at the Town Hall, and in this way further recruits from the Arsenal to the classes are obtained. The literature class also contributes a public performance, producing scenes from standard plays and authors. But though a large number can, and do, attend these classes, there is a far larger number who have no time for recreation except on Sundays. I therefore, in co-operation with Mr. Howard Jones, organised Sunday concerts at the Woolwich Town Hall, for which we obtain the best talent possible, and at which we endeavour to reach a very high standard and tone. These concerts have done untold good; but now that the factories are closing half days on Saturdays, I am proposing to drop the Sunday during the summer months, and organise Saturday afternoon outings into the country.

"Several hockey and football clubs have been organised throughout the winter, under the supervision of some of my staff.

"The members of the various classes and clubs, from time to time, have given performances for the entertainment of wounded soldiers. Another outcome of the scheme has been the inauguration during the winter season of a series of dances, under welfare supervision."

526. What may be done on a smaller scale by an energetic welfare supervisor is illustrated by the following account:—

"We are in need of recreation rooms; we have to use our dining rooms for all recreation schemes. In these dining rooms we have a cinema box and stage. We have concerts, dances or whist drives all through the winter months every Saturday night. The girls' club runs a gymnasium class on Wednesday evenings and a dance every Monday, to which men and non-members are allowed to come on payment of 3d."

527. In 1915, the Maharajah Scindia of Gwalior generously gave a sum of £6,000 for munition workers. Up to the present, about three-quarters of this sum has been distributed by the Welfare Department of the Ministry of Munitions on the development of schemes for recreation, including lectures and concerts in clubs and canteens, pianos, lantern slides, books or pictures for clubs, organisation of recreation, and a holiday camp for boys.

528. *Facilities for divine worship*, religious instruction and spiritual ministration according to the convictions of the various denominations are no less worthy of consideration for munition workers than for the Army and Navy. The existing local provision may not always be adequate or conveniently situated.

529. *Public Order*.—To bring large numbers of young people into any locality must increase the difficulty of maintaining public order and good behaviour at all times. Just as in university towns there are proctors and in military centres there are military police, so where large numbers of women and girls are assembled for munition work Women Police and patrols are required. Special dangers beset young women away from home and friends; the impossibility of excluding altogether from those who flock into munition areas some women of bad character, the necessity for subduing the lighting of streets and courts and open spaces, and the change of shifts at the factory early and late—all contribute to conditions of difficulty for which trained women are well adapted. A large number of Women Police are employed by the Ministry of Munitions inside factories; in one area, eight are employed by the Ministry in the town itself. In many towns Women Police are now working successfully under the Chief Constable, they are uniformed, and trained as recognised members of the force, and in some towns they are "sworn in." Women patrols have been found very useful working in co-operation with the Police. They are more especially helpful in dealing with young girls whose thoughtlessness may be placing them in the way of temptation. In the report of H.M. Inspector of Constabulary, Home Office, 1918, it is stated that seven counties and 24 cities show women as part of the actual strength of the Police Force. The Inspector mentions, in his report, the duties allotted to Women Police. Among them—"the maintenance of public decorum among girls upon whom the presence and advice of women in authority has a more restraining influence than those of a man." He also comments on the good work done by Women Patrols and writes: "The success of the Women Patrols will, to my mind, provide strong argument for the employment of women in the Regular Police Force."

530. *The encouragement of sobriety among the population* is an important branch of the welfare work; questions as to the number and the status of the public-houses in munition areas, the hours during which drink may be sold, and other matters of a like nature, arise for consideration and action in accordance with the needs of each locality.

531. Much has been done to improve the health and increase the efficiency of the munition worker by the reduction in excessive drinking which has been brought about through the restrictive measures of the Central Control Board (Liquor Traffic) under the chairmanship of Lord D'Abernon and of which the Committee's chairman (Sir George Newman) is a member. The statistical evidence which is at present available with regard to the effect of these measures deals with the general population, and does not include data having specific reference to munition workers as a distinct class. It may, however, be assumed without question that any general movement in the prevalence of alcoholism must necessarily affect the industrial classes as much as, if not, indeed, more than the other sections of the community; so that, if there has been any considerable decrease in alcoholic mortality and alcoholic disease in the

population at large, it is clear that there must have been a corresponding, or even greater effect of the same sort in the case of munition workers. And the statistical evidence that such a decrease of alcoholism has, in fact, occurred is definite and convincing. Thus, taking the figures for the pre-war year 1913 as the basis of comparison, the returns of the Registrar-General show that the mortality from chronic alcoholism, which in 1914 showed a slight decrease in the case of females and a slight increase in the case of males, fell in the following year by 22 per cent. in men and by 19 per cent. in women, and in 1916, when the restrictive orders of the Control Board were in operation over the greater part of the country the number of deaths from this cause dropped by no less than 44 per cent. and 54 per cent. in males and females respectively. This downward movement continued in 1917, the figures for the 12 months being 67.8 per cent. below the 1913 standard in the case of men, and 69.1 per cent. in the case of women. Deaths from cirrhosis of the liver show a similar decrease, though smaller in degree, as would naturally be anticipated, having regard to the chronic nature of this affection and the limited extent to which its progress can be delayed even by rigorous abstinence from alcohol.

532. Statistical data of a comparable character referring to alcoholic disease are unfortunately very scanty, but, so far as they are available, they fully agree with the mortality returns of the Registrar-General in showing a marked and progressive decrease of alcoholism during the last three years. Thus, in certain localities where it has been possible to obtain records of the cases of *delirium tremens* over a term of years, it has been found that the prevalence of this unequivocally alcoholic disorder has fallen by as much as 81 per cent. between 1914 and 1917. In Liverpool, for example, the cases recorded in each year within this period numbered as follows—1914, 511 (366 males, 145 females); 1915, 421 (263 males, 158 females); 1916, 205 (128 males, 77 females); 1917, 99 (71 males, 28 females). Official statistics of alcoholic mortality and alcoholic disease do not, of course, furnish any measure of the absolute amount of ill-health and inefficiency due to excessive drinking; but this fact does not detract from their value as indicating by their fluctuations the general movement of alcoholism, and its reaction to the influences which tend to increase or diminish its prevalence. Regarded from this point of view, the statistics quoted above justify the inference that the unprecedented reduction in the death-rate from alcoholism and in the incidence of the graver forms of alcoholic disease since the enforcement of the restrictive measures of the Control Board, is a sign and index of a corresponding decrease in the less serious and less obvious effects of intemperance on the health and working energies of the munition worker. And this inference is fully borne out by the testimony of employers of labour and by the evidence of competent observers who have had opportunities of investigating the effect of liquor control on the condition of the industrial worker and his output. The Liquor Board not only reduced the hours of sale, but concentrated them at the workmen's meal times and also imposed restrictions upon the sale of spirits, credit sales and the habit of treating.*

SECTION XX.

SUMMARY OF CONCLUSIONS.

533. The Committee consider that it is both desirable and convenient that they should conclude their Final Report by shortly summarising the various principles enunciated, the conclusions arrived at, and the recommendations made in the various sections of the Report. While there can be no doubt that since the appointment of the Committee in September, 1915, the issue of their Memoranda, the action of the Central Departments concerned, and the trend of opinion amongst employers, workers and the public generally have combined to secure a very substantial improvement in the conditions of employment, it would be a very grave mistake to assume that all is now well, or that further care and attention are not still essential if a serious breakdown of industry is to be avoided. Further, while the Committee have of necessity been primarily concerned with the health and physical efficiency of the munition worker under the abnormal conditions created by the war, they are strongly of opinion that the principles underlying right action at the present time are permanent and not merely transitory in importance, and should be accepted also as fundamental to all schemes for industrial health and betterment after the war. One of the vital and pressing problems before the country at the present moment and in the immediate future is the question of the health and contentment, the capacity, status and efficiency of the industrial worker, whose contribution to the commonwealth is of ever-growing importance.

For convenience of reference the summary follows the order of the Sections of the Report.

I.—Introductory.

(i) Since the Committee were appointed in September, 1915, there has become apparent an increased appreciation of the importance of the whole question of industrial hygiene; there is no doubt that the environment and conditions of employment of the worker are vastly better than they were, though there is still much need for further improvement. Apart from the quickening of the national consciousness and sense of responsibility resulting from the war, this development may be attributed to three main causes, the widespread adoption of the recommendations contained in the Committee's Memoranda and Reports, the establishment of a "Health and Welfare Section" at the Ministry of Munitions and the increased powers for securing the welfare of workers conferred upon the Home Office by the Police, Factories, &c. (Miscellaneous Provisions) Act, 1916. (See paragraphs 1-10.)

* See First [Cd. 8117], Second [Cd. 8243], Third [Cd. 8558], and Fourth [Cd. 9055] Reports of the Central Control Board (Liquor Traffic).

II.—*Preliminary and Historical Survey.*

(ii) The problems concerned with the well-being of the worker are not new, though they have been accentuated by the war. Ever since the first beginnings of the modern factory system these problems have received increasing attention from the State, the employer, and from the workers themselves. Many of the questions considered in this Report are intimately connected with wider social and industrial questions which fall outside the terms of reference of the Committee.

(iii) The work of the Committee has been greatly embarrassed by the limited extent to which in the past scientific investigation has been made into the various problems affecting industrial efficiency. Inquiries into the effect of industry upon health have been largely limited to special inquiries conducted into particular "dangerous" trades. There has existed no permanent official body charged with the duty of continuing these inquiries or of investigating the effect upon health of industries which, though not technically "dangerous," may still exercise a potent influence upon health and physical efficiency. Research is greatly needed into the relationship of occupation to fatigue, invalidity and mortality. It is only within the last twenty years that medical officers have been appointed to the Factory Department of the Home Office, and the limited number of those officers has made it inevitable that their activities should be largely confined to questions of immediate administrative importance. It is greatly to be hoped that permanent provision will be made for a wider and more continuous investigation of the influences of industry upon health than has hitherto been practicable. (See paragraphs 11-50.)

III.—*The relation of fatigue and ill-health to industrial efficiency.*

(iv) The subject of industrial efficiency in relation to health and fatigue is in large degree one of preventive medicine, a question of physiology and psychology, of sociology and industrial hygiene.

(v) Fatigue is the sum of the results of activity which show themselves in a diminished capacity for doing work. Fatigue may spring from the maintained use of intelligence, the maintenance of steady attention, or the continued use of special senses. When the work is monotonous fatigue may appear in the psychical field; monotony may diminish capacity for work; on the other hand "interest" may increase it.

(vi) Fatigue should be detected and its causes dealt with while it is still latent, and before it becomes excessive. The tests of fatigue are diminished output, the failure of concentration as shown in increased accidents and spoiled work, staleness, ill-health and lost time.

(vii) Without health there is no energy, without energy there is no output. More important than output is the vigour, strength and vitality of the nation. The conditions essential to the maintenance of health are, first, personal conditions or those favourable to the body itself (*e.g.*, food, fresh air, exercise, warmth and adequate rest), and, secondly, a satisfactory environment (*e.g.*, a safe and sanitary factory, suitable hours of work, good housing accommodation and convenient means of transit). (See paragraphs 51-82.)

IV.—*The industrial employment of women.*

(viii) In considering conditions of employment of women as compared with those of men account must be taken not only of physiological differences, but also of those contributions which women alone can make to the welfare of the community. Certain ailments and forms of physical disability to which women are liable are readily caused, or at least accentuated, by lack of attention to their special needs.

(ix) Up to the present there has been no marked breakdown in the health of women in industry. It is probable, however, that the strain has been greater than is at present apparent, having been hitherto counteracted or disguised by certain factors such as improved food and better factory environment, welfare supervision and the dropping out of the physically weaker. Undoubtedly many women are only able to keep working by a total abandonment of all recreation or social intercourse.

(x) Certain conditions of employment are essential if the risk of future breakdown is to be avoided, including short hours of work conveniently arranged, medical supervision (including rest-rooms, first-aid, &c.), careful selection of workers, good food, a favourable factory environment, sympathetic management and supervision.

(xi) In the case of married women, to the strain of their work must generally be added the strain involved in housework, as well as in family worries and anxieties. Consequently they are less able to bear the strain of employment and special attention is necessary to the conditions of their work, particularly in relation to the period of pregnancy, and the care of young children. Any general prohibition of their employment is impracticable, but it should be confined so far as possible to "light" work, and the possibility might be considered of allowing them some relaxation at the beginning and end of the day, and also during the dinner interval, as is sometimes done in certain industrial districts, and also in France. The Committee desire to draw special attention to the conclusions of their medical investigators. (See paragraphs 83-115.)

V.—*Hours of labour.*

(xii) At the beginning of the war there existed a marked divergence of opinion as to the length of hours that men could profitably work, but there was a wide-spread belief that long hours produced

a larger output, though not necessarily proportionately so. Men, and especially the more highly skilled workers, were frequently employed for as much as 90 hours a week. In January, 1916, the Committee provisionally recommended that the average weekly hours of employment of men should be limited to 65-67, that is to say a 13-14 hours' working day.

(xiii) In the earlier stages of the war many women were employed for over 70 hours a week, but there was a much smaller divergence of opinion as to the length of hours which was productive of the greatest output, and the Committee in January, 1916, provisionally recommended that the hours of women should be restricted within the limit of 60 prescribed by the Factory and Workshops Act, 1901, and that the employment at night of girls under 18 should be limited so far as possible.

(xiv) In view of the extent to which boys are employed to help men, the Committee in January, 1916, provisionally recommended that they should be allowed to work for the same hours as men, but it was urged that so far as possible boys under 16 should not be employed for more than 60 hours or at night.

(xv) The scientific data collected for the Committee, and the experience gained during the past two years combine to support the view that the length of hours of employment provisionally recommended two years ago are now too long and can be reduced without loss of output.

(xvi) By economising time, apart from any increased rapidity of working, the hourly rate of output can be considerably increased.

(xvii) Though hours of work have been much reduced during the past two years the time is ripe for further substantial reductions. What the extent of the reduction should be in any particular case can only be determined after considering a number of factors such as the physical or mental strain of the work, the extent to which the pace of the work is governed by the machine, the factory environment, the physical capacity, the age, sex, and experience of the worker, the suitability of the food taken by the worker, the arrangement of hours of work and conditions outside the factory (*e.g.*, housing and transit). (*See paragraphs 116-162.*)

VI.—*Shifts, Breaks, Spells, Pauses and Holidays.*

(xviii) Provided that the weekly hours of employment are reasonable it follows in practice that the daily hours of employment will also be confined within moderate limits.

(xix) The daily employment of workers is organised, either in single shifts, or in double shifts, or in three shifts. From the point of view of output single shifts are open to objection owing to the large number of hours during which the machinery lies idle. Double shifts are the form of employment most commonly adopted. Though night work is open to serious objection, at any rate for women and adolescents, double shifts under reasonable conditions are undoubtedly productive of increased output, since they enable the machinery to be employed for the greater part of the twenty-four hours.

(xx) Wherever possible an interval should be left between the two shifts. The shorter hours of employment involved are widely recognised to be advantageous from the point of view both of the health of the worker and of output. Apart from this, opportunity is afforded for cleaning and ventilating the shops.

(xxi) The three shift system, especially for women, has much to commend it where it can be organised. The difficulties involved arise in combining the hours of men and women workers, from the shortness of meal intervals, from the workers' fear that shorter hours will mean smaller wages, and from the benefit of the shorter hours being lost through mis-use of leisure time or by its devotion to housework duties. The numerous instances in which the three shift system has been successfully organised show that these difficulties are ordinarily surmountable.

(xxii) The ordinary daily hours of work are organised either under the "two break" system or the "one break" system. Under the former system work usually commences at 6 a.m., and the normal breaks are half-hour for breakfast and one hour for dinner. Under the latter system the work commences after breakfast at 7 or 8 a.m., and there is frequently only a single break of one hour for dinner, though a break for tea is sometimes necessitated by the hours of work.

(xxiii) The evidence suggests that work before breakfast is a mistake. Only the minority of workers can put in their best work before having a proper meal in the morning. The time lost often causes serious disorganisation, and even where the discontinuance of work before breakfast involves a small reduction in the nominal hours of employment the loss is generally more than made good by the reduction in the time lost.

(xxiv) Many women and young persons cannot profitably be employed for the full spell of five hours on continuous work allowed by the Factory Act.

(xxv) Even where the spell is somewhat less than five hours, employers frequently allow short intervals for refreshment in the afternoon, and also in the morning. These pauses not only provide an opportunity for refreshment, but a period of rest and recovery from fatigue, and a break in the monotony of work.

(xxvi) All workers engaged on active work take voluntary rest periods, generally quite unsystematically. It is desirable that these rests should be replaced by authorised rest pauses systematically determined.

(xxvii) All workers should be allowed periodic holidays—preferably of several days' duration. They are equally important for the management and foremen. They also afford an opportunity for repairs to plant and machinery. (*See paragraphs 163-189.*)

VII.—*Sunday Labour and Night Work.*

(xxviii) At the commencement of the war Sunday labour, especially for men, was widely adopted in the hope of increasing output. The evidence, however, proves conclusively that Sunday labour is unpopular, uneconomical and not productive of increased output.

(xxix) In accordance with an early recommendation of the Committee Sunday labour is now almost entirely confined to sudden emergencies, repairs, attending furnaces, and certain continuous processes. Constant scrutiny is, however, necessary in order to secure that such exceptions as continue are confined within the narrowest limits. Where Sunday labour becomes necessary, arrangements should be made by a system of relief shifts, that no individual worker is employed more than six days in the week.

(xxx) Even for men night work is open to serious objection. It is uneconomical owing to the higher charges for wages, lighting and heating. Lighting is generally inferior and supervision more difficult. Adequate sleep by day is difficult owing to dislocation of ordinary habits or from social causes. Social intercourse and recreation can hardly be obtained except by an undue curtailment of sleep. Continuance of education is generally impracticable. Finally it is unnatural to turn night into day.

(xxxi) Night work for women and girls has been illegal for over 50 years. Although inevitable for adult women under existing conditions it should be stopped as soon as it ceases to be essential. Night work for girls under 16 has now been entirely stopped; for girls between 16 and 18 it has been largely curtailed and should be ended as soon as possible.

(xxxii) Night work for boys is only legal in certain continuous processes. It has already been curtailed for boys under 16, and should be altogether stopped. The Committee fully endorse the arguments against the employment of any boys under 18 at night which were put forward in the Report of the Departmental Committee on the "Night Employment of Male Young Persons in Factories and Workshops."

(xxxiii) There is no uniformity of practice as to how long a worker should remain on the night shift at any one time. A week is the commonest period but much depends on the social conditions under which he lives. Investigations suggest that continuous night work is productive of less output than the system under which a worker is engaged on day and night shifts alternately. There is no evidence that the output of a continuous day shift balances this inferiority. (*See paragraphs 190-211.*)

VIII.—*Lost Time and Incentive.*

(xxxiv) Time may be lost through the failure of the worker to attend the factory regularly, or it may be lost at the factory by slackness at the beginning or end of the spell, unregulated rest pauses, or lack of material.

(xxxv) The causes of lost time (as ordinarily understood) may be broadly divided into those that are mainly inherent (*e.g.*, sickness and accidents external to the factory; bad conditions of housing and transit, bad weather, domestic duties, or lack of material), and those which are mainly controllable (*e.g.*, sickness and accidents of factory origin, drink, indifference, discontent, overtime and Sunday work, lack of work).

(xxxvi) The proportion of lost time due to sickness is generally greatly underestimated.

(xxxvii) The causes of lost time should be carefully ascertained and remedies sought.

(xxxviii) Incentives to work include patriotism, a good factory environment, social amenities, instruction of the new worker, suitable and sufficient rest pauses, and wages.

(xxxix) Wages are probably the most important incentive. No wage system can afford an effective incentive unless there is a healthy body of workers. The system must be easily understood and properly adjusted. The incentive fails if the workers can obtain too easily the money required to meet their social aspirations, or if the hours of work prevent their spending the money earned. (*See paragraphs 212-219.*)

IX.—*Food and Canteens.*

(xl) The requirements of the body for food are largely affected by the amount of physical energy expended in daily work and by the environment of the worker. Growing boys and girls require relatively more food than adults. For the maintenance of industrial efficiency, the worker must have food which is adequate in amount, nutritious, fresh, digestible and appetising.

(xli) Apart from any question of shortage of food supplies many workers do not obtain suitable food owing to domestic difficulties, distance of the home from the factory, night work and ignorance of the need (in the case of women).

(xlii) Carried food is unsatisfactory owing to the limitation in the kinds of food suitable. Further, the food is necessarily cold and may deteriorate easily. Means of heating up food are useful, but are inadequate because such food loses nutritive value. The heating up of any large number of meals is difficult to do satisfactorily.

(xliii) The only satisfactory solution of the problem of providing suitable food at low prices for large numbers at convenient times lies in the establishment of Industrial Canteens. Apart from the suitability of the food provided the essentials for success of a canteen include accessibility, the convenience and attractiveness of the premises, prompt service, convenient hours of opening, and a system of management acceptable to the workers.

(xliv) At the end of 1917 there were about 840 canteens in munition works and docks. The Committee are strongly impressed with the value of the facilities thus afforded, and are convinced that they have very materially contributed to the maintenance of the health of the worker, to the prevention of a serious breakdown under the strain imposed by war conditions, and to increased efficiency and energy, and corresponding output. Though the need for canteens has been accentuated by war conditions, it is in a large measure a permanent one. (*See paragraphs 220-261.*)

X.—*Sickness and Ill-health.*

(xlv) An undue proportion of sickness in any group of workers usually represents amongst those not actually sick lessened vigour and activity which cannot fail to reduce output.

(xlvi) Conditions of industrial occupation may affect health by reason of long hours of work, cramped and constrained attitudes, prolonged or excessive muscular strain, bad ventilation and lighting, dust and fumes. To the influences of occupation upon health must be added the predisposition to disease arising from the absence of personal hygiene.

(xlvii) Medical inquiries suggest that the principal forms of minor ill-health to be found amongst male workers are headache, footache, muscular pains, sleepiness on the night shift and nervous symptoms; amongst women workers indigestion, headache, anæmia and muscular pains.

(xlviii) Records of sickness, broken time or diminished output should be carefully kept and scrutinised. For a correct appreciation of their significance account must be taken of various causes of fluctuation, such as climatic conditions, approaching or recent holidays, patriotic enthusiasm, long hours and Sunday labour.

(xlix) Any sound system for dealing with industrial disease must be based on the principles, first, that prevention is better than cure, and, secondly, that the treatment, to be imposed effectively, must deal with the beginnings of the disease. It follows that the preliminary safeguard should be to extend to all workers the preliminary medical examination already provided for in certain munition works and especially in those where dangerous substances are manipulated. Such an examination is especially necessary at the present time owing to the strain involved by present conditions of employment and owing to the large number of persons who are taking up industrial employment for the first time; but such examinations are likely to be always desirable where the work involves special strain and particularly so in the case of women. There is a similar need for the periodic re-examination of such workers.

(i) The present provisions of the Factory Act for the certification of the physical fitness for employment of children and young persons can hardly be regarded as adequate. The factory's certifying surgeon has seldom any previous knowledge of the case. The value of his certificate would be greatly increased if it were only given after consideration of the medical records in the possession of the School Medical Service, and closer co-operation appears to be desirable. At present these records are seldom available. Provision is now seldom made for periodic re-examination, but it is extremely desirable having regard to the effect of entry into industrial life. The Departmental Committee on the Night Employment of Male Young Persons emphasised the need for periodic examinations once at least in every six months, and recommended that records of the results should be kept.

(ii) The second preventive measure is to reduce to a minimum unfavourable conditions of environment. Thirdly, arrangements should be made for adequate medical and nursing schemes. Medical attendance is usually obtainable under the National Insurance system, but nursing can only be obtained by the employment of one or more trained nurses to undertake duties in the factory by night as well as by day. The duties of the nurse would include supervision of the health of the workers and especially of those temporarily indisposed, following-up cases of sickness and taking charge of first-aid treatment of injuries. Such arrangements have been instituted in many munition factories, especially where women are employed, and have proved of great value to employers and employed alike. (*See paragraphs 262-279.*)

XI.—*Injuries and Accidents.*

(lii) A grave amount of disablement is caused by accidents such as fractures, open wounds and injured limbs, but probably an even larger amount of interruption to work is caused by slighter injuries,

such as scratches and burns, which may however become serious if neglected. The principal causes of accidents are speed of working, fatigue, psychological influences, nutrition and alcoholic consumption, lighting and temperature.

(liii) A large number of accidents are preventable, and it is to the interests of all parties that the number should be reduced. However complete the installation for securing the safety of workers, success must largely depend upon the intelligent co-operation of workers and foremen, and their help should be secured in studying causes and methods of prevention.

(liv) However effective may be the methods of prevention adopted some accidents will occur. It is accordingly important that in each shop there should be one or two workers trained to render first-aid in case of accidents. Leaflets of instruction and advice should be issued.

(lv) Though in many factories good provision has been made for the treatment of accidents great improvements should result from the recent Home Office Order requiring employers in certain industries to provide and maintain:—

- (a) First aid posts or local dressing-stations for every 150 workers; and
- (b) An ambulance-room or central dressing-station wherever the total number of employees is 500 or more. The room is to be in charge of a nurse or other person trained in first-aid work. Records of all cases treated are to be kept. Provision is also to be made for the conveyance to hospital of the more serious cases. (See paragraphs 280-298.)

XII.—Eye Injuries.

(lvi) Injuries to and diseased conditions of the eye are a widespread cause of inefficiency. The principal causes are accidents from flying particles and impacted bodies arising from grinding and similar operations, injuries due to exposure to intense heat and eye-strain from inferior lighting, uncorrected errors of refraction, or other causes.

(lvii) The principal measures of prevention are the provision of eye-guards or goggles, good lighting, examination of eye-sight, and the provision of suitable spectacles. Accidents if neglected may easily cause serious incapacity, and they should receive immediate attention from a doctor, or failing him a qualified nurse. (See paragraphs 299-314.)

XIII.—Special Industrial Diseases.

(lviii) From the point of view of munition work T.N.T. is much the most important of the "dangerous" occupations, both on account of the serious effects which may result, and the large numbers of workers employed. It may be absorbed through the skin or through the digestive tract, or by the inhalation of fumes or dust. Poisoning normally takes one or more of the following forms, dermatitis, digestive troubles, blood changes, and liver degeneration (toxic jaundice). The occurrence of poisoning depends to some extent upon personal idiosyncrasy. The great majority of workers are insusceptible and remain so, but a few are affected, but not always those who, owing to ill-health and malnutrition, might be expected to be specially liable.

(lix) The conditions of employment in the manufacture of T.N.T. are governed by a Home Office Order, while its use and manipulation are governed by Regulations of the Ministry. The principal means of prevention adopted are:—the reduction to a minimum of dust and fumes, constant medical supervision, limitation of the period of exposure, provision of ample and suitable food, special working costumes and suitable cloakrooms and washing facilities.

(lx) Other substances in the manufacture and use of which special precautions are necessary include:—lead, fulminate of mercury, tetryl, aeroplane dope, picric acid, poisonous gases, and nitrous fumes. The preventive measures adopted are on similar lines to those for T.N.T. (See paragraphs 315-351.)

XIV.—Cleanliness, Ventilation, Heating and Lighting.

(lxi) A high standard of cleanliness is essential not only for health, but because it has an important bearing on the self-respect of the worker.

(lxii) Flooring should be smooth, hard, durable and impervious. Wooden flooring should be provided for standing on, as causing less fatigue and being more conducive to warmth and dryness of the feet.

(lxiii) The object of ventilation is to provide air which is pure, clean, stimulating, and refreshing. The air should be cool and dry, not monotonous in temperature, and moving rather than stagnant. The principal impurities are carbonic acid (principally important as affording an indication of the efficiency of ventilation), volatile substances given off from the skin and alimentary canal of human beings, bacteria, dust and fumes.

(lxiv) The ventilation and heating of every workshop presents a separate problem. There should be adequate cubic capacity, louvres or other definite openings into the outside air, supplemented by the use of doors, windows and fans.

(lxv) What is the best temperature depends on the work and habits of the worker. Sedentary workers may require a temperature of about 60° Fahrenheit, though it may be somewhat higher if the air is in motion.

(lxvi) Some one person should be made responsible for securing the proper use and maintenance of any installation for ventilation and heating.

(lxvii) Lighting should be adequate, reasonably uniform, shaded from the eyes of the worker, and should not cause extraneous shadows. Windows should be cleaned regularly. (*See paragraphs 352-387.*)

XV.—*Sanitation, Washing and Cloakrooms.*

(lxviii) For the proper maintenance of health it is essential that the sanitary accommodation should be adequate, conveniently arranged and kept thoroughly clean.

(lix) Washing is beneficial to the health, efficiency and self-respect of the worker, and there is a growing demand for the provision of facilities. The installation must be adequate in amount, readily accessible and easily maintained. Washing troughs are generally to be preferred to separate basins. An ample supply of hot and cold water, nail brushes, soap and towels are other essentials.

(lxx) The provision of baths is recommended where workers are employed on hot or dusty processes. In such cases they may prove an effective antidote to muscular rheumatism.

(lxxi) Cloakrooms are necessary for health, especially of women and girls. They should be close to the canteens, lavatory and sanitary accommodation. Separate lockers should be provided for each worker. There should be ample accommodation for changing clothes and boots, and for the drying of clothes. They should be kept thoroughly clean and ventilated. Means should be taken to prevent petty pilfering or theft. (*See paragraphs 388-412.*)

XVI.—*Seats, Weights, Clothing and Drinking Water.*

(lxxii) Protective clothing, though essential for certain types of employment (*e.g.*, those involving dirt, dust, damp, heat or dangerous machinery), is desirable for all workers, and especially for women and girls. It adds to their smartness and neatness, and also aids discipline and *esprit de corps*.

(lxxiii) Whatever the nature of their employment workers should have opportunities of sitting down from time to time. Comfortable seats should also be provided for use during meal hours, and for workers who are temporarily indisposed.

(lxxiv) Apart from their inferior physical strength, women are more liable than men to strain from sudden muscular effort. To obviate this attention should be paid to the size and shape of burdens, receptacles and vehicles, labour-saving contrivances, to the knack of lifting, and to hours of employment.

(lxxv) The Committee fully endorse the policy underlying the Order recently made by the Home Office requiring the provision of adequate facilities for obtaining drinking water in all factories. (*See paragraphs 413-434.*)

XVII.—*Welfare Supervision for Women and Girls.*

(lxxvi) Under modern industrial conditions the employer usually has neither the time nor frequently the experience to give the requisite attention to many of the special problems affecting the health and welfare of women workers. There has therefore been an increasing tendency to appoint a special officer for the purpose, who is generally called a "Welfare Supervisor" or "Welfare Superintendent."

(lxxvii) The stress of war conditions, the widespread introduction of women into industry, and the increased employment of married women and young girls greatly increased the need for adequate supervision and led the Committee to recommend in January, 1916, the appointment of welfare supervisors in all factories where women were employed.

(lxxviii) The welfare supervisor should have a clearly defined status and definite duties, and should be directly responsible to the manager. What her exact duties may be will to some extent depend upon the circumstances of the factory and her own capacity. Experience, however, shows that her duties may properly include the engagement of workers (so far as their general suitability is concerned); keeping of records of individual workers; investigation of cases of lost time, sickness, low output, or wages, incapacity, dismissals or withdrawals, working conditions, home visiting, feeding arrangements, training and instruction, housing, transit and recreation. They should not interfere with the work of Trades Unions.

(lxxix) The welfare supervisor must be of good standing and education, and must possess strength of character, tact, and broadmindedness, such as will secure the confidence of the management as well as of the workers. Provided only that they are possessed of the requisite qualifications, they can be and are drawn from all classes of the community.

(lxxx) It is, as a rule, desirable that welfare supervisors should have undergone a preliminary course of training of not less than one year's duration, which should, while allowing of a special study of welfare

problems, be grounded on a wide study of social questions. A large part of the time should be devoted to practical work. Neither admission to the course nor financial assistance should be conditional on the student subsequently taking up welfare work.

(lxxxii) Welfare supervisors should not be appointed by the State. They will probably continue for some time to come at any rate to be appointed by the employer, as the person responsible for the maintenance of satisfactory conditions of employment, though the workers are likely to an increasing extent to seek some voice in the selection. Though the establishment by the Ministry of Munitions of a panel of candidates has been justified as a temporary expedient, it is not desirable that any Department of State should do so as a permanent arrangement.

(lxxxiii) The time has not yet come when a definite judgment can be passed on the development of welfare work during the past two years, still less is it possible to prophecy as to future lines of development. The confident support of the workers has yet to be obtained. Undoubtedly unwise appointments have been made; complaints have been considerable and often well founded, though their importance may have been over-emphasised. On the other hand some mistakes were inevitable in the initiation of what was largely a new enterprise in industrial organisation. The conditions of employment of women have vastly improved. It has been and is likely to be of material advantage that there should exist a body of persons specially concerned to promote the health and well-being of the worker. (*See paragraphs 435-475.*)

XVIII.—*Welfare Supervision for Boys and Men.*

(lxxxiiii) The problems involved in the welfare supervision of boys are not new though they have been accentuated by the war. The essential remedy is personal influence. The influences to which they are subject will largely affect their permanent outlook on life. High wages, restlessness, lack of control all have demoralising influences, which specially need control at the present time.

(lxxxv) Personal influence to be effective must ordinarily be exercised by some one individual, and the Committee in January, 1916, recommended the appointment of welfare supervisors wherever 100 boys are employed. Experience has shown that for this number of boys a full-time appointment is desirable. Where, as is more often the case, a smaller number are employed, a part-time arrangement is usual.

(lxxxvi) The duties of a welfare supervisor for boys may usefully include most of those specified in the case of women, but nothing which makes for their well-being should be alien to his duties. The wider his outlook the stronger is likely to be his position. It is specially desirable that he should keep in touch with all other persons and bodies in the district who are concerned with the well-being of boys. Recreation, training and instruction are matters calling for special concern.

(lxxxvii) The need for the welfare supervision of boys has not been so readily appreciated as in the case of women and girls, and time has been required for obtaining the support of the foremen and the local trades unions as well as of the employer. These initial difficulties have, however, not been without their advantages in preventing hasty or ill-considered schemes, and while it is as yet too early to form any final judgment the work appears to have started on sound lines.

(lxxxviii) The problems of the welfare supervision of men are much more difficult, and only gradual development is to be anticipated. The whole question is intimately concerned with the growths of works councils now being so widely discussed. In the immediate future at any rate any welfare work among men is likely to grow spontaneously out of that for boys. (*See paragraphs 476-492.*)

XIX.—*Welfare Outside the Factory.*

(lxxxix) The State being responsible for the employment of large bodies of workers, and especially women, in places remote from their own homes, has a special responsibility for their welfare outside the factory. The Ministry of Munitions have placed in the principal munition areas a number of officers specially charged with the duty of looking after the health of the worker outside the factory; they deal with such matters as housing and transit, sickness and recreation.

(lxxxix) It is of the utmost importance that only healthy, clean and wholesome minded women should be exported. Mothers with young children should not be exported. No woman or girl should be exported without a sufficiency of money and clothing. Travellers across country should be seen off and met.

(xc) In all large centres clearing hostels should be provided, in which women can be housed until other accommodation can be found for them.

(xci) Lodgings with or without board in a family is generally the readiest and most acceptable means of housing women and girls. An organised system is required for providing suitable lodgings and keeping them under supervision. In the more important areas this work is generally undertaken through officers of the Ministry of Munitions, or by local billeting committees established by the Central Billeting Board under the Billeting Act. Under that Act payments for rent and board can be guaranteed. No use has hitherto been made of the power of compulsory billeting, and it is doubtful how far it is workable in practice.

(xcii) In most areas the problem, however, is one not of lodgings, but of housing, and existed before the war. Assistance has been given in some areas to local authorities for the provision of additional permanent accommodation, but in the main the requisite housing has had to be provided by the establishment of hostels and hutments.

(xciii) Hostels have not always been popular. Objection has been taken to living in large institutions or under the control of the employer, also to the restrictions on individual liberty which are involved. Some workers only use them on account of the lack of other decent accommodation and the difficulty of housekeeping under present conditions. It is of particular importance that the planning and management of hostels should be thoroughly satisfactory. In Appendix F. detailed suggestions are given.

(xciv) Sickness, however temporary, among girls in lodgings involves much hardship, and may become serious if neglected, and special steps should be taken to deal with it. Action is also necessary in the case of girls thrown out of work or otherwise stranded often through no fault of their own.

(xcv) Recreation is an essential aid to recovery from fatigue, and adequate provision for it should be made, especially in those areas where large numbers of imported workers are employed. Much attention is now being given to the subject and facilities are steadily increasing. Where they can be organised central schemes available for all workers in the district are to be preferred. More often, however, provision depends upon the initiative of an individual firm and its workers, and most welfare supervisors are concerned with schemes for recreation.

(xcvi) The maintenance of public order, notably in centres where large numbers of girls are assembled) has led to the employment of women police and patrols. They have done valuable service both inside the factory and outside the factory, also in assisting the regular police.

(xcvii) Much has been done to improve the health and increase the efficiency of the munition worker by the reduction in excessive drinking which has been brought about through the restrictive measures of the Central Control Board (Liquor Traffic). (See paragraphs 493-532.)

534. The Committee desire to place on record their warm appreciation of the unfailing courtesy, the devotion to duty, and the ability of their Secretary, to whom they offer their best thanks for the assistance he has rendered them in the performance of their task.

(Signed) GEORGE NEWMAN (*Chairman*).

THOMAS BARLOW.

GERALD BELLHOUSE.

A. E. BOYCOTT.

J. R. CLYNES.

EDGAR L. COLLIS.

W. M. FLETCHER.

LEONARD HILL.

SAMUEL OSBORN.

ROSE E. SQUIRE.

MAY TENNANT.

E. H. PELHAM (*Secretary*).

April, 1918.

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APPENDIX A.

LIST OF PERSONS WHO GAVE EVIDENCE OR OTHERWISE ASSISTED THE COMMITTEE.

(a) The persons giving evidence before the Committee included the following, many of whom have also assisted the Committee in other ways:—

London.—

Mr. F. S. Button } (*Amalgamated Society of Engineers*).
 Mr. A. B. Swales }
 Mr. R. J. A. Pearson (*Messrs. Vickers, Ltd., Erith*).
 Mr. H. S. Adams (*Messrs. The Projectile Company (1902), Ltd.*)
 Captain Pasley (*Messrs. Eley Bros., Ltd.*).

Birmingham—

Mr. J. E. Harston, H.M.I. (*Deputy Superintending Factory Inspector for the Birmingham District*).
 Miss Hilda Martindale, H.M.I. (*H.M. Senior Lady Inspector of Factories under the Home Office for the Midland Division*).
 Mr. George Ryder (*Amalgamated Society of Engineers*).
 Mr. George Wilkinson (*Amalgamated Society of Toolmakers*).
 Councillor John Beard }
 Mr. John Whiston } (*Workers' Union*).
 Mr. J. E. Grobey }

Sheffield—

Mr. William Ireson (*Messrs. Thomas Firth & Sons, Ltd.*).
 Mr. G. H. Wilkinson (*Chief Assistant Overseer of the Townships of Sheffield and Eccleshall*).
 Mr. William Marshall (*Messrs. Vickers, Ltd., Sheffield*).
 Mr. A. J. Bailey (*National Amalgamated Union of Labour*).
 Mr. Green and Mr. R. E. Jones (*Amalgamated Society of Engineers*).
 Mr. M. Humberstone (*National Steel Workers' Association, Engineering and Labour League*).
 Mr. A. R. Fearnley (*General Manager, Sheffield Corporation Tramways*).

Newcastle-on-Tyne—

Mr. Thomas Bowmaker (*Amalgamated Society of Engineers*).
 Mr. E. Gilbert (*Blacksmiths' Society*).
 Mr. I. D. Hebron (*Pattern Makers' Society*).
 Mr. J. Wile (*Brass Founders' and Turners' Society*).
 Mr. D. S. Marjoribanks (*Messrs. Armstrong, Whitworth & Co.*).
 Miss E. Sadler (*H.M. Senior Lady Inspector of Factories*).
 Mrs. Fawcett (*National Federation of Women Workers*).
 Mr. G. B. Hunter (*Messrs. Swan, Hunter and Wigham Richardson, Ltd.*).

Glasgow—

Sir W. Weir (*formerly Director of Munitions for Scotland*).
 Mr. Harold D. Jackson (*Messrs. Barr and Stroud, Ltd.*).
 Mr. H. J. Wilson (*H.M. Inspector of Factories*).
 Dr. Alexander Scott (*Medical Referee for Industrial Diseases for the West of Scotland District, Workmen's Compensation Act, 1906*).
 Mr. G. Moore }
 Mr. Walter Hicks } (*Representative Munition Workers*).
 Mr. R. Polgrean }

Representatives of Women Workers—

Miss Lois Young (*Secretary, National Federation of Women Workers*).
 Mrs. Gibb }
 Miss Fanny Workman } (*Workers*).
 Miss Anna Howatt }
 Miss Nellie McGregor }
 Miss Vines (*H.M. Senior Lady Inspector of Factories for Scotland*).

Woolwich Arsenal—

Royal Gun Factory Department—
 Messrs. Cardwell, Keir, Mills, Savage, Stratton.
Mechanical and Inspection Department—
 Messrs. Hsley, Taylor, Blake.
Royal Laboratory—
 Messrs. Pendrey, Falconer, Franks, Cage, Hill.
Royal Carriage Department—
 Messrs. Thompson, Leighton, Wallis.

Manchester—

Mr. Robert H. Coates (*United Machine Workers' Association*).
 Miss A. Tracey (*H.M. Senior Lady Inspector of Factories*).
Representatives of the National Union of Gasworkers and General Labourers—
 Messrs. Eccles, J. Cummings, Masterman.
 Mrs. Annot E. Robinson (*Women's War Interests Committee*).
 Mr. Edward Hopkinson (*Messrs. Mather and Platt*).
 Mr. M. A. McLean (*The British Westinghouse Electric and Manufacturing Company*).
 Mr. E. Reid (*Sir William Armstrong, Whitworth & Company*).

Coventry—

Mr. C. Greenway (*Amalgamated Society of Engineers*).
 Mr. W. T. Smith (*Toolmakers' Society*).

Representative of the Trades Council—

Mr. Chater, Secretary.

Representative of the Workers' Union—

Mr. Morris.

Representatives of the Coventry Branch of the National Federation of Women Workers—

Mrs. Lewis, Mrs. H. E. Givens.

Representatives of the Women's Co-operative Guild and the Women's Hostel Committee—

Mrs. Collington (*Hostel Committee*).

Miss Selina Dix (*President, Women's Hostel Committee*).

Averal C. Wilks

Mrs. Eleanor Kirkman Gray } (*Women's Hostel Committee*).

Annie E. Corrie

Mrs. Mary A. Keene (*President, Women's Co-operative Guild, Poor Law Guardian*).

Mrs. Mary Biggs } (*Hostel Committee and Poor Law Guardian*).

Emily Chalker

Hon. Mrs. Baillie (*Chairman, Voluntary Committee on Supply of Labour*).

Mr. A. Wall (*Coventry Labour Exchange*).

Dr. T. M. Legge (*Home Office*).

Mr. Leon Gaster (*Hon. Secretary, Illuminating Engineering Society*).

Mr. John Hodge, M.P. (*Secretary, British Steel Smelters, Mill, Iron, Tinplate and Kindred Trades*).

Mr. C. E. B. Russell (*Chief Inspector of Reformatory and Industrial Schools*).

Dr. E. F. Armstrong, D.Sc. (*Technical Adviser and Managing Director of Messrs. Crossfield & Co., and of Wm. Gossett & Son*).

Mr. T. North (*Superintendent, Vickers & Co., Crayford*).

Mr. J. J. Mallon } (*National Federation of Women Workers*).

Miss Macarthur

Mr. P. B. Brown (*Director and General Manager of Messrs. Hadfields, Ltd., Sheffield*).

Right Hon. Sir W. Mather (*Messrs. Mather and Platt*).

Representatives of the following bodies concerned with the Welfare of Women and Girls—

Women Police Service.

National Association for Women's Lodging Homes.

National Association for Women's Lodging Houses.

Young Women's Christian Association.

Church Army.

Salvation Army.

Catholic Women's League.

League of Honour.

National People's Palace Association.

*(b) Persons who assisted in the Medical Inquiries conducted by the Committee included the following :—**(i) Medical Officers—*

Dr. Ethel Stacey.

Dr. Beatrice Webb.

Dr. Ethel Williams.

Dr. Mabel Campbell.

Dr. L. M. Chesney.

Dr. Margaret Thackrah.

Dr. Mary Phillips.

Dr. Rhoda Adamson.

Dr. Lilian Wilson (*Board of Education*).

Dr. John Bradley.

Dr. Ada Whitlock (*Home Office*).

(ii) Inspectors and others—

Mr. P. A. Heath.

Miss E. G. Woodgate.

Miss C. M. Thompson.

Miss E. M. Gardner.

Miss Howatt.

Miss Workman.

Mrs. George Young.

Mrs. Osborne, M.Sc.

Miss Gordon.

Mrs. Banks.

Miss Miller.

Miss Irene Whitworth (*Home Office*).

Miss H. C. Escuret (*Home Office*).

Miss Isabel Taylor (*Home Office*).

Miss Elizabeth Macleod (*Home Office*).

Miss Carbutt (*Home Office*).

Mrs. C. D. Rackham (*Home Office*).

Miss E. G. Colles (*Board of Education*).

Miss G. M. Broughton (*Ministry of Munitions*).

Miss Hilda Walton (*Ministry of Munitions*).

(c) Amongst other persons who have by the submission of memoranda or by other means, placed their special knowledge at the disposal of the Committee were :—

Lord Leverhulme; Mr. B. Seebohm Rowntree; Mr. A. H. Self and Miss Lilian Barker, C.B.E. (*Woolwich Arsenal*); Mr. A. Maitland Ramsay (*Ophthalmic Surgeon, Glasgow*); Dr. Elizabeth Butler (*National Filling Factory, Georgetown*); Miss Hilda Cashmore (*Bristol University Settlement*); and Miss Elizabeth Macadam (*University of Liverpool*); Mr. R. A. Bray, Viscount Dunluce and Miss G. E. Hadow (*Ministry of Munitions*); Mr. A. F. Agar and Mr. P. R. Higgins (*Canteen Committee of Liquor Board*).

APPENDIX B (I).

A FURTHER INQUIRY INTO THE HEALTH OF WOMEN MUNITION WORKERS.

By MISS JANET M. CAMPBELL, M.D., M.S. (A Senior Medical Officer of the Board of Education).

In accordance with the instructions of the Health of Munition Workers' Committee, an Inquiry was arranged in the Autumn of 1917 to follow up the medical investigation of the health of women munition workers which had been made in 1915 and 1916, and with a view to ascertaining in a general way the effect of continued munition work upon the health and physique of women.

The Inquiry was carried out by Dr. Lilian Wilson (one of the Medical Officers of the Board of Education), Dr. Mary Phillips and Dr. Rhoda Adamson, assisted by Miss E. G. Colles (Board of Education), Miss Hilda Walton (Welfare Department, Ministry of Munitions), Mrs. George Young and Mrs. Osborne, M.Sc. The factory conditions were reported on by H.M. Factory Inspectors, Miss Irene Whitworth, Miss H. C. Escreet, Miss Isabel Taylor, Miss Elizabeth Macleod and Miss Carbutt. Miss Gordon, Mrs. Banks and Miss Miller of the Welfare Department gave assistance in following up workers who had left the factory. Every endeavour was made to secure comparable results, and the following Report has been compiled from the accounts written by the investigators.

GENERAL ARRANGEMENTS.

The Inquiry was made at eight factories at which the general conditions may be regarded as reasonably typical. Five of them were chosen on account of the heavy nature of the work done by the women. At all the factories the management and welfare staff were most courteous and considerate and gave every facility for the Inquiry.

The women examined were chosen at random and were not selected on account of physical weakness or strength. As a general rule, only women who had worked for at least nine months were seen. A considerable number was drawn from heavy operations likely to cause strain or fatigue, and from operations at which women had only recently been tried. The proportion of married women seen was also intentionally high. No compulsion was exercised and women were free to refuse to be examined if they wished. The numbers examined were as follows:—

Factory No. 1. (North East Coast)	193
" 2. (Midlands)	264
" 3. (Yorkshire)	116
" 4. (London)	157
" 5. (Yorkshire)	199
" 6. (Midlands)	73
" 7. (Near London)	67
" 8. (Near London)	114
Total	1,183

DESCRIPTION OF WORK UNDERTAKEN BY THE FACTORIES.

Factory No. 1 (North East Coast).

Workers were selected from nine departments doing heavy work and including the following processes:—

6-inch shell		All machine processes.
18-pdr. shell		A few of the heavier machine processes, copper bending, gauging, filling with shrapnel.
Making fuses		Most machine processes.
Cartridge cases		Shovelling coke in brass casting shop, oiling machinery and wheeling bogeys in rolling mill, on acid tanks in annealing shop, automatic presses, all heavy machine processes.
Traffic department		Unloading and loading waggons—18 pdr. shell only.

Factory No. 2 (Midlands).

Shells.—Women are employed on practically all processes of manufacture of 9.2 and 6 inch shells in various stages of heaviness. They are also employed on overhead cranes and as slingers.

Guns.—About 60 women are employed as assistant operators to men on machines in this section. The work is less heavy than that of the shells as the articles manufactured are very large and the work consists of machine minding pure and simple. Some of the operations take as long as 10 hours.

Factory No. 3 (Yorkshire).

The main part of the factory is used for the manufacture of 4.5-inch and 60 pounder shells. A small part is used for the manufacture of gun parts.

The great majority of the workers concerned in the output of shells can be divided into three classes, machine operators, labourers and inspectors. The factory is arranged in such a way that so far as possible the first process starts from the right hand side of the factory on which the rolling way for billets is situated and the shells are then worked gradually along towards the left. With the exception of the initial process of centreing, the machine operator is not concerned with the transit of shells and her heavy work consists in lifting the shells in and out of the machine and in the necessary "tightening up" of the machine. No lifting tackle is provided for the 4.5 shells, but it is provided for the 60 lb. shells up to the process of fuse hole boring when the shell is reduced in weight to 53 lb. 4 oz. The centreing is done on rather a different system. All the labouring and machine work is done by a gang of four women to each machine, so that in addition to lifting the shell into the machine they load up the trolleys and pull them towards the tables and unload them at the tables.

The primary work of the labourers is the moving of shells from one process to another. This is done by means of trolleys on to which the shells are loaded. In the early processes the trolleys and the tables on to which the shells go are about the same height so that in most cases the shells can be rolled on and off the trolleys instead of being lifted. This considerably lightens the work but the trolley loads seem in many cases to be unnecessarily heavy. As the shells proceed down the shop and gradually become lighter the trolleys in many cases are lower, and shells, owing to lack of table space, are stacked on the floor, so that they have to be lifted up constantly from the floor to tables, about 3 feet high. By this time the 4.5 shells have been reduced in weight to under 30 lbs., but the 60 lb. shells still weigh about 50 lbs.

Factory No. 4 (London).

Women are employed on about 30 different processes, on lathes, milling and drilling machines, examining, cleaning and checking, and also in the tool room. Although the majority of the work entails handling 6-inch shells which weigh 130 lbs. in the rough and nearly 90 lbs. in the complete state, practically all the heavy handling is done by men, and the placing of the shells in the machine is done by sliding them down a sloping plane so that there is no particular strain placed on the workers when they are actually handling the shells.

Factory No. 5 (Yorkshire).

Factory (a) is engaged in the manufacture of 9.2-inch shells, and women are machine operators on most operations. Owing to the size of the shell (the initial weight of the forging is about 440 lbs.) women were not employed as labourers or shell movers in this factory until recently. Now since the introduction of the rolling bench and hydraulic cranes the men labourers have been extensively replaced by women who assist in craning up the shells with the women operators. Some women do their own craning in. As a result of the introduction of the afore-mentioned rolling bench system the energy required for labouring has been considerably reduced and the shells have merely to be craned from the bench to the machine, instead of, as formerly, from the ground. Men fix practically all the shells into the machines and all through skilled men act as tool setters.

In *Factory (b)* 6-inch shells are made. Women are at work on practically all the operations to which the shell is submitted and these vary very considerably in time occupied per shell, and in the skill required. The forging at its heaviest stage weighs about 130 lbs. and before it leaves the shop its weight has been reduced to about 86 lbs. The machine operator fixes her own shells in the lathe, and the methods of fixing vary very considerably from automatic clamps to chucks, the fastening of which requires a series of violent jerks at the end of a long crow bar.

Factory No. 6 (Midlands).

The women are engaged in making fuzes. The work is light in character and in itself involves little or no physical strain.

Factory No. 7 (near London).

The firm is now mainly engaged on gainees and gaine caps, having only a small number of 12 and 14-lb. shells in hand to finish a contract. Therefore practically all the work is light. The women are employed on turning the shells throughout after the first two operations (cutting off and roughing out): melting and centring fuze plugs; parting off, drilling, screwing and forming gainees; boring, screwing and forming caps; besides lacquering and inspection.

Factory No. 8 (near London).

The firm makes and assembles ball bearings which consist of "races" and balls or rollers, and in some cases of "cages" and balls, and vary in size from those having a bore of 5 millimetres to the large ones with a 12-inch bore, whilst the balls vary from one-sixteenth of an inch to $4\frac{1}{2}$ inches in diameter. The women are engaged in making and assembling the small ones throughout, but only on some lathe processes and on viewing parts of the larger ones. They are employed on the automatic and semi-automatic machines, grinding on the presses, viewing, gauging, ball viewing, assembling, testing and packing. It is all unskilled or semi-skilled work and does not entail any heavy lifting, but is monotonous and in certain cases demands great concentration.

HOURS OF WORK.

Factory No. 1 (North-East Coast).

Most of the work is done on the two-shift system. Typical hours are given below:—

	Hours.	Meals.	Total.
<i>Day</i> ...	7 a.m.-6.30 p.m. Monday-Friday. 7 a.m.-12.30 p.m. Sat.	12-1 p.m. 4-4.30 p.m. (10 min. tea.)	55 hours.
<i>Night</i> ...	7 p.m.-6.30 a.m. Sunday-Friday.	11-12 p.m. 2.30-3 a.m. (10 min. tea.)	60 hours.

Factory No. 7 (near London).

	Hours.	Meals.	Total.
<i>Day</i> ...	7 a.m.-7 p.m. M.-F. 7-12 a.m. Sat.	10-10.10 a.m. 12-1 p.m. 4-4.20 p.m.	57½ hours.
<i>Night</i> ...	7 p.m.-7 a.m. M.-F.	10-11 p.m. 3.30-4 a.m.	52½ hours.

Factory No. 8 (near London).

	Hours.	Meals.	Total.
<i>Day</i> ...	7 a.m.-6 p.m. M.-F. 7-12 a.m. Sat.	8.30-8.45 a.m. 12-1 p.m. 3-3.15 p.m.	52½ hours.
<i>Night</i> ...	7 p.m.-6 a.m. M.-F.	10.30-11 p.m. 3-3.30 a.m.	50 hours.

At *Factory No. 2 (Midlands)* the work is arranged on both two and three shift systems. Broadly speaking, the supervisors (e.g., foremen, tool setters, etc.) work two shifts, the day shift 11 hours, the night shift 13 hours, with mealtimes of one hour and $1\frac{1}{2}$ hours respectively. The actual operators work on a three-shift system, the shifts being slightly uneven, and a meal time of half-an-hour being given in each case. Where men and women work together on a lathe the women work the same hours as the men.

At *Factory No. 3 (Yorkshire)* practically all women work on the three-shift system.

Morning shift.

Monday to Friday, 7 a.m. to 2.30 p.m. Meal, 10-10.30.

Saturday, 7 a.m. to 5 p.m. Meals, one hour.

Weekly total, 44 hours.

Afternoon shift.

Monday to Friday, 2.30 to 10 p.m. Meal, 6-6.30 p.m.

Weekly total, 35 hours.

Night shift.

Monday to Friday, 10 p.m. to 7 a.m. Meals, 2.30-3 a.m., and about 10 minutes for tea at 11.40.

Weekly total, 42½ hours.

At *Factory No. 5 (Yorkshire)* until June, 1917, women in *Factory (a)* were working on eight-hour shifts with a half-hour meal break, the men being on 12-hour shifts—so that each set of men worked with two sets of women each day. In June, 1917, a change over was made—the hours then being 10 hours shift for day and $11\frac{1}{2}$ for night work. Work starts at 8 p.m. on Sunday and finishes at noon on Saturday. It is noticeable that the night shift is of longer duration than the day shift, and the work in addition includes a long Sunday night. No reason has been discovered as to the object of having longer night work than day, other than that this scheme of hours fits in with the existing train service, for this factory is situated some four miles out of the city in almost rural surroundings. It is not unlikely that the train service could readily be modified to suit the convenience of the large numbers of daily workers if it were proved desirable to equalise the length of shift. There can be little doubt that from an efficiency point of view it is desirable, where other than automatic work is being done, that the shifts should be of equal duration, as the worker must be tuned to a certain speed dependent on length of shift, and a variation in duration of shift weekly must necessitate some loss of efficiency.

In *Factory (b)* the hours are as follows:—

Shift.	Time.	Meals.	Longest period without break.	Total hours worked per week.
<i>Day.</i>				
Week-day	6 a.m. to 6 p.m.	9-9.30 a.m. 1-2 p.m. Unofficial break. 3.45-4 p.m.	3½	59½
Saturday	6 a.m. to 1 p.m.	9-9.30 a.m.	3½	...
<i>Night.</i>				
Sunday-Friday	6 p.m. to 6 a.m.	9-10 p.m. 1.15-1.45 a.m. Unofficial break. 3.45-4 a.m.	3½	63
Saturday	Nil.	...	...	...

Just at the time of the investigation the question of shortening the hours had been considered and practically decided on, when it was announced that the matter had been postponed. In order to fit in the working time of the men on two shifts with that of the women on three, the working hours of the women on the new shifts were to be $7\frac{1}{2}$, $7\frac{1}{2}$ and $6\frac{1}{2}$. This reduction of hours to $6\frac{1}{2}$ naturally caused many of the women to feel that they would not be able to earn a "living wage."

An endeavour was made to ascertain the views of the women themselves on the question of the two and three-shift systems. The main objection to the eight-hour shift seems to be that less money can be earned. On the other hand, the short shift is obviously more convenient for women with children and home duties and provides a reasonable opportunity for rest and recreation.

The *Factory No. 2 (Midlands)* report states "the general impression was gathered that married women prefer shorter hours as they like to undertake the management of their own homes without outside assistance. The unmarried women, on the other hand, evidently feel that they ought to be helping in home work when they are not at the factory, and prefer the increased pay of the longer shift to indefinite unpaid home duties. One point raised against short shifts was that on two out of three shifts workers were always about at 10 p.m. either ceasing afternoon work or starting on the night shift; and with decreased lighting and lonely roads some found the journey a considerable strain to their nerves. On the whole, it appeared that there is less disturbance to home life if the shorter shift is in use, but the question of strain for individual women needs careful consideration, as the eight hours factory shift in addition to heavy household work involves a heavier day's toil than factory work alone through a 12 hours shift when it is obviously impossible to undertake home duties."

The report on *Factory No. 1 (North-East Coast)* states—"On the point of shorter shifts (e.g., the substitution of eight-hour shifts I gathered that many shop managers would welcome it and would expect to obtain the same output in two eight-hour shifts as they do at present, but that the many difficulties in the way include (1) the strong opposition of the men fitters and tool setters; (2) the objection of the women themselves who are in most shops on the premium bonus system and who would object to the lower wage (this objection does not hold in the piece-work shops); and (3) the re-organisation of the transit arrangements which in a factory of this size would be a big problem. Many women themselves told me that they could easily produce the same output in an eight-hour shift; in all cases there appeared to be considerable waiting about for work owing to the work not coming through quickly enough from the men on the previous process; in one shop at least the daily output is limited and when

the girls have finished they hang about the shop sometimes for an hour or an hour and a half—being on the premium bonus system (which is based partly on a time wage) they have to put in their hours at the shop. In no shop on the premium bonus system did it appear to me that much work was done during the last hour of the shift."

At *Factory No. 5 (Yorkshire)*. "The general impression gathered from the women in *Factory (b)* is that the large majority would be glad to return to the eight-hour shift even though their weekly earnings were reduced. A minority composed of very strong women who had reached middle age after hard working lives and the younger single women with no home ties are satisfied with the 12 hours and feel quite able to continue at this rate and to earn their present rate of pay. There were on 12-hour shifts many who openly wondered how long they could continue to work under present conditions, and a few definitely intended to give up munition work this winter as they felt the long hours were ruining their health.

"The general impression gathered from the women in *Factory (a)* is that there is a greater appearance of well-being and satisfaction with the work and hours. The weekly earnings for each process appear a little higher than those earned in corresponding processes in 6-inch shells."

Night Shifts.

As a rule day and night shifts were worked alternate weeks. At *Factories 7 and 8*, however, only a proportion of the workers were required for night work and there was no regular alternation.

At *Factory No. 8 (near London)* 16 permanent night shift workers were examined. Nine were classified as A and six as B. Workers in Class A had worked continuously on night for periods varying from 3½ to 11 months, the average time being 4½ months. The average time of the remainder was also 4½ months. The nutrition and general health of the night workers examined (and they were picked at random) was much better than that of the day workers. This is probably because it is only the stronger girls and women who "can stick it." There is no regular alternation of day and night work, and if a worker agrees to go on night she is left on until she "knocks up." It was said that numbers of girls had had to give up night work because they could not stand it. Several had left because they were not allowed to change to day work.

The night workers examined were satisfactory. Their feeding is better on night shift as they have two good hot meals one before coming out in the evening and a good breakfast. The breakfast of the day workers is nothing but tea, bread and butter, as they have to leave so early that there is no one to prepare a meal for them. The majority of the night workers apparently preferred night because of the long week-end. They work five nights and rest from Saturday morning till Monday night. Even those who complained that they were tired at the end of the week said that they got rested during the week-end.

At *Factory No. 7 (near London)* where there is also no regular alternation of day and night work, 19 workers on different processes were examined. Twelve were classed as A and seven as B. The average time worked continuously on night was 13·5 months in Class A and 15 months in Class B.

On the whole night work was not unpopular among the women, partly because of the higher wages earned, partly because they found more opportunities for shopping and personal affairs. Most workers found no difficulty in sleeping during the day, though many, for reasons which were often unavoidable, did not allow themselves sufficient time for sleep. Work on Sunday night was disliked, few women cared to spend Sunday in bed and many used this day for heavy domestic work for which they had no opportunity during the week.

SEATS.

Although in some cases seats had been provided for use when workers have proper opportunity for resting, this was by no means general. For example,

The report on *Factory No. 1 (North-East Coast)* states—"There is a great grievance in certain shops. Sitting is generally not allowed and in many cases this appears to cause quite unnecessary fatigue to the workers. There is no provision of stools or benches except for certain drilling machines and benches where the work must be done sitting. No stools are provided for workers on such processes as rough turning (6-inch shell and 18-pdr. shell) and on certain automatic machines where the worker might often sit for some minutes at a time."

The report on *Factory No. 4 (London)* calls attention to the lack of seating accommodation.

At *Factory No. 7* it is stated that "only the viewings and lacquering girls have stools; in none of the other shops is provision made for sitting, though I noted many times when workers were waiting either for the tool setter or material." Many women complained that they could not sit down while waiting for work as no seats were provided and they were not allowed to sit. In this factory the proportion of tired and swollen feet was noticeable. On the other hand, the report on *Factory No. 8* states: "In nearly every department seats were provided for the workers; some had metal backs for support, while some were merely stools."

The provision of seats and the use made of them unfortunately often appears to depend too much on the caprice or prejudices of individual managers and foremen, who do not yet realise that, if suitably used, seats reduce fatigue and do not encourage habits of idleness and slackness. Seats are particularly needed where the operations are long and cannot be accelerated, where waiting is apt to occur for material or assistance and where the two-shift system is followed.

NUTRITION.

Canteens had been established in connection with all the factories visited and on the whole were suitable and convenient, though not always as popular with the women as had been hoped. In spite of the provision of cheap, appetising dinners, many women still prefer to bring the main portion of their food from home, merely supplementing this with "extras" or tea from the canteen.* On an eight-hour shift a disinclination to purchase a full meal is understandable. The shift is relatively short and allows time for meals at home, while the factory meal time is only half-an-hour and does not correspond with any of the ordinary principal meals of the day.

At *Factory No. 2 (Midlands)*, for example, only 20 of the workers stated that they used the canteen entirely, getting their dinners there. The remainder took their solid meals at home, and brought sandwiches, cake and bread and butter to the factory, getting "what they fancied," in the canteen, and making tea there. This incomplete use of the canteen may be attributable to the short meal times to which workers have grown accustomed on the three shifts, and to the consequent difficulty of serving rapidly enough to allow proper time to eat.

Factory No. 5 (Yorkshire). At *Factory (a)* the girls take all their meals in the canteen—a fair proportion actually buying all their food there; that is to say, on day shift they buy good breakfasts and good dinners, whilst the remainder bring their food from home, often prepared dishes which they can warm up in the canteen and which they supplement with small purchases at the canteen. On night shift the usual plan is to have substantial food before leaving home, many having a good meat meal often with the members of the household who have returned from day work. They make this their main meal and purchase light suppers.

* Since the Inquiry was made the difficulties of shopping have become greatly accentuated and the demand for food at canteens has correspondingly increased.

and breakfasts during the night or bring light meals with them. The women have certainly learned the lesson, and act on it, that they cannot continuously work at their strenuous occupations unless they get adequate food. Occasionally one would say "we are really doing men's work, we cannot expect to do it on bits of thing that would keep us going at home, we have to have real meals." These inquiries were made at the time when the great difficulties in obtaining certain provisions arose and many of them told of the hardships which were being experienced by themselves or their mothers in obtaining food. It was common at this time for the women to leave work in the early morning after the 11½ hours of night shift, with perhaps two hours' travelling in addition, and line up in the food queues in order to obtain supplies. In many cases this resulted in the women not getting home until midday, so that their rest was hopelessly interfered with. At this time, too, the weather was very cold, heavy snow having fallen.

The women on the heavy work in *Factory (b)* have also realised that they require substantial food, if they are to carry out their duties continuously.

Of the women interviewed the following analysis gives roughly the system in food taking :—

124 good meals every day at home.
24 buy good meals at canteen.
64 buy some light food at canteen.
45 buy no food at canteen.

An interesting comparison between the two factories is to be noted. The average wages are lower in *Factory (b)* though the hours are longer. A relatively small proportion is buying full meals at the canteen and a relatively large proportion buys nothing at all at the canteen. Apparently the higher wages ensure a greater expenditure on food by these workers on heavy operations.

On the 12-hour shift and at nights the practice of buying a full meal seems to be increasing, and in some cases, if more were done to meet the wishes and tastes of the workers, the meals would probably become much more popular. It is not an easy task always to satisfy and meet the likes and dislikes of factory workers unused to restaurant meals and very ready to criticise, but at the same time there is room for improvement in canteen management.

For example, one factory has a canteen to seat 4,000. It is run by an outside caterer so badly that very few will use it. The supervisor offered to take it over but was refused. The caterer has been reprimanded and it is hoped the management will be improved.

At *Factory No. 4 (London)* the canteen is too small to hold the workers, the food is only fairly good, the service is inadequate, especially at night, and the tea is particularly bad and strong.

In other cases, although the food at the canteen is good, the workers, through force of habit, prefer to take their meals in the shops. This is unsatisfactory from every point of view, but it seems practically impossible always to exclude them from the shops in certain factories.

Typical prices are as follows :—

(1) Meat and vegetables	9d.
Soup	2d.
Pudding	3d.
(This is considered too dear by some girls.)	
(2) Boiled beef and vegetables	6d.
Steamed pudding	2d.
Custard	1d.
Rice pudding	1d.
Soup with dumpling	2d.
Bread and cheese	½d.
(The food appeared well cooked and of good quality.)	
(3) Tripe and onions	4d.
Savoury (a kind of rissole)	2d.
Fish	5d.
Pudding	3d.

(The quality of the food seemed good but the dinner is not often purchased, although there is a big trade in meat pies, cakes, beverages, chocolate, &c.)

The nutrition of the workers was generally satisfactory except in the case of *Factory No. 8*, where "the nutrition was very poor and the diet unsuitable and insufficient for women working long hours. Bread and butter and tea formed too large a part of the dietary and 41 out of 114 examined were considered to be suffering from under-feeding." This malnutrition is due mainly to long established habit and cannot be ascribed to war conditions. It may be hoped that the well-managed canteen which the firm have now provided will encourage a better and more substantial dietary.

TRANSIT.

Convenience of transit varies greatly. At *Factory No. 1 (North East Coast)* the difficulties of transit still form an unsolved problem. Of 193 workers examined 39 walk to work, 64 travel by train, 2 by the factory bus, 1 by boat, 1 cycles—the remainder travel by tram. The journey occupies one hour or more in 41 cases, two hours and more in 19 cases, three hours in 3 cases, four hours in 1. The train service is stated to have improved, but the tram service is still wholly inadequate and unsatisfactory. The large majority of workers, men and women, is obliged to use the trams, and the extreme overcrowding and bad air are certainly responsible for much of the tiredness among the women. The crowding in itself may be dangerous, and one girl examined had recently been seriously crushed and injured in the attempt to find a place.

At *Factory No. 2 (Midlands)* a considerable number of workers (118) are able to walk or cycle to and from the factory if they wish. The remainder come by bus or train. Thirty-eight workers complained of difficulty in transit, or mentioned conditions which involved considerable addition to their hours of work in getting to and from the factory. The decreased service of trains proves most inconvenient in certain cases; workers who arrive by train may have to wait an hour at the factory before their shift begins. In one instance a worker on the afternoon shift (2.30 to 10 p.m.) arrived regularly at her home at 12.30 a.m., and for the morning shift (7 a.m. to 2.30 p.m.) she rose at 4 a.m. The tram service varies. Many of the workers have no complaint to make, but on some lines cars are crowded, and women stand habitually, travelling an hour each way.

At *Factory No. 3 (Yorkshire)* practically all the workers come by car or train :—

	15 minutes and under.	15-30 minutes.	30 minutes -1 hour.	1 hour and over.	Walk.	Tram or Train.
A	4	25	32	2	4	59
B	4	18	24	—	5	41
C	—	4	2	1	—	7
Total (116)	8	47	58	3	9	107

Certain trams were said to be crowded, and the women complained of the cold and fatigue of waiting in queues at the end of the day's work.

At *Factory No. 4 (London)* 114 out of 167 were able to walk home. 138 take less than 10 minutes for the journey and only two more than an hour.

	15 minutes and under.	15-30 minutes.	30 minutes -1 hour.	1 hour and over.	Walk.	Bus or train.
A	64	37	10	1	83	29
B	16	18	6	1	28	13
C	2	1	1	—	3	1
Total (157)	82	56	27	2	114	43

At *Factory No. 8 (near London)* 90 out of 114 walk home, and in 88 cases the journey occupies less than 30 minutes. The firm has arranged for a special train morning and evening, and should any fare exceed 4s. weekly the firm pays the excess.

LOST TIME.

No attempt was made in the course of this Inquiry to obtain accurate data in regard to lost time and its causes. In the case of women working long hours there are clearly numerous more or less legitimate reasons for broken time in addition to temporary ill-health. There is, for example, genuine fatigue and the not unnatural desire for an occasional "day off." There are also domestic duties or emergencies in regard to the home or children which, in the case of married women, almost necessarily exert a prior claim to the factory.

At *Factory No. 1 (North East Coast)*, for example, the report states :—" I gathered on all hands that most workers deliberately stay away from work one day a week or a fortnight : this is sometimes for domestic reasons, but often because they feel the need of a day's rest. The time-keeping records are consequently bad. In two shops where the time-keeping is much better I found that this was due to the strict discipline ; any girl who stays away for a week, except it be on sick leave, loses her machine—she is put on some time work such as labouring and has to wait her turn to get a machine again. It is interesting that these were the only shops in which I had emphatic complaints from the girls as to the length of hours. Roughly speaking and simply from the general statements given, the time-keeping in these two shops was 50-75 per cent. better than in the other shops."

At *Factory No. 5 (Yorkshire)*, the information given by the workers themselves indicated that the lost time at *Factory (a)* was low. There was in general a high sense of duty in this respect, great pride being taken in the possession of a "clean slate" both in respect of absence and lateness. Occasionally a woman stopped away as she was "just done up" or "dead beat" and felt that she must rest. The records of time lost during the last six months (since the introduction of longer hours) compared with the records for the previous two months when the women were on eight-hour shifts, show a rise in the total percentage of time lost which must be due largely to increased fatigue.

In *Factory (b)* there is the same pride in many of the women in having "no broken time" to show. The machine operator who is fond of her work dislikes very much to stay away, for she is always anxious lest she should have "her machine taken away." Some cases were noted of women who took "breakfast time," because they felt "too done up" to come, but felt that the three hours extra rest they would obtain would set them up for the rest of the week.

WELFARE SUPERVISION.

In all factories visited Welfare Superintendents had been appointed who were charged with the general oversight of the physical well being of the workers.

At *Factory No. 1 (North-East Coast)* the Lady Superintendent has a large staff of supervisors allocated to the different shops. Each supervisor has under her at least one assistant supervisor and an adequate number of attendants for cloakrooms, cook-houses, &c. The workers say that conditions have much improved since the appointment of these officers and evidently regard them as valuable acquisitions. Welfare Supervisors have nothing to do with the management of the canteens, and the ambulance arrangements are in charge of the firm's Medical Officer. The ambulance rooms are staffed by nurses and first-aid attendants who have no relation to the Welfare Supervisors.

At *Factory No. 2 (Midlands)* a Welfare Supervisor with three shift supervisors under her is in charge of the welfare work. The department is a branch of the Labour Department of the factory and the Welfare Supervisor is consulted by the management on questions concerning women. There are two surgeries in charge of nurses which can be used as rest-rooms if required.

At *Factory No. 3 (Yorkshire)* there is a welfare staff of 19. This includes the Head Welfare Superintendent, 15 supervisors in the works, one in the record office and one for engaging the workers. The various processes are divided into five sections and each of the 15 supervisors has her own section under her control on each shift. She has a desk in the middle of her section and is therefore always accessible to the women. Of late a large number of athletic and social societies have been instituted in connection with the factory, and a Welfare Committee, which brings matters to the notice of the management, has also been formed. Various classes are also soon to be started in co-operation with the Local Education Authority.

An extremely well equipped surgery with a separate department for men and women is in charge of the firm's Medical Officer and staffed by nurses.

At *Factory No. 5 (Yorkshire)* the care of the workers at *Factory (a)* is in charge of a well-developed Welfare Department under the control of a Lady Supervisor and Assistant Supervisor. In each shop there is a Shop Supervisor who takes a personal interest in the women. A Night Matron has charge of the welfare of the girls during the night shift. A good spirit of comradeship has been developed amongst the women due to the energy of the Welfare Department. Games, football and cricket on Saturdays and sports meetings, are participated in by the women with great enjoyment. The welfare work at *Factory (b)* is under the direction of a Lady Supervisor and assistants, and working in the shops under the direction of the Lady Supervisor are the shops supervisors.

At both factories all the women who are engaged are required to undergo a medical examination by a Woman Medical Officer within the first week or two after engagement. Practically all the women who are employed have been examined, or will have been, in a very short time. Recommendations of the Medical Officer as to transference of women to light work are attended to by the Lady Supervisor and any other recommendations made by the Medical Officer are followed up by the Welfare Department.

At *Factory No. 7 (near London)* the Welfare Superintendent does not engage or dismiss workers but interviews them after the assistant manager has taken them on. She is responsible for first aid and supervises the mess room. She engages mess-room and lavatory attendants. For first aid the supervisor has a well-fitted Red Cross box in her surgery for the treatment of minor injuries. Serious cases can be taken to the hospital close at hand. In her absence a lavatory attendant applies bandages, &c.

At *Factory No. 8 (near London)* two Welfare Supervisors have been appointed, but they have not as yet any very effective grip of their work. The canteen is not under their control and the first-aid arrangements are separately managed. The present ambulance room is only temporary. It is well equipped, but there is no waiting room. Different hours are arranged for men and women. Three nurses take spells of eight hours each.

GENERAL HYGIENE.

Apart from the long hours usually worked and difficulties of transit in some cases, the general arrangements for the health and comfort of the workers appear reasonably good in most cases. The conditions of the shops as regards ventilation, heating, lighting, removal of fumes, etc., have often been much improved, and special contrivances have been designed to ease the strain of heavy work. The cloakrooms, lavatories, etc., are usually fairly satisfactory, though there is often no provision for drying wet garments. Overalls of a suitable pattern are now generally provided, together with special means of protection (clogs, waterproof aprons, etc.) for women carrying out wet or dirty operations. Rest-rooms for workers temporarily indisposed are usually available, although they are probably not made full use of. In the person of the Welfare Supervisor an officer exists to whom women may bring personal complaints or requests for advice or help. The organisation is by no means perfect, but it represents an immense advance on the conditions which obtained two or three years ago.

An endeavour is often made by the factory to arrange lodgings for workers. It is found that women usually prefer to live at home even though this entails a long daily journey, than in lodgings close at hand.

At *Factory No. 8 (near London)* as the number of women employed increased and it became necessary to draw workers from a distance the housing question became urgent. The firm persuaded the Local Authorities to make a canvass in the town and find out the householders willing to take lodgers and the prices they would charge. The names are kept on a card register and given to workers who require rooms. Unfortunately the register has not been kept up to date. The firm has also provided two small houses to be used as reception houses, one for men and one for women. These are placed under the management of the Canteen Supervisor, and workers may remain for three nights while looking for permanent lodgings. A woman cleans both houses and cooks, the charge being 2s. 6d. per day. The houses are well kept, are furnished with single beds, not more than two in a room, and chests of drawers. Each house has a bath with hot water.

MEDICAL EXAMINATION.

The arrangements were generally similar to those of the previous Inquiry. Each woman went first to the assistant investigator, who asked various questions in regard to general and social conditions, and then to the doctor who made the medical examination. Except at *Factory No. 5 (Yorkshire)*, where the medical officer was personally known to many of the women, this examination was necessarily somewhat cursory in nature, partly because of the circumstances under which the Inquiry was conducted, but mainly because it was essential to avoid alarming or irritating presumably healthy women by requiring much undressing or by making a searching examination. The Inquiry was voluntary and its results depended entirely on the success with which the investigators were able to overcome the shyness or even suspicion of the women. For example, in some factories where numerous dismissals happened to be taking place, the workers naturally supposed that the Inquiry might be intended to weed out the most unfit. In another factory in a town where the Medical Officer of Health had recently published a report on ill-health and especially "chest trouble" among munition workers, a number of those who were not in the best of health refused to be examined as they feared subsequent action. No detailed examination of the chest was made as a routine. The doctors endeavoured to elicit the medical history by sympathetic enquiries.

As before, the workers were classified into three groups—A, B and C.

A denotes apparent good health.

B denotes some signs of fatigue or ill-health.

C denotes marked fatigue or ill-health.

England.	Number of workers examined.	A (healthy).		B (slight fatigue).		C (marked fatigue).	
		Number.	Percentage.	Number.	Percentage.	Number.	Percentage.
Factory No. 1	193	110	56.9	70	36.2	13	6.7
" 2	264	199	75.3	53	20.07	12	4.5
" 3	116	63	54.3	46	39.6	7	6.03
" 4	157	112	71.3	41	26.1	4	2.5
" 5	199	77	38.6	114	57.2	8	4.02
" 6	73	45	61.6	19	26.02	9	12.3
" 7	67	35	52.2	30	44.7	2	2.9
" 8	114	51	44.7	52	45.6	11	9.6
	1,183	692	58.4	425	35.8	66	5.5

CAUSES OF FATIGUE IN WOMEN WORKERS.

The cases classified as "C" were those regarded by the medical officer as definitely unfit for the work they were doing. In some instances the physical condition appeared due to the nature of the work alone, but in most to heavy work combined with domestic duties and perhaps mental anxiety.

The cases classified as "B" were those in which signs of weariness and the beginnings of ill-health were obvious to the examiner. No scientific tests of fatigue were applied. The opinion formed was based upon appearance, signs or symptoms of ill-health, physical and social history, etc. At times obviously tired women were loath to admit any signs of fatigue, for example, at Nottingham, as they feared dismissal. Tiredness and "nervousness" were common complaints among these women. At *Factory No. 1 (North East Coast)* where all the workers had been working for at least a year, and many for over two years, a number of workers stated that one of the first signs of fatigue noticed by themselves is that they "dread the belt." Sleeplessness and restlessness were relatively common; indigestion, loss of appetite, headache, &c., were often associated with the tiredness. Some had definitely lost weight, many looked pale, thin and worn.

Among the special causes of fatigue may be mentioned heavy work, especially when associated with long hours, age and general unsuitability for particular work, length of service, insufficient attention to "welfare" inside the factory, home duties, mental anxiety, transit, dietary, etc. Some of these have been referred to already, others may now be considered in some detail.

(a) *Heavy Work and Long Hours.*

As an example of fatigue due to these causes, the results of an examination of 199 women at Leeds may be mentioned.

At *Factory No. 5 (Yorkshire)* of 146 women employed on 6-inch shells the medical officer reported that 51 were physically fit and able and willing to continue at the present pressure of work. Of these the greater number were women living in lodgings or in homes where they had no work to do after their munition shift; a few had spent many years as charwomen working hard for little remuneration, and these looked upon the regular long hours of munition work as a well paid rest. Of the remainder 95 women showed signs of fatigue varying from those who were moderately tired and unable to spare any energy for recreation to those who were completely exhausted and unfit for recreation or work. Of these, seven were entirely broken down in health.

The most noticeable point about these women was a general appearance of weariness and loss of tone. There seemed to be a general want of alertness as though it needed a definite effort of concentration before they could bring their minds to bear upon any given question. Many had the appearance of a rapid loss of weight, and those who did not know their weight could remember that their clothing had to be definitely taken in to make it fit the present waist measurement.

Women suffered from loss of appetite with fulness and epigastric pain after food, having the appearance of atonic dyspepsia in varying degrees. A few suffered from cough, the result of bronchitis which was started or aggravated by work in a Munition Factory. Many showed signs of cardiac insufficiency with weak heart sounds, irregular in time and force, while a few had definite cardiac dilatation. Some of these women were dyspnoeic while at rest and more were definitely so on moderate exertion.

The evidence of nervous fatigue varied from staleness with loss of interest in, or inclination for, amusement or work in the milder cases, up to exhaustion of a marked degree with nervousness, loss of control of temper and depression in the more marked cases. The loss of voice occurring in women especially on the night shift appears to be the outcome of exhaustion and loss of tone.

The general impression gained from these women (working on 12-hour shifts) suggests that they are not physically fit to continue indefinitely on these long hours. Some will voluntarily leave at an early date, and others from economic necessity will continue to work above their strength and will become permanently damaged members of society. The ones who will remain at work at all costs are those who have many dependents. These threaten to become prematurely old, losing all the joy of life and continually haunted by the fear of a breakdown in health.

As regards the examination of 53 women working on 9.2-inch shells (10-hour day and 11.4-hour night shifts) they cannot by any effort lift them from place to place as they do in the case of the 6-inch shells. The chucks of the machines are tightened by men and the result is that though the shells are heavier and the machines larger the women actually carry out lighter work than they do when working on 6-inch shells. Of those examined, 23 were physically fit; and again these were usually women with few home duties. The remaining 30 showed signs of varying degrees of fatigue. But their fatigue, generally speaking, was not so obvious as the fatigue of those on the lighter shells.

At *Factory No. 2 (Midlands)* where the women are engaged on 9.2-inch and 6-inch shells (8-hour shifts usually), it appears that the processes which caused most strain were those of boring, drilling and rough turn body. The latter involves an upward jerk to tighten the shell in the machine, which the majority of women find fatiguing, especially on night work or during menstruation. On the other hand, seven young women and four elder workers of an especially wiry type had suffered no inconvenience of any kind beyond a temporary muscular stiffness.

At *Factory No. 3 (Yorkshire)* the women are engaged on 4.5 and 5-inch shells (8-hour shifts); 24 workers on the rough turn body process were examined for the purpose of comparison with findings at other factories where similar work is undertaken. It was observed at *Factory No. 2 (Midlands)* that robust young women suffered little inconvenience at this work beyond temporary stiffness, but that there was a tendency to cause pelvic disorder in elderly married women with weak abdominal muscles. Here it appeared usual to employ younger women. Seventeen out of 24 examined at this factory were under 24 years of age and only two women were 30 years old. Some of the more delicate workers had found this work too heavy and had been transferred to other operations. There were four cases of dysmenorrhoea, seven of irregularity of menstruation, where it was said that the complaint had arisen or had become worse since working at the factory.

It is evidently most desirable that workers should be carefully selected for heavy work such as rough turn body, ripping and centring if undue fatigue or physical injury is to be avoided. The length of the shifts is clearly of great importance.

(b) *Age and General Unsuitability for Work.*

Other things equal, workers under 18 and those of middle age may naturally be expected to show fatigue more readily than those in the prime of life.

Young Workers.—At the previous Inquiry considerable fatigue was manifested by girls under 18 who were working exceptionally long hours under somewhat unfavourable conditions. A large number was not examined in the course of the present investigation, but in the factory where these findings were noted the conditions of work and comfort have been greatly improved and the fatigue has diminished accordingly.

At *Factory No. 7 (near London)* 9 workers under 18 were examined, 8 were classified A and 1 as B. Their general condition was satisfactory. One strong girl of 16 is in the foundry sand placing, another girl of 17 has already worked three years at munitions.

Middle-aged workers may be divided broadly into two divisions—(1) The thin wiry women who have worked all their lives and stand heavy work more easily than many younger and apparently stronger women; and (2) the women who may appear strong and well nourished but whose abdominal muscles are lax and flabby from lack of exercise, frequent child bearing, &c. The latter type is apt to suffer unduly from fatigue or internal injury when on heavy machine work or on operations which entail jerks or the lifting of heavy weights.

(c) *Length of Service.*

It is only to be expected that workers employed for long periods under arduous conditions will tend to show increasing signs of slackness and fatigue. The re-examination of workers at *Factory No. 6 (Midlands)* who had already been examined twice before is of interest in this connection, although the numbers are small.

	January, 1916.	July, 1916.	October, 1917.
	Per cent.	Per cent.	Per cent.
A	38	52.6	56
B	49	33.7	22
C	13	13.7	22
	100 examined.	80 examined.	27 examined.

The figures indicate that women showing slight signs of fatigue in 1916 are now feeling increased strain.

(d) *Insufficient Attention to Welfare.*

It is obvious that discomfort inside the factory—for example, damp floors, no seats, cold rooms and lack of ventilation, unsatisfactory arrangements for meals and so forth—will tend to cause avoidable fatigue and minor ailments.

At *Factory No. 4 (London)*, for example, many of the women who complained of special "tiredness" on the night shift stated that they brought their own food instead of purchasing a hot meal from the canteen. The night service of this particular canteen was evidently so bad that workers had often given up the attempt to obtain food within a reasonable time.

The conditions of factory (b) at *Factory No. 5 (Yorkshire)* where a large number of the women appeared definitely fatigued is another case in point.

In the shell shop there is considerable congestion. The number of machines installed is probably much too high, leaving the alley ways too narrow, with the result that the continual passing up and down of the bogies with and without shells, bookers, gaugers, labourers, sweepers, barrows, &c., causes an unpleasant overcrowding. The factor most to be criticised in the building is the existence of wooden galleries, which are used as a fuze department and in which approximately 400 people are constantly at work. The presence of these galleries removes all feeling of air space and gives a depressing overcrowded sensation in the shops. The hanging of clothes in the shops, the absence of provision in cloakrooms and elsewhere for shoes and garments which are changed by the girls, contributes to the sense of congestion.

Large gates at the one end swing open to admit truck loads of forgings. Until recently these gates opened directly on to the machines in this part of the shop, giving rise to pronounced fluctuations in temperature and in the cold weather to great discomfort for the workers. But recently a high screen has been erected which should be some protection against the sudden changes of temperature.

As to the general cleanliness, sweepers are continually at work, but the crowded state prevents the work being carried out as well as might be. The splashing of the cooling liquor from the machines leads to an unwholesome dampness of the floor; sawdust is sprinkled to absorb the wet and standing boards are provided, but too much wet remains lying about.

(e) *Home Duties, etc.*

The relatively large number of married women now employed increases the amount of fatigue likely to be observed among the workers. A certain proportion of these women are the recently married wives of soldiers and have no children or domestic responsibilities. The majority, however, are older women with children and homes of their own.

At *Factory No. 2 (Midlands)* 105 out of 264 women were married, 56 had young children and about half of these were doing heavy housework. Fourteen women had sick husbands at home in some cases needing special diet. As a rule the children were left with neighbours or were sometimes taken charge of by other relatives.

At *Factory No. 3 (Yorkshire)* 48 out of 116 women were married, 37 had children at home. Of the latter, 20 were classed as A, 15 as B, and 2 as C. 18 had heavy housework and 26 lighter home duties. Of the 18, seven were classified as A, eight as B, and three as C, while of those with lighter housework eighteen were A, seven B, and one was C.

At *Factory No. 8 (Near London)* only 16 out of 114 women were married. Eight had children at home and five were doing considerable housework. Two of these were classified as A, two as B, and one as C.

At *Factory No. 4 (London)* 53 out of 157 women were married. 26 had children at home, and of these twenty-one were classified as A, four as B, and one as C. Of 26 married women who had considerable housework, eighteen were classified as A, seven as B, and one as C. It may be added that there was little evidence of fatigue in this factory.

Married women are often fully competent physically to carry out duties at the factory. It is only when these duties are supplemented by home work after long hours of factory work, by the difficulty of making proper arrangements for the children during their absence, by the ever increasing difficulty of shopping during the limited interval, and often by worry or anxiety in regard to husband or relatives at the front, that the burden becomes too heavy to bear without mental or physical damage. If married women must be employed, either because they need money to support themselves or their families, or because the Government need their labour, some special arrangement ought to be possible by which they could be relieved of a portion of the work which now devolves upon them.

GENERAL AILMENTS.

Table of Chief Defects Detected.

	Factory 1	Factory 2	Factory 3	Factory 4	Factory 5	Factory 6	Factory 7	Factory 8	Total per cent.
Number examined	193	264	116	157	199	46	67	114	1,156
Percentage of defects noted	100	100	100	100	100	100	100	100	100
Digestive system—									
Indigestion (pain, flatulence, &c.)	23	15.5	25.5	16.5	24.5	13	31	37.5	23.5
Constipation	14.5	7	9.5	14.5	16	26	16.5	12	12.5
Teeth—									
Several carious	31	26.5	20	29	32	17	24	29	27.5
Oral sepsis	8	10.5	13.5	5	20.5	8.5	7.5	3.5	10.5
Artificial teeth	32	15.5	20.5	12.5	36.5	10.5	18	10.5	21.5
Nervous system (tired, nervous, irritable)	30	13	20	18	26.5	15	15	17.5	20
Headache (frequent)	42	13.5	33.5	24	19	28	59.5	41	28.5
Anæmia	13	12	23	14.5	22.5	15	22	50	20
Aching and swollen feet	10	5.5	4	3	21	—	19.5	9.5	9.5
Muscular pains (including rheumatism)	14.5	8	20	7.5	14	4	28	14	12.5
Nose and throat (pharyngitis, unhealthy tonsils, &c.)	5.7	2	3.5	18.5	3	2	10.5	22.5	7.5
Eye strain, &c.	6	2.5	22.5	5	5.5	17	15	17.5	8.5
Disorders of menstruation	35	17.5	27.5	25	19.5	28	37	29.5	26

Digestive Disorders.—Loss of appetite and pain after food were the most common symptoms. Constipation was comparatively seldom complained of. This was partly due, no doubt, to the fact that aperients (salts or seidlitz powders) are often taken as a routine.

At *Factory No. 7 (near London)* 21 out of 67 complained of indigestion, and here bad cooking and catering seemed the main cause. Bread and butter and tea formed far too large a portion of the dietary.

At *Factory No. 8 (near London)* 43 cases of indigestion were noted among 114 examined. This was not due to bad teeth but seemed caused partly by hurrying over meals before a long bicycle ride, by bad cooking and an inadequate dietary and partly by fatigue. Forty-one girls were noted as under-fed.

Decayed Teeth and Oral Sepsis were common, especially in some factories, though as far as the workers' own statements went they appeared to have little direct effect upon the digestive system. Sooner or later they are bound to affect the health adversely and are indeed responsible for malaise, headaches, etc., with which the workers do not associate them.

At *Factory No. 6 (Midlands)* some of the youngest workers had excellent sets of teeth and had been educated in good habits of dental hygiene, thus illustrating the effect of the School Medical Service which in Birmingham pays special attention to the care of the teeth.

At *Factory No. 4 (London)* "the women are paying increased attention to dental hygiene. During last year several had visited the dentist and had carious teeth out and plates in."

At *Factory No. 2 (Midlands)* "the teeth were usually extremely bad, dental hygiene seemed unknown and pyorrhœa occurred in most of the women over 30 years of age. Considerable reluctance was shown at the prospect of a visit to the dentist and conservative treatment was rarely sought in time even by young girls of otherwise good appearance. There was a general impression that stopping always hurt more than having a tooth out and as a result no treatment was sought."

At *Factory No. 8 (near London)* the teeth were exceptionally good. Only 33 out of 114 had carious teeth, and it was noticed that those who had bad teeth lived out of the District.

Headache is probably often merely a symptom of general tiredness and may be caused or aggravated by noise in the factory and bad conditions of transit (e.g., Newcastle), insufficient fresh air and exercise. In other cases it appeared to be associated with anæmia or with digestive disturbances.

At *Factory No. 7 (near London)*, where the factory is old and crowded with machines, 40 out of 67 complained of headache, many attributing it to the noise of the machinery—the long hours and constant standing also made them "so tired and headachey."

At *Factory No. 8 (near London)* 47 out of 114 complained of headache and it was often attributed to noise. For the most part the girls were unused to factory life. The high temperature at which the work has to be carried out in some of the rooms is also responsible for headache.

Anæmia was seldom marked in type and usually no special treatment was being obtained. At *Factory No. 4 (London)*, for example (where little fatigue was observed), only 3 well-marked cases were observed, and 20 slight ones, among 157 women. At *Factory No. 5 (Yorkshire)* on the contrary, where there was much fatigue, 45 cases were noted among 199 women. An exception was also noted at *Factory No. 8* where 57 out of 114 girls suffered with anæmia, which in 19 cases was severe with dyspnoea and hæmic murmurs. Many of these girls were under 18, their diet was unsatisfactory and the conditions of their work in hot, stuffy rooms would naturally predispose to anæmia.

Muscular Pains and Swollen Feet.—Muscular pains, aching back, shoulders and arms were often experienced at the commencement of factory life, and afterwards tended to disappear as the worker became accustomed to the physical exercise. In other cases, however, where the work was heavy and the worker not robust, muscular pains were frequently complained of towards the end of the shift and especially after night work.

The prevalence of *swollen or aching feet* appears to depend a good deal on the conditions of work and especially on the nature of the floor and the provision of seats.

At *Factory No. 7 (near London)*, for example, the heating of the factory was not good and the floors were complained of as uneven and wet, making the feet very sore. Muscular pains and swollen, aching feet were common.

At *Factory No. 5 (Yorkshire)* many women in *Factory (b)* complained of sore or swollen feet which they attributed to standing on a concrete floor; the condition was sometimes improved by the wearing of clogs or standing on a board. Varicose veins were relatively common among the older workers and often associated with aching legs and feet and swollen ankles.

Gynaecological Conditions.

Disorders of menstruation occurred with some frequency and appeared to be associated particularly with heavy work, especially if other causes of fatigue were present. They usually took the form of dysmenorrhœa, which in some cases had appeared since factory work had commenced, menorrhagia or increased frequency.

The dysmenorrhœa did not seem as a rule to be severe in type, but the pain was sufficient to cause considerable tiredness and malaise even when it did not entail absence from work.

At *Factory No. 1 (North-east coast)* 58 out of 185 complained of dysmenorrhœa, for which 15 lost time every month, 10 suffered from menorrhagia. Serious complaints having been made of the bad effect of the work in a particular shop on menstruation, 11 girls about whom the supervisor was concerned were specially examined in this respect. Of these, four cases were normal, six had dysmenorrhœa, two suffered from menorrhagia. In two cases the girls were obliged to lose time, but in only one case had the symptoms appeared since the work was commenced. The medical officer came to the conclusion that there was no special cause for alarm and that the conditions were fairly typical of the factory as a whole.

At *Factory No. 2 (Midlands)* 30 out of 264 suffered from dysmenorrhœa, and nine from frequency. An inquiry among 34 women engaged on the rough turn body process showed that considerable pelvic discomfort occurred in those women whose pelvic and abdominal muscles were weakened either through pregnancy, over-fatigue or lack of muscular power. In six of the cases women had observed irregularity of menstruation, in eight there was some degree of menorrhagia, three cases of prolapsed uteri had occurred and three suffered from some weakness of the bladder. Dysmenorrhœa had increased in three cases; one woman had undergone spontaneous extrusion of a fibroid while engaged on this process and was feeling considerably better in health.

At *Factory No. 3 (Yorkshire)* 23 out of 116 women suffered from dysmenorrhœa, and in about half the number of cases the pain was sufficiently severe to necessitate absence from the factory. Eleven severe cases and five slighter ones were stated to have arisen from or to have been aggravated by factory work. Two women complained of menorrhagia and seven of increased frequency.

At *Factory No. 4 (London)* 39 women out of 157 suffered from menstrual disorders, 12 losing time every month. In one case improvement had taken place since working at the factory, in six cases the reverse.

At *Factory No. 5 (Yorkshire)* of 146 women engaged on 6-inch shells menstruation was unchanged in 88 cases, decreased in 12 and increased in 5 cases. In the last group the loss was so excessive as practically to amount to actual flooding. These latter cases were women who had borne children and were working on processes involving heavy lifting, such as tightening the chuck of machines. A few complained of backache and bearing down sensation, amounting to definite prolapse in one case. These were directly attributable to over-strain and gave a fairly typical picture of endometritis following hard work and want of rest. Of 53 women engaged on 9-inch shells menstruation was increased in 9 cases and diminished in 10. There was no history of severe flooding.

At *Factory No. 7 (near London)* 20 out of 67 girls complained of dysmenorrhœa, and 2 of menorrhagia. 7 lost time every month.

At *Factory No. 8 (near London)* 31 out of 114 suffered from dysmenorrhœa, of whom 19 lost time every month. 2 stated that they were worse since coming to the factory.

Very few women who suffered from dysmenorrhœa had ever consulted a doctor. They appeared to consider it a necessary evil to be put up with and made the best of. Many women were surprised that it should be regarded as an abnormal condition for which medical advice and treatment should be sought. There seemed indeed a great disinclination to consult their doctors, and "he's no time for such things" was a common reply to the question as to whether advice had been obtained. At *Factory No. 3 (Yorkshire)* "there was a tendency for mothers or elderly women relatives to prescribe gin as a specific remedy, and though the younger women disliked its taste at first its use might easily lead to alcoholism in later years. In some cases the medical treatment obtained appeared to be palliative rather than curative, powders and liniment being given."

Other gynaecological conditions which were noted (in addition to backache and symptoms possibly due to chronic pelvic trouble) were prolapsus uteri and miscarriage. Both these conditions may be caused partly or entirely by the heavy work, but without detailed inquiry it is difficult to attribute the cause solely to factory work, when the woman may also be undertaking heavy or unsuitable work at home.

ADDENDA.

In the course of the inquiry the attention of the medical officers was directed to two processes which for different reasons presented features of special interest, namely (a) Copper band turning; (b) continuous work in artificial light; (c) following up workers who have left the factory.

(a) Copper Band Turning.

During this process workers are apt to inhale metallic dust or fumes, and symptoms suggesting irritant poisoning were noted in a number of cases.

At *Factory No. 1 (North-East Coast)* there was an unusual amount of digestive disturbance among the workers in copper and brass. The girls themselves have a fixed idea that the copper "gets on their stomach" or "on their chest." They complained of dust in the mouth like "Verdigris" and purgatives are taken regularly to counteract this. In 11 cases inflammation of the gums and nausea and vomiting were noted, while diarrhoea and vomiting occurred in four.

At *Factory No. 2 (Midlands)* 28 women on copper band turning were examined, and, generally speaking, the work was popular, but a fairly large number appear to have had symptoms suggestive of mild poisoning, possibly due to the inhalation of impurities in copper dust. About 18 were aware of a metallic taste in their mouths, 10 had noticed dryness of the throat and about seven suffered at intervals from nausea, indigestion and diarrhoea. Actual vomiting occurred in four cases. Others who did not complain of nausea suffered from nose bleeding with occasional loss of voice, especially after night duty. A certain amount of eye strain was noticed from the dazzling reflection of the rotating copper band.

It was observed that about 10 of the workers who complained of a metallic taste with digestive disturbance or nose bleeding had extremely bad teeth with marked oral sepsis. Conversely 10 women with clean and well-kept teeth had remained healthy at this work. Only two employees were examined who had good teeth but yet showed some symptoms on this process; and one of these stated that her sister had been away for some weeks with "copper poisoning" so that allowance may be made for personal susceptibility.

At *Factory No. 3 (Yorkshire)* an examination of 26 women showed that at least 20 of the workers were conscious of a metallic taste with dryness and pricking of the throat, especially after night duty. Nausea was present in 16 and four had occasional attacks of vomiting and diarrhoea. Nose bleeding occurred in two workers.

Fatigue of the eyes and headache were observed in a large number of cases from the glare of artificial light on the rotating copper band. These symptoms suggest that women are occasionally suffering from mild attacks of irritant poisoning due to impurity in the copper dust, and it seems possible that arsenic may be the exciting cause. This is supported by a conversation with the manager, who stated that arsenic is frequently found as an impurity in the copper and that the amount varies at different times; occasionally the copper bands are unduly soft and more dust is produced in rotation.

In favour of arsenic is the apparent connection between the condition of the teeth and the susceptibility of the worker, thus pointing to the existence of a volatile irritant. Forty per cent. of the workers who showed symptoms had several carious teeth, often with marked oral sepsis. Conversely, five workers with good, well-kept teeth had remained quite healthy, and three women with excellent teeth who had attacks of vomiting or colic admitted that they never used a tooth brush. The known variation in susceptibility of persons to the influence of irritants such as arsenic should also be taken into account.

At *Factory No. 5 (Yorkshire)* the work of the copper band turners is highly paid and not so exacting physically as in the case of some other operations. It involves deftness and close visual attention and the girls employed are picked at the outset. In the summer of 1917 it was recognised by the medical officer of the factory that the girls working in brass and copper were suffering to a certain extent from copper absorption as shown by a taste of copper in the mouth, sore dry throat and nose, pain after food, colic, constipation and in some cases a green line of the gums corresponding to the lead line produced in cases of plumbism. At that time the worst cases were recommended for transfer to other work, washing before meals encouraged, saline drinks supplied in the ambulance room and a half-pint of milk per shift given to each worker. After this line of treatment the conditions improved greatly, so that the girls examined for the purpose of this inquiry showed no very marked evidence of injurious results. In 10 girls examined there were six cases of irritation, as shown by a copper taste in the mouth, and sore nose and throat, three cases of mild absorption; one girl had no evidence of injurious effects.

These findings point to the desirability of special attention being devoted to workers in this process. All possible means should be taken for preventing the inhalation of irritant dust, and the women so employed should be under the observation of the Welfare Staff, who should at once report symptoms suggestive of poisoning to the medical officer. Attention should be paid to dental hygiene, and personal cleanliness should be encouraged.

(b) Continuous Work in Artificial Light.

Ball-viewing is a most trying type of work as it has to be done in strong electric light, except in the case of lapping-viewing where diffused light is used. For this process the women and young persons have to work in a room whence daylight is excluded by shutters; strong arc lamps, hanging low over octagonal tables and shaded by cartridge paper, throw a diffused light on to trays containing a certain number of balls (varying according to size). Each worker keeps her tray continually rotating whilst she watches intently for any flaw, removing any defective ball she may find. In order to detect any flattened surfaces the balls are examined again in the "twilight" room, similarly shuttered, but with the ordinary electric light so dimmed that the room is in a state of semi-obscurity, in which the irregularities are said to be more quickly seen.

The work is very light and requires no physical strength. It therefore attracts girls who are perhaps unfit for ordinary factory employment. The workers say that their eyes ache and they have headaches for the first week, but after that they become accustomed to the light. At *Factory No. 8* some women had been working for several years in diffused light and appeared well. The pauses in this work are frequent. There are two additional breaks at 10.45 and 2.15 and the work is not continuous for more than 2½ hours. During these breaks the girls are sent out on to a roof-playground for exercise and recreation.

At *Factory No. 8 (near London)*, there were seven girls in the "twilight" room and five were examined. All five suffered from enlarged cervical glands which were presumably tubercular, two had scars of old abscesses, and one had had four operations for the removal of glands. In the latter case the last operation had been done three weeks previously, and the worker, who suffers from indigestion and is subject to fainting, had already been back at the factory for a week.

Nineteen girls were examined who work in diffused artificial light. Of these, six had enlarged cervical glands, seven were anæmic and seven had eye affections.

Of the 24 workers, seven were classified as A, 13 as B and four as C.

The presence of so many enlarged and possibly tuberculous glands, not a common complaint among munition workers, associated with continued work in the absence of sunlight, is worthy of notice. It suggests that continued employment in artificial light is undesirable and that there should be some arrangement by which alternation of employment could be provided for workers in this process.

(c) Following up of Workers who have Left the Factory.

It is clear that the examination of women actually employed at any given moment in the factories will not reveal a complete picture of the effect the work is having upon health and physique. Those who have been able to remain for a year or more in continuous employment without a breakdown are to some extent the results of a physiological selection and represent the most physically fit among the women workers. An examination of this kind takes no account of the women who have dropped out of employment because they were unable to support the strain of long hours, night shifts or heavy work. It is not an easy task to trace workers who have left the factory, especially when the workers are drawn from a wide area. Lack of time and opportunity have prevented any extensive inquiries being made in this direction. At the same time it was thought that even limited investigations might be worth making and the following results are therefore given.

Factory, No. 2 (Midlands). Home visits paid to 56 workers who had recently left showed that women liked the factory and were usually sorry to leave. The cause of absence as entered in the records of the Welfare Superintendent agreed closely with the results of private inquiry in the homes of workers. The following table shows causes of leaving:—

Ill-health	18 cases.
Left for other work	11 "
Care of children or home duties	8 "
Long hours	8 "
Left district	7 "
Long distance from work	2 "
Not traced	2 "
	56 "

Cases of ill-health included four women who left for approaching confinements, and one woman who gave up factory work owing to severe hæmorrhage during the menopause. One single woman who worked until three weeks before the birth of her child had a difficult confinement and the child was said to be very delicate. This was attributed by the doctor in charge to the prolonged work during pregnancy. The mother was at a nursing home for four weeks, but has now recovered and is working on munitions elsewhere. Another married

woman was a machine operator and worked at her lathe until the day of her confinement when she had a seven months still-born child. Among the women who left for other work are included certain cases who gave in notice to secure employment elsewhere fearing dismissal owing to shortage of work. The eight cases who found hours long were unable to stand the fatigue of the 12-hours shift.

Factory No. 6 (Midlands). Visits were paid to 37 workers who had been examined at the previous inquiry but who were not available for inspection by the medical officer on this occasion. The results showed that only two workers left actually on account of illness.

Factory No. 4 (London). Visits were paid by the Medical Officer to 14 cases who were said to have left the factory on the grounds of ill-health. The results were as follows :—

1. Aged 18. Normal pregnancy, no complications.
2. Aged 20. Normal pregnancy, together with a mastoid abscess not attributable to factory conditions.
3. Aged 22. Left on account of slackness of work—in good health.
4. Aged 26. On base facing process. Miscarriage at four months attributed to pulling levers. Work probably too heavy. Normal health at present.
5. Aged 38. Engaged in sweeping floors. Left on account of hæmorrhage from piles. Found work too heavy. At present thin, worn, subject to bronchitis.
6. Aged 22. Worked on base plates. Constantly got steel splinters in her eyes—wore no goggles. Left on this account. Is in normal health now.
7. Aged 19. Left on account of slackness of work. Is in good health. Working at a tailor's shop.
8. Worked as a checker. Sight was poor and could not do work properly. Left on this account. Thin, delicate girl.
9. Aged 38. Found standing tiring and got varicose veins. Left on this account.
10. Aged 25. Found work too hard—refused to be medically examined.
11. Aged 18. Left because she could not stand the night work. Is anæmic but now works at a tailor's.
12. Aged 28. Worked on base plates at first and then on boring. The latter operation caused menorrhagia. She became very tired and worn out, especially as she did her own housework, including washing. Is at present strong and well and menstruation is normal.
13. Left on account of night work. Is now a guard on a tram, strong, healthy and well.
14. Left on account of pregnancy—normal confinement. Quite well now.

Factory No. 8 (near London). The total number (according to the firm's records) of workers who have left since August 1st, 1917, i.e., during four months, was 134. The following reasons for leaving were given :—

1. Ill-health	34	5. Own accord	18
2. Unknown	7	6. Home duties	11
3. Bad time-keeping	13	7. Not suitable	15
4. Other disciplinary reasons	20	8. Leaving town or to be married	16

An endeavour was made to visit the whole of these workers to ascertain whether the reasons given to the firm corresponded generally with the reasons given on inquiry. The results of 102 visits were as follows :—

Visited at addresses recorded—

(a) Effective.		Reasons for leaving.	
1. Ill-health	34		
2. Maternity cases	3		
3. To be married	7		
4. Home duties	7		
5. Still working at same factory	1		
6. Dismissed	5		
	57		
(b) Ineffective.			
1. No information	3		
2. Left addresses—forms sent in, 12; no forms, 17	29		
3. Not traced or out—forms sent in, 8; no forms, 5	13		
	45		

It is of interest to note the present occupations of 17 of the women visited :—

Laundry	2	Work at same factory	1
Shop	2	Munition work	4
Flour mills	1	Work in recruiting office	1
Gas works	1	Domestic service	5

Factory No. 7 (near London). The total number (according to the firm's records) of workers who have left since August 1st, 1917, i.e., during four months, was 42. The following reasons for leaving were given :—

1. Ill-health	9	5. Own accord	13
2. Prolonged absence	3	6. Not required (probably owing to slackness)	6
3. Bad time-keeping	4	7. Not suitable	1
4. Other disciplinary reasons	4	8. Left town	2

Visits were paid to the homes of the workers with the following results in 14 cases :—

Visited at addresses recorded—

Effective.		Reasons for leaving.	
1. Ill-health	9		
2. Maternity cases	2		
3. To better position	1		
4. Dismissed	1		
5. Still at same factory	1		
	14		

Eight of the women visited are now employed as follows :—

Shop	1
Ticket collecting	1
Waiting at aeroplane canteen	1
Work at same factory	1
Work at munition factory	2
W.A.A.C. Baker	1
Domestic service	1
	8

In only a few cases was it practicable for the women to be examined by a doctor, so unfortunately few details are available as to the precise ailments of those who left work because of ill-health. As far as they go, these findings do not suggest that an unduly large proportion of women is leaving the factories on account of physical breakdown. The numbers are highest at *Factory No. 8*, where 34 out of 57 interviewed had left for reasons of health. The physique of the women at this factory, however, was decidedly below the average of workers examined, and a large number of women appeared to be under-nourished. Such workers might be expected to be unable to stand the strain of munition work and all that it entails even when the work is light in character.

JANET M. CAMPBELL, M.D.

February, 1918.

APPENDIX B (II).

GENERAL FINDINGS OF INQUIRIES INTO THE HEALTH OF WOMEN MUNITION WORKERS.

By Miss JANET M. CAMPBELL, M.D., M.S.

The rapid multiplication and growth of munition factories since the commencement of the war have been associated with correspondingly wide and urgent demands upon women to enter industrial life. There has been ample response, not only from women already accustomed to factory work, but from large numbers of others who entered upon such employment for the first time. Latterly many places have been filled by married women, some of whom offered themselves because of the urgent National need, but most perhaps because they were unable otherwise to support themselves and their children. The existing conditions of employment are in many respects abnormal, but it is important to consider their effects on the health of the women with a view to present and future guidance. It was for the purpose of obtaining some reliable data and first-hand evidence of the effect of employment upon the individual woman that the Health of Munition Workers Committee made arrangements for two medical inquiries which were carried out in various factories in 1915-16 and in 1917.

In the *First Inquiry* 1,326 women were examined in 11 typical engineering factories. In most cases the work was fairly light in character, nothing heavier than 4.5 inch shells being handled. The hours of work were often excessive. In one case women were employed 77 hours weekly and here 15.5 per cent. showed evidence of severe fatigue. In other cases the hours, excluding meals, were 68½, 63, 67 and 69 a week. Sunday work was general. On the whole, the women realised the need for an adequate dietary and usually had substantial meals, but the canteen and mess-room accommodation at the factories was wholly insufficient and sometimes non-existent, welfare supervision was little developed and the arrangements for the personal hygiene and convenience of the workers often left much to be desired.*

In the *Second Inquiry* 1,183 women were examined in eight typical factories. Practically all the women had been engaged in munition work for at least nine months and most of them for longer. Those examined included a large proportion of married women with domestic responsibilities, and the difficulties of shopping and providing food were beginning to be severely felt in some districts. Many women were employed on heavy work (5, 6 and 9.2 inch shells). The general conditions of employment had considerably improved. The hours had been shortened, there was no overtime or Sunday labour (except Sunday night in some cases), good canteens were available for meals, and the "welfare" of the workers was carefully organised. The conditions of work deserve a brief recapitulation.

Character of the Work.

In the earlier days of the war women were only employed on the lighter processes of munition work and in the making of smaller shells up to 3-inch shells. Then after some hesitation they were allowed to begin work on 4.5-inch shells which weigh 48 lbs. in the rough and about 27½ lbs. in the complete state. For these and heavier shells they now carry out all the different processes, which include working on lathes, milling and drilling machines, examining, cleaning, checking, and also loading and unloading waggons. They are employed as crane drivers and slingers. No lifting tackle is provided for the 4.5-inch shells and the total weight of shell handled daily is considerable. For 5 and 6-inch shells lifting tackle is usually available but is not always used by the women who sometimes find it quicker to lift the shell than to adjust the tackle. The 6-inch shells weigh about 130 lbs. in the rough and 90 lbs. when finished, so that the women are just able to lift them. For this reason this type of shell is perhaps the most likely to cause overstrain and fatigue, although much has been done in many factories to reduce the strain of manipulation by arranging rolling ways, trolleys of the right height, etc., and giving the machine operators the assistance of labourers to lift the shells into the machines. The 9-inch and all heavier shells cannot be handled except by tackle, and the risk of strain from lifting is much reduced, though the machines themselves are often heavy to work.†

* A report on this Inquiry was published in the Interim Report of the Health of Munition Workers' Committee on Industrial Efficiency and Fatigue, 1917.

† The number of shells and consequently the weight handled by individual women varies greatly on the different operations. In order to give some indication the average individual output per 12-hour shift at one factory engaged in 6-inch shells may be cited for the different processes: ripping, 79; rough turning, 35; rough and base boring, 37; finish and counter boring, 25; face base, 82; counter boring and chase, 50; rough profile, 120; finish turn, 43; grooving, 110; waving, 218; rough recess, 114; finish recess, 58; copper band turning, 130.

Women engaged in loading and unloading shells are usually organised in gangs and given due rest between each spell of work. Much can be done to minimise energy by preventing unnecessary lifting as from the ground or a low trolley to a high bench or waggon above. Forge work, for example, lifting shells out of the furnace or carrying them out of the forge press, is done by a few women. At one factory the larger shells so handled weighed 96 lbs. and the smaller ones 45 lbs. Women took turns in lifting and changed after every 20-30 shells. It is astonishing how deft women become in dealing with heavy weights, and they often take great pride in their muscular strength and dexterity. But clearly it is most important first to select the workers properly and next to watch that they do not attempt too much in their eagerness to do well.

The Long Hours of Work.

Even though the excessive hours worked at the beginning of the war have now been reduced, it is still permissible for women to work 60 hours a week irrespective of pauses and meal times. This usually means in practice two 12-hour shifts with no Sunday day work. In many factories working the two-shift system the hours are somewhat less than this (55 or 57½) and a half-holiday is given on Saturday. A 12-hour shift means in practice 13-14 hours away from home. The whole of the remaining time ought to be occupied with meals and sleep if the women are to have sufficient rest to overcome fatigue. But though many of the younger women are fairly free from domestic responsibilities most of the older ones are burdened with the care of house or children after working hours. Their "leisure" is occupied with shopping, mending, cleaning and other duties. The time for sleep is perilously reduced and recreation is impossible. Even Sunday, which should bring relief, must often be spent in doing the weekly washing, baking or cleaning, and if such a day is followed by a night shift it is small wonder if the output of work is not as good as it might be.

Even girls who have few or no home duties only obtain the time they desire, and indeed require, for exercise in the fresh air, recreation and amusement at the expense of much needed sleep. It may have been necessary, and even desirable, at the beginning of the war to impose these long working hours. For a time it was possible, by giving up many things that make life worth while, for women to stand the physical strain reasonably well, but after more than three years of war domestic conditions have become more arduous, staleness and fatigue are being experienced by many women who have worked cheerfully until now, and the question whether, having regard to the present and future health of the women, these long hours can rightly be continued becomes ever more urgent. To put the case at its lowest it is not economically sound to exhaust and cast aside women who have become experienced and capable workers. Even if there were no disadvantages in constantly training new relays of workers, it should be remembered that the best of the available women have probably already been attracted to the munition factories, and if they become physically unfit they can only be replaced by the less efficient.

Some factories, recognising the need of their workers for proper rest and recreation and for at least a minimum of time to devote to their own affairs, are working a three-shift system of about eight hours each. This involves a weekly total of 35-44 hours. In some respects the hours of work are not altogether convenient, but the main objection on the part of the workers to the shorter shift is the reduction in their possible earnings. From the factory's point of view there is the difficulty of providing women for three shifts instead of two and of suiting the hours worked by the women to those worked by the men.

If it is considered impossible to effect a general reduction of working hours for women it might at least be practicable to arrange for shorter hours for certain groups, for example:—

- (a) All women engaged in heavy work should not work longer than eight-hour shifts. A sufficient minimum wage would be necessary as many of the operations are lengthy and cannot be much accelerated by the skill of the worker.
- (b) The hours for light work, the output of which can be increased by skill and industry, might be reduced either by working two shifts of, say, 9 or 10 hours in length (e.g., beginning after breakfast instead of before) or three shifts of eight hours each. It might even be possible in some cases to work two eight-hour shifts and abandon the night shift without materially affecting output.

Proposals have been made at times for reducing the hours of work for married women, allowing them to come later, leave earlier, or work half-shifts. Such arrangements would not seem to be practicable, at any rate on a general scale, from the point of view of the factory, and the only true remedy lies in a general shortening of hours, so that as long as women having other duties must be employed they may have reasonable time in which to perform them.

It has been shown so repeatedly that unduly long hours do not yield a correspondingly large output that it seems not unreasonable for the sake of the health of the women to ask urgently for a further re-consideration of this matter even though a reduction in hours of work would involve difficult questions of factory re-organisation, wages and adjustment with the hours of men workers.

Nutrition.

Women are now beginning to realise that a heavy day's work in a factory under discipline and in touch with the rhythm of machinery requires a better and more substantial dietary than miscellaneous work at home. Most working women have never acquired the habit of taking solid and regular meals, partly because when food is not abundant the woman goes short rather than the man, partly because women as a whole have never commanded sufficiently good wages to enable them to purchase adequate food as well as the various other articles, necessities or luxuries, which they also desire. The bread and butter and tea dietary is practically a thing of the past as far as munition workers are concerned, though the evidence from one factory visited indicates clearly the disadvantages to health of unsuitable food. This is due to the higher wages which allow better food to be bought, to the increased appetite and desire for solid food following upon regular work under fairly good conditions of hygiene, and to the growing taste for the substantial middle-day meal in place of sandwiches brought from home and supplemented by sweets, pastry, tinned pineapple, &c., from the canteen. The increase in the number of well-equipped and managed canteens, and the daily object lesson of cheap, appetising meals, nicely served, are gradually promoting a habit of eating well which has undoubtedly saved many women from unnecessary fatigue and physical disability or breakdown. Sweets, pastry, &c., are popular, as they always will be. Taken in excess by themselves and instead of proper food they are unwholesome in many ways. It is quite another matter when they are eaten as part of a full, well-proportioned dietary. The custom of drinking tea frequently is widespread, but as the tea is almost always freshly made it probably does little if any harm, and it forms the best and most acceptable stimulant for the tired worker.

Transit and Housing Difficulties.

Transit and housing difficulties have pressed hardly upon women and much of their fatigue is certainly due to conditions incidental to the factory life rather than to the nature of the work itself. The waiting in all weathers for the often crowded tram or train, the struggle for a place, the frequent obligation to stand for part or the whole of the journey, is fatiguing to men but usually far more so to women. Most men have few, if any duties once they are free of the factory. Practically all women return home to some work, which varies from their personal washing and mending to the care of a house and family. It is this combination of home and factory duties which bears so hardly on the women.

The Importance of Welfare Work.

All available evidence goes to show the value of welfare supervision when suitably organised, at any rate as far as girls and women are concerned. It is valuable not so much from the point of view of increasing output, though this usually follows when workers are healthy and contented and the factory environment satisfactory, but primarily in order to raise the standard of health, contentment and happiness as a whole. Women have become so accustomed to work for low wages and under bad conditions that they are only beginning to learn what is needful for their mental and physical health. Someone, therefore, is required to supervise on their behalf conditions which do not belong to the actual technical work, for example, to make sure that the lavatory and sanitary accommodation is convenient for the women and is properly used and supervised; to see that there are opportunities for drying wet clothing; to watch that minor accidents and injuries receive prompt and continued treatment; to ensure full and suitable use being made of the rest-room for temporary illness; to encourage wholesome outside interests and recreation, such as games, gymnastics, dancing, classes, clubs, etc.; in short, to make the well-being of the women her chief care and to establish such friendly relations with them that they will not hesitate to seek from her help, advice or guidance. Whether the welfare supervisor should remain an *ad hoc* officer, as is common at present, is relatively unimportant, provided her chief function is not in any way overshadowed or lost sight of.

MEDICAL FINDINGS.

The medical examination could not be made as complete and exhaustive as might have been wished, partly because suitable accommodation was not always available, partly because the time was limited, (women were summoned from their work), but chiefly because presumably healthy women are naturally shy of searching medical examinations. In estimating the physical condition and the amount of fatigue reliance had to be placed to a large extent on statements and descriptions of symptoms volunteered by the women. The heart, lungs and abdomen could not be fully examined as a routine. As in the previous inquiry the workers were classified into three groups—A, B, and C, and it will be interesting to observe the results of the two inquiries which, in spite of the different conditions of the examination, are surprisingly similar.

	Number of workers examined.	Class A (healthy).	Class B (some fatigue or ill-health).	Class C (marked fatigue or ill-health).
		Per cent.	Per cent.	Per cent.
Inquiry No. 1	1,326	763 = 57.5	451 = 34.0	112 = 8.5
Inquiry No. 2	1,183	692 = 58.5	425 = 35.8	66 = 5.7

FATIGUE.

These tables indicate generally the amount and degree of fatigue observed among typical workers chosen at random. The following points clearly emerge:—

- (1) The proportion of serious fatigue amounting to marked ill-health and incapacity for work is relatively small, approximately 5 to 6 per cent. of the cases examined.
- (2) There is a considerable amount of slight fatigue which varies from 20 to 57 per cent.
- (3) The total proportion of women exhibiting definite signs of fatigue is about 40 per cent. of all cases.

This proportion, namely 40 per cent., does not however represent the full burden of fatigue for the following reasons:—

- (a) Much early fatigue is latent and objectively unrecognisable.
- (b) The women most seriously affected tend to drop out of factory life before they have served for any long period.
- (c) Women knowing themselves to be fatigued did not volunteer for examination.
- (d) The examination was necessarily superficial and only such as could detect definite and relatively well-marked fatigue.

(a) *Latent or undetected fatigue.* Fatigue, apart from reduced capacity and diminished output, is always difficult to measure, and particularly so when the investigator is dependent upon the statements of workers who may be interested in exaggerating or minimising the effects on their work. A tired woman who fears in any way to prejudice her position at the factory may make a point of appearing bright and cheerful to the medical officer and give an excellent account of her health. Although from her nutrition, complexion and general appearance, the doctor may be disinclined to accept her statements as accurate, it is almost impossible in a short interview to elicit the whole truth. Again, the beginnings of fatigue may show themselves in ways unrecognised by the workers. A greater number of accidents, more spoilt work, diminished output often pass unnoticed because unrecorded, and even when fatigue becomes objective and pathological many of

the physical symptoms, such as headache, indigestion, sleeplessness, irritability, and so forth, are disregarded or made light of because they have often been experienced before and are taken as a matter of course. Working women are so accustomed to being weary and over-tired that they frequently accept patiently a condition of physical malaise which would be the subject of definite complaint by women in better circumstances.

(b) *Disappearance of women most affected.* The fact that a woman is able to work regularly for many months is in itself evidence of good physique. The less robust women who are unable to stand the strain tend either to leave voluntarily or to be dismissed for bad time-keeping. No accurate estimate of the fatigue caused by the conditions of work can be made unless the women who drop out on physical grounds are examined as well as those who remain.

(c) *Women knowing themselves to be fatigued* are likely to have refused to present themselves for examination, especially in factories where dismissals were taking place or known to be pending, for fear that the detection of physical disability might, if reported to the management, result in their discharge. The examination was, in point of fact, wholly confidential but no compulsion was exercised and any woman approached was free to decline to see the doctor.

(d) The necessarily *superficial character of the examination* made it impossible to detect anything but fairly well marked fatigue. No special tests were employed and there was no opportunity of examining the records of individual workers as regards lost time, accidents, etc., even had such records always been available. Fatigue in its earliest stages is therefore not recorded.

Thus it is clear that the amount of fatigue revealed by the Inquiry is less, and possibly much less, in amount and degree than the actual fatigue experienced by the workers as a whole. On the other hand there are various reasons why the fatigue should not be so great as might be anticipated from a mere recital of hours and processes. For example:—

- (a) *The interest of the work.* Interesting work is less fatiguing than dull and monotonous work. Women have taken extremely kindly to machine work. The former tailoresses, mill hands, domestic servants, charwomen, etc., find engineering work unexpectedly congenial and they enjoy it for its intrinsic interest apart from added incentives such as high wages, responsibility, etc.
- (b) *Patriotism* and a desire to "do their bit" have also had considerable effect in maintaining interest and keenness. The women are glad to feel that they are releasing men for other service and are anxious to play an effective part in the defence of their country.
- (c) *The higher wages* obtained are in themselves an incentive to good and regular work, but they have important secondary results in that they lead to a higher standard of living, better food and clothing, and so to improved nutrition and a greater power of resistance to fatigue and disease.
- (d) *Previous harder work* had been carried out by many of the women under less good conditions. Such women are accustomed to long hours, they derive benefit from an improved environment and their health is likely to become better rather than worse.
- (e) *The immense advance of welfare supervision.*—The attention now given by the management to the health and welfare of the workers was almost unknown in ordinary factories before the war. The development of welfare supervision in the broadest sense has led to astonishing improvements in the circumstances of the work and has prevented the establishment or continuance in many factories of conditions likely to be harmful to the workers. For instance, *hours of work* have been shortened, there is practically no Sunday day work, and overtime has been largely abolished. It is realised with increasing clearness that women cannot profitably work for five hours without a break, and the spells of work have therefore been shortened in many cases, and unofficial "breaks" of 10 minutes or so for tea have been found to assist the workers without reducing output. The greatly extended provision of *canteens and mess-rooms* on a scale never before contemplated has not only made cheap, well-cooked food easily accessible to the workers, but has enabled those who remained at the factory to spend their mealtimes under conditions of reasonable comfort and restfulness. The improvement in canteen accommodation is still going forward, and in view of the difficulties of shopping, &c., it is likely to become even more welcome and needful. *Rest-rooms* for women workers are now provided in most factories, though their proper use is not always fully appreciated by the factory staff. Malingering must, of course, be guarded against mainly by effective supervision, but an hour or two's rest in a comfortable room may enable many women temporarily unfit for work to return to the shop and continue to work satisfactorily instead of experiencing physical discomfort or malaise during the whole period and doing bad work in consequence. *Well-equipped surgeries* for the treatment of minor accidents and ailments have replaced the Red Cross boxes kept in the workshop. Prompt and continued treatment has prevented many slight wounds from becoming serious and has saved much physical distress to the workers. Great attention has been given to the provision of suitable and comfortable *protective clothing*, including goggles, caps, footwear, &c., with good results on the health of the workers. This is particularly important where ordinary clothing is apt to catch in machinery or become wet or soiled during the work, where the liability to burns, &c., is great or where workers are exposed to the weather. The protective clothing in filling factories in particular is of the highest value. *Welfare supervision* by trained, experienced women acting in the interests of the workers, co-ordinates the various means by which comfort and well-being are promoted and physical disabilities, likely to cause more serious ill-health if neglected, removed.*

In the second Inquiry the greatest amount of fatigue was observed at *Factories No. 5, 3, 7, and 8*. At *Factory No. 5 (Yorkshire)* the women were engaged in making 6-inch shells (which it is just possible for them to lift without tackle), and they were working 12-hour shifts in an unsatisfactory environment. Many were married women with heavy domestic responsibilities. Transit was reasonably good and the food taken satisfactory in quality and quantity. The women themselves were the pick of the available workers, independent,

* In addition to the general supervision special arrangements have been made for the supervision of all filling factories and especially those where T.N.T. is handled. These are not dealt with in the present report.

sturdy and keen. The number of women classified as B was high (57 per cent.), and in many in this group the evidence of fatigue was decidedly greater than in the same group in other factories. The reports on individual women give the impression that if the conditions of work continue a considerable number will either drop out or pass into the C group. It is interesting to compare the proportion of B cases with those in other factories doing similar work. At *Factory No. 2 (Midlands)* 22 per cent. of cases were classified as B. Here eight-hour shifts are worked on 6-inch shells and the general conditions are reasonably good. At *Factory No. 4 (London)* (mainly 6-inch shells) the proportion of B cases was 27 per cent. Twelve-hour shifts are worked and the factory conditions and environment are good. At *Factory No. 3 (Yorkshire)*, where the proportion of B cases is 40 per cent., 4.5-inch and 60-pounder shells are made and the factory conditions are satisfactory. The physique of the women is less robust than, for example, at *Factory No. 4*, and this may explain the greater amount of ill-health revealed.

Factories No. 7 and 8 (near London) fall into another category. Here the work is not heavy, but the hours are somewhat long and the physique of the workers poor. At *Factory No. 7* the B cases were 44.5 per cent. of the total. The hours worked are 57½ a week. The factory is crowded and ill-ventilated and heated. There is as yet no canteen and no properly equipped surgery and rest-room. At *Factory No. 8* the B cases amounted to 45.5 per cent. The factory conditions are good on the whole. The hours are 52½ a week. The workers, on the other hand, were markedly ill-nourished and of poor physique. In both these cases the workers are drawn from a small town and rural district where low wages have always been the rule, and the people are habituated to an inadequate dietary. Generally speaking, the workers were younger than those engaged in the heavier processes, and in the circumstances it is not surprising that even though occupied in light work many are unable to withstand the strain of continuous employment on 12-hour shifts.

The results of the Inquiry indicate therefore that although the amount of existing fatigue probably considerably exceeds that discovered by the investigators, the women at work in the factories are as a whole bearing the fatigues of munition work surprisingly well. At the same time there are evident signs that where heavy work is combined with long hours and possible domestic duties the strain is beginning to produce a serious degree of weariness, ill-health and fatigue, which is likely not only to prevent the workers from continuing to give efficient service in the factories, but may cause more or less permanent physical incapacity. The longer the war continues the greater the evidence of staleness and fatigue is likely to become unless conditions of work can be further improved. It should not be forgotten that any physical unfitness which exists at the time of demobilisation will probably be considerably accentuated by the reaction which will then take place and the financial anxiety which will have to be faced by many of the women now employed in munition factories.

PHYSICAL DISABILITIES.

The ailments most frequently observed included digestive disturbances (indigestion and constipation) headache, anaemia, muscular pains and various "nervous" symptoms. Disorders of menstruation also occurred with some frequency.

Digestive Disturbances.—Common causes of indigestion among women are dietetic, e.g., insufficient, unsuitable or improperly prepared food, the persistent use of certain unwholesome articles of diet, such as strong tea, unduly rich substances or food containing excess of carbohydrates. Alcohol may be a cause especially in older women, but this was not observed in the present examination. It had been expected that complaints of indigestion, &c., would be far more frequent than proved to be the case. Long hours and the alternation of night and day shifts lead to hurried meals, eating when tired, meals at unusual times and a consequent disturbance of regular habits of bodily function. Although many women stated that they were not hungry on night shift, and some did in fact take inadequate and unsuitable meals at night, while many others said that they had occasional attacks of pain after indigestible food, the abnormal arrangement of the work appeared to have resulted in much less indigestion or chronic dyspepsia and constipation than might have been supposed. Constipation was usually avoided by the regular taking of aperients, but few who complained of indigestion were receiving medical treatment. History pointing to severe gastritis or gastric ulcer was very seldom obtained. The improved nutrition resulting from better food is likely to diminish digestive disorders unless counterbalanced by increased fatigue.

Defective teeth and oral sepsis were only too common. In some factories complete upper or lower dentures were frequently observed. The dentistry had apparently been fairly rough and ready, all upper or lower teeth having been extracted, regardless of the possibilities of conservative treatment, in order to make a complete job. The women were not alive to the advantages of stopping the teeth, but even if they had been, few facilities were available for such treatment and the provision of efficient dental treatment at moderate charges seems to be one of the most pressing needs for working women. Bad teeth were not often directly associated with complaints of indigestion, but many ill-defined symptoms of malaise were doubtless due to the effects of absorption of toxins from unhealthy teeth, and these effects are likely to become more pronounced as the woman becomes older and the teeth decay still further.

Headache was fairly common. It could often be attributed to one or more causes, such as fatigue in transit, noise in the factory, eye strain, general tiredness, and was often associated with anaemia, indigestion or carious teeth. "Neuralgia" was complained of by a number of workers evidently suffering from nervous fatigue. Sleeplessness, especially among women on night shift, was frequently accompanied by headache.

Anaemia is most common among ill-fed, overworked girls in industrial districts who have to work in badly ventilated and badly lighted rooms, under conditions which prevent proper exercise especially in the open air and sunshine. Associated menstrual disturbances are not uncommon. Indigestion and constipation are frequently observed. Breathlessness on exertion, palpitation or a tendency to fainting may be noted. The proportion of anaemia observed was unexpectedly small. A large number of the workers classed C showed signs of more or less severe anaemia frequently accompanied by hæmic murmurs. A higher percentage was noted in one or two factories where it was mainly due to pre-war rather than post-war conditions, such as chronic malnutrition or work in artificial light. The improved diet and the usually healthy factory environment have no doubt acted as preventive of anaemia, and as far as can be judged on general grounds, munition workers compare favourably in this respect with young women workers in other trades and industries.

Indigestion, constipation, anæmia and headache are so closely associated that it is often difficult to say which is primary and which secondary. They all depend in considerable degree upon environments and habits of life, and they are remedied less by drugs or direct medical treatment than by improved hygiene and nutrition. Sunshine, fresh air, exercise, good food and sufficient sleep are the most potent factors in the restoration to health.

Muscular pains, including aching or stiffness of the neck or limbs, are naturally common during the early weeks at the factory until the workers become habituated to unaccustomed muscular exercise. Among more experienced workers muscular pains may be complained of towards the end of a shift or attributed to a particular operation. They may indicate the commencement of fatigue in the worker or that the work is unduly heavy or otherwise unsuitable.

Aching or swollen feet were not complained of to any considerable extent, except where the floor surface was unsatisfactory or damp. Most women, except a few who suffered from varicose veins, soon became accustomed to standing, especially when allowed to sit down during prolonged operations. The pain was often stated to be relieved by the provision of wooden boards to stand on and the wearing of suitable thick shoes or clogs.

Nervous symptoms, such as neuralgia, irritability, nervousness, sleeplessness, or an undue tendency to worry, were complained of by many women who were beginning to feel tired and worn. The symptoms were dependent on the general state of health rather than upon any organic defect.

Disorders of menstruation may be due to local organic causes, but they also depend to some extent on general derangement of health. Anæmia, for example, is often associated with amenorrhœa or dysmenorrhœa. The most serious departures from the normal are dysmenorrhœa and menorrhagia, which may be combined with metrorrhagia. Dysmenorrhœa may vary from quite bearable pain to total physical disablement. Its degree is difficult to estimate from the workers' statements, some being inclined to regard severe pain as a natural and necessary burden, others, probably much fewer in number, being somewhat apt to exaggerate the discomfort. The severity can to some extent be estimated from the numbers who regularly lose time on this account. For example, at *Factory No. 8*, 19 out of 34 who complained of symptoms lost one or more days work each month. At *Factory No. 7*, 7 out of 25 lost time each month. At *Factory No. 1*, 19 out of 31 lost time regularly, and at *Factory No. 4*, 12 out of 39. Many who suffered much pain, however, endeavoured to continue their work in spite of it. There was some evidence of increase in pain since undertaking munition work and this was most noticeable among women engaged in heavy work. On the whole there is probably not a serious increase in dysmenorrhœa, though the total number of women affected is considerable.

Menorrhagia was complained of by a much smaller number of women. It seemed more directly due to conditions of work (e.g., constant standing, strain) though sometimes attributed to a miscarriage. The disorders of menstruation averaged 26 per cent. and, broadly speaking, they were most common in factories where the greatest amount of fatigue was observed.

Both dysmenorrhœa and menorrhagia exercise a definitely harmful effect upon the general health whether through recurring pain, malaise and disablement, or through anæmia consequent upon undue hæmorrhage. A disturbing element in the Inquiry is the almost negligible amount of medical treatment being obtained for such conditions. This is partly because the girls take the discomfort as a matter of course and use only domestic remedies, which unfortunately sometimes include alcohol, partly because they hesitate to consult a doctor about a matter of this kind, but also because expert medical advice is not always obtainable. It is suggested that steps might be taken by welfare supervisors, at any rate in some cases, to arrange for women who suffer in this way to consult a medical practitioner, preferably a woman, who would be prepared fully to investigate and treat the condition. Much unnecessary suffering and injury to health might thus be saved.

MATERNITY AND CHILD WELFARE.

Although not strictly arising out of the findings of these Inquiries, some reference to maternity in its special relation to munition workers seems not inappropriate. The problems which arise in connection with maternity cases among munition workers are the same as those which affect the community as a whole, but from causes associated directly with the making of munitions they are apt at times to become acute and urgent in an unusual degree. The exceptionally large numbers of married women engaged in factory work, the overcrowded condition of many munition areas, and the large influx of women into these areas naturally strain to the breaking point the always inadequate provision for maternity which exists locally. The impression gained from inquiries at numerous factories and among many of those responsible for the supervision and welfare of the workers is that the problem in an acute form is limited to a relatively small proportion of women workers, but that there is urgent need for some immediate action in regard to the care of those expectant mothers, married and single, who are unable to make suitable arrangements themselves.

The cases naturally fall into three groups—pre-natal, natal, and post-natal.

(a) *Pre-natal*.—The married woman with a home of her own usually leaves the factory in the early months of pregnancy, or at least as soon as her condition becomes obvious. No special provision is required for her apart from the provision for women as a whole. A certain number of women, however, are obliged to work almost until their confinements are due as they have no other means of support. In filling factories it is usual, on account of the danger due to explosion or the handling of poisonous materials, to discharge a woman as soon as she is known to be pregnant. In engineering factories the practice varies. Where the work is heavy and it is not possible to transfer women to lighter processes they may be discharged as soon as their condition is recognised. Where lighter work is available and the general environment suitable they may be retained until, say, the 7th or 8th month. There is often employment for a few as checkers or cloakroom attendants, and welfare supervisors usually do all they can to find suitable work for at least the most necessitous cases and to arrange for them to work day shifts only. As regards unmarried women, public opinion in a factory is usually kindly, but at times it is averse to their remaining after they are known to be pregnant.

The question of lodgings is another difficulty. Many landladies refuse to keep pregnant women, even when married, though they may be willing to do so if arrangements are made for the confinement to take place

elsewhere. In most cases there is necessarily a period of one, two or more months before leaving the factory and the birth of the child, during which time the woman may find herself with no home and little means of support. The fear of dismissal may thus lead the women to conceal their condition for as long as possible, and they are often successful in doing so for a considerable time. Such concealment may result in disaster to mother and child. The following example is typical :—

A woman was engaged on heavy munition work (6-inch shells and working night and day shifts). Because of her need for money to keep her home together she concealed her condition and remained at the factory until she was five months pregnant and could no longer stand because of the swollen condition of her legs. When she finally had to give up work she miscarried. Her general health suffered considerably from the prolonged physical strain and she is now neither the mother of a healthy child nor a useful machine operator.

(b) *Natal*.—The number of lying-in homes and hospitals is notoriously inadequate to the needs of the country as a whole. In many munition areas the workhouse is the only institution to which women, unable to be in their own homes, can go for their confinements. This is naturally repugnant to most women.

(c) *Post-natal*.—The care of the mother's own health is now complicated by the need for suitable arrangements for her child. Where is she to live? How is she to support herself until fit to resume factory work? What is to become of the child while she is absent night or day? The only statutory provision which relates to the employment of pregnant women or nursing mothers is Section 61 of the Factory and Workshop Act, 1891, which states that a woman must not be employed within four weeks of giving birth to a child. It is obvious that the mother's first duty is to her young infant and that in the interests of its health she should not return to the factory for a much longer period than four weeks. But she may have to choose between remaining with her baby without adequate means of support or returning to well-paid work as soon as possible, even though this entails virtual separation from the child. A breast-fed infant is more likely to thrive than one which is brought up by hand, but an ill-nourished mother is either unable to nurse her baby or continues to do so only at undue cost to herself. Until the State is prepared to recognise the claims of nursing mothers to assistance and financial aid the lesser of the two evils may be for the mother to go back to work as soon as she is physically fit to do so, provided that she can ensure the care of the baby during her absence.

The practice in regard to the employment of mothers with young infants varies in different factories. In some, with a view to encouraging breast feeding, no woman is supposed to be employed who has a child under nine to twelve months. In others no general rule exists and cases are judged on their merits. In others, again, no attention is paid to the age of the child. It is, of course, impossible to investigate all cases fully and a woman who is badly in need of employment has often little difficulty in evading inquiries. Children are thus commonly left with relatives or "minders" or sent to a day nursery when there is one.

A *Maternity Scheme* for the assistance of munition workers might properly include the following :—

(a) *Skilled supervision of pregnant women* is necessary, both factory and domiciliary, by a qualified and competent officer, in order to ensure that suitable arrangements are made for the confinement at home or in lodgings (engagement of the midwife or doctor, ante-natal care, post-natal care, &c.), and for the care of the infant after birth. Such an officer would be able to bring the women into touch with local agencies for assistance. She would also encourage thrift and proper preparation for the confinement. This supervision might be arranged by the welfare staff of the factory, though in large factories an extra officer with midwifery qualifications might be desirable for home visitation, &c.

(b) *The provision of light employment* may be made available inside or outside the factory during the later months of pregnancy, say from the 4th or 5th to the 8th or 9th month and also after the birth of the child. In some factories this might be arranged as part of the general organisation; in other factories all the work is too heavy or the general conditions too unsatisfactory to admit of pregnant women being employed at least after the early months. In such cases separate workrooms would be necessary, which might serve more than one factory, where lighter work, such as sewing and mending, might be undertaken (e.g., the sewing of exploder bags, the making of light boxes, the manufacture of overalls, &c.). Such small separate departments might also be used by other women temporarily ailing from one cause or another.

(c) *Favourable welfare conditions* are essential for all pregnant women, including the abolition of night work and, where possible, reduction in the length of the day shift. Arrangements for an adequate supply of suitable food, including milk, through the canteen or otherwise, is also advisable.

(d) *Maternity Homes* should be established for women who cannot be confined at home or in their lodgings.—These Institutions should also provide where necessary for pre-confinement residence and lying-in accommodation. Maternity homes might be organised :—

- (i) As a branch of an existing lying-in hospital available for normal and abnormal cases; or
- (ii) As an *ad hoc* maternity home of six or a dozen beds in charge of a competent midwife.

In connection with these Homes, but not necessarily under the same roof, there should be accommodation for women before and, if necessary, after confinement. Arrangements should be available for married or unmarried women, and as far as possible the schemes should be self-supporting.

Exchequer grants would be necessary for the establishment of such Homes and also to make good deficits in the cost of working and maintenance, but the greater part of the maintenance expenses should be met by payments from the women themselves.

(e) Lastly, in many districts a *crèche* or *day nursery* is necessary for the children, where they may be cared for during the absence of the mother. The number of available "minders" to whom children would ordinarily have been sent has steadily diminished, largely because these women have themselves sought regular employment. Mothers working long shifts are physically unable to devote as much attention as they would wish to the care of their homes and children. There is thus a substantial case for an increased provision of nurseries which would take charge of children under school age by day, and if necessary, by night.

Sympathetic administration is essential to the success of such a scheme, the aim and intention of which is to encourage the women to report their condition at an early stage and to afford them such advice and assistance as are needed, without exercising a burdensome or inquisitorial supervision.

CONCLUSIONS.

To sum up, the general results of these Inquiries indicate :—

- (1) That there is definite burden of fatigue, which though relatively small in amount as regards severe fatigue is considerable as regards that of a less severe character ;
- (2) That the fatigue and ill-health are less than might have been anticipated having regard to the hours of work and the nature of the employment, and that this is due, broadly speaking, to the greatly improved attention to the health and welfare of the workers ;
- (3) That fatigue and sickness are greatest where heavy work is combined with long hours at the factory and associated with onerous domestic duties after factory hours ;
- (4) That unless brought under control, the considerable amount of moderate weariness and ill-health now present is likely to reduce immediate efficiency and also exercise in many cases an injurious effect on subsequent health and on capacity for maternity ;
- (5) That although there has been substantial improvement in the conditions and circumstances of women's work in factories further action is necessary if the amount of fatigue is to be diminished rather than increased. In particular the findings of this Inquiry seem to indicate the necessity—
 - (a) for further shortening of the hours of labour for women ;
 - (b) for restricting women's work in the heavier branches of industry to those who are young, physically fit and capable and who have not arduous home duties to perform ;
 - (c) for the continuation and development, wherever women are employed in factories, of hygienic conditions and especially " welfare " arrangements (including industrial canteens) ; and
 - (d) for making appropriate provision for effective medical supervision, both on entrance to the factory (in heavy and exceptional occupations) and subsequently, by means of the services of medical officers (women preferred) and nurses, and in the form of suitable accommodation as to rest rooms, first-aid appliances and well-equipped surgeries.

JANET M. CAMPBELL, M.D.

February, 1918.

APPENDIX C.

A COMPARISON OF THE SYSTEMS EMPLOYED FOR DIVIDING UP WORKING HOURS INTO SPELLS AND BREAKS.

By H. M. VERNON, M.D., Fellow of Magdalen College, Oxford, and University Lecturer in Chemical Physiology.

The systems employed in various factories for dividing up the weekly hours of work into spells and breaks differ greatly, and it is a matter of considerable importance to select the system which yields the most advantageous results in respect of output, and of the comfort and convenience of the workers. Direct and exact evidence upon the merits of rival systems is very difficult to obtain, and so the information adduced below is necessarily incomplete. Nevertheless it is sufficient to indicate that the systems employed in the majority of factories are capable of considerable improvement, and to suggest the lines on which such improvements should be made.

First, if a night shift is being run as well as a day shift, what ought to be the distribution of working hours as between the two shifts? In my own experience the night shift hours are usually longer than the day shift hours. For instance, in the four factories (A to D) referred to in another Memorandum*, the following hours were usually worked:—

Factory.	Day shift hours.	Night shift hours.	Excess of night shift hours over day shift hours.
Factory A, from February to August, 1916	64.5	62.5	—2.0
" " August, 1916, to March, 1917	58.5	62.5	4.0
" " March, 1917, to October, 1917	54.5	62.5 (or 52.5)	8.0
" " October, 1917, onwards	54.5	60 (or 50)	5.5
Factory B, from October, 1916, to March, 1917	63	63	0.0
" " April, 1917, onwards	59	63	4.0
Factory C, from July, 1916, till May, 1917 (for men) ...	57	69.5	12.5
" " May, 1917, onwards (for men and women) ...	48	60	12.0
Factory D, from August, 1916, till March, 1917 (for men) ...	63 or 62	63	1.0
" " April, 1917, onwards	58	63	5.0
Factory E, before June, 1916	56.8	61.5	4.7
" " after June, 1916	52.3	57	4.7
Factory F	53 (or 64)	57.5 (or 67)	4.5

Grouped with these factories are two others, viz., Factory E, which was chiefly devoted to the manufacture of rifle ammunition, and Factory F, where 3-inch shells and aeroplane engines were made. These data show that the night shift was generally several hours longer than the day shift, and in one instance was 12.5 hours longer. This system of division is undoubtedly erroneous, as night shift work imposes a greater strain than day shift work, and so the hours ought to be shorter rather than longer. The cause of the difference in the total hours worked is frequently due to the fact that only a half day is worked on Saturday by the day shift, whilst six full nights are worked by the night shift. In correspondence with the Saturday afternoon relaxation, the night shift might be allowed some reduction of hours on Sunday evening, but the workers object to this plan as they lose the double time pay which is usually granted on Sunday evenings up till midnight. It would be better, therefore, to recognise the greater strain of night work by reducing the time worked each night to an hour less than that worked each day, and regard nine hours per night, or a 54-hr. night shift week, as the equivalent of 10 hrs. per day, or what is generally a 55 or 54-hr. day shift week. Similarly 8 hrs. per night would be equivalent to 9 hrs. per day.

If the number of working hours per week be fixed at, e.g., 54, the question arises as to the best system of dividing them up throughout the week. Theory might suggest that they should be divided up nearly equally over the seven days, or that, for instance, 8 hrs. should be worked each day from Monday till Friday, and 7 hrs. on Saturday and Sunday. Though some such system was adopted in many factories in the early months of the war, it is now generally recognised that every worker is entitled to one day's rest per week, and that such a relaxation tends to the increase of the total output rather than to its diminution.†

But ought the 54 hrs. to be divided up equally over the remaining six days, so as to give an evenly distributed 9 hr. day, or ought there to be only a half day's work on Saturday, with the resultant necessity of 10 hrs. work per day from Monday to Friday? An even 9 hr. day is undoubtedly the best for such workers as are prepared to put every ounce of their available energies into the production of munitions. Such patriotic workers exert themselves to their limit each day, the said limit being such that it does not prevent complete or nearly complete recovery of vigour as the result of the night's rest. If the limit is surpassed, so as to induce a state of fatigue which is no longer properly recovered from, output is diminished and the worker is no longer capable of exerting his maximum powers of production. Unfortunately not many workers have the strength of mind to exert themselves in this manner month

* Committee's Memorandum No. 21

† Cf. Memorandum No. 18.

after month, and year after year. They crave for some relaxation from the monotonous grind of work, and this they can get best on Saturday afternoons. Hence the Saturday afternoon work, which was enforced in many factories in the earlier years of the war, is now usually remitted, and the 54-hr. week is accomplished by working 10 hrs. per day from Monday to Friday, and 4 hrs. on Saturday. In a few factories six full days of work are put in, but the day of rest from work is on Saturday, not Sunday. By this procedure the workers get plenty of opportunity to enjoy themselves, and, moreover, get a whole day of double time pay. The system, though not morally defensible, permits of freedom from work (until the evening) on alternate Sundays, supposing that the workers are employed on alternate weeks of day and night shift.

Two-Break and One-Break Systems.

Supposing that a 10-hour day be considered necessary, what is the best way of dividing up the hours into spells and breaks? The method most frequently adopted is on the two-break system, though this is gradually being replaced by the one-break system in many industrial areas. In the two-break system the workers start at 6 a.m., or less frequently, at 6.30 or 7 a.m., and work for about two hours, when they have a breakfast interval of half-an-hour. There is an hour's dinner interval from 12.30 to 1.30, or from 1 to 2, or the working day is usually cut up into spells of 2, 4 and 4 hours. On the one-break system, the workers usually start at 7, and work two spells of 5 hours each, with an hour for dinner in between. Upon the disadvantages of the two-break system a large amount of valuable evidence has been collected by Professor Loveday.* His main conclusion may be quoted: "Work before breakfast gives inferior output, lowers health, and leads to great loss of time as the first short spell is so frequently missed. Experience shows that in certain descriptions of work the early quarter has been advantageously abolished both prior to and even during the course of the war, and under similar conditions it ought not to be instituted in new factories opened during the further course of the war." Though Professor Loveday adduces plenty of evidence in proof of his contention that work before breakfast increases lost time, he does not quote any direct observations to support his statement that it gives inferior output. Hence, it is worth while for me to record such information as I have been able to collect upon the subject.

Output observations were made at Factories A to D by the method described in Memorandum No. 21. It consisted in determining the power consumption, either by the reading of watt-meters, or from automatic power records, deducting the power required to drive the machinery apart from that required in the actual machining operations, and verifying the results by direct enumeration of the articles produced. A number of these output determinations are quoted for every hour of the day and night shifts, but for my immediate purpose it is necessary only to consider and compare the output during the first few hours of the corresponding day and night shifts. The night-shift workers have invariably had a good meal before they come on to work, or start work in full vigour. How does their output compare with that of the day shift, who are presumed to have had an adequate breakfast before work when employed on the one-break system, but to have had little or no breakfast when employed on the two-break system? In Fig. 1 we see the output curves for the first 3½ hours of the day and night shift at Factory A, where the day shift worked a 5-hour spell from 7 to 12. This output relates to seven sections of lathe workers (some 1,000 to 1,800 individuals), who were for the most part engaged in machining fuse parts. The output was determined for three consecutive days and for three consecutive nights in January and July, 1917, and the mean relative hourly output taken as 100 in each case. We see that the output variations of the day and night shift workers corresponded closely both in winter and summer, and increased from about 55 per cent. of the average during the first half-hour of work to 100 per cent. of the average in the next hour, and 110 per cent. of the average in the next hour but one. If anything, the day shift worked up their output more rapidly than the night shift.

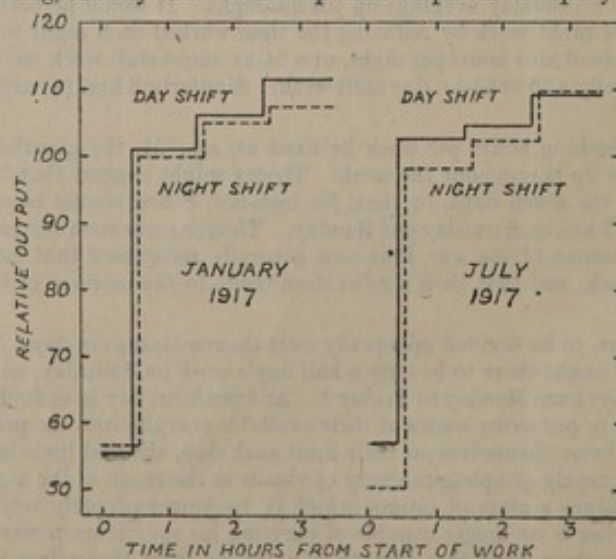


Fig. 1.—Output at Factory Working on One-Break System.

* Cf. "Interim Report," pp. 41 to 67, 1917.

Very different is the comparison of day and night-shift output shown by workers on the two-break system. At Factory B, where 6-inch shells were made, the day shift started at 6 a.m., and had break-

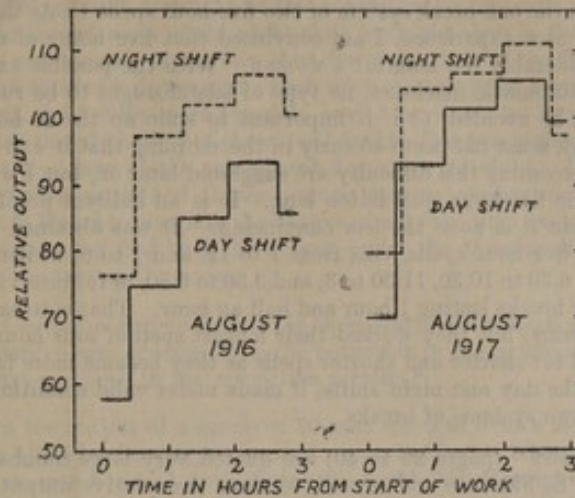


Fig. 2.—Output at Factory Working on Two-Break System.

fast from 9 to 9.30 a.m., whilst the night shift started at 6 p.m., and in corresponding fashion had their first break at 9 p.m. Power records for the whole factory were obtained for five consecutive days and

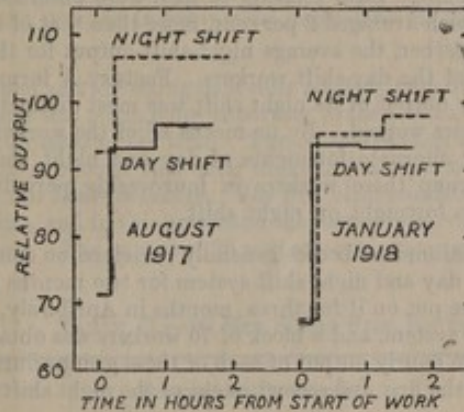


Fig. 3.—Output at Factory Working on Modified Two-Break System.

nights in August, 1916, and for three consecutive days and nights in August, 1917. From Fig. 2 it will be seen that in 1916 the day-shift output during the first half-hour was only 58 per cent. of the average, whilst that of the night shift was 76 per cent. of the average. Even in the next three-quarters of an hour period it was only 75 per cent. of the average in the day shift, whilst it was 97 per cent. of the average in the night shift, and, in fact, the day-shift output lagged behind the night-shift output so much throughout the spell that the mean hourly output during the spell was only 80 per cent. of the average for the whole day, whilst that of the night shift during the corresponding spell was 97.5 per cent. of the average for the whole night. In August, 1917, the difference was not so great, the mean hourly output during the first spell of the day and night shifts being respectively 95 per cent. and 102 per cent. of the average.

In factory C, where 9.2-inch projectiles were exclusively manufactured, the day shift started work at 6 a.m. until May, 1917, when their weekly hours of labour were reduced from 57 to 48, and they started work at 7.15 a.m. They had a breakfast interval from 9 to 9.30, or 9.30 till 10, and so were under the two-break system, but owing to their late start it is probable that most of the workers got more breakfast before coming to the factory than the workers at factory B. Power records for the whole factory (from four automatic recorders) were obtained for 48 consecutive hours in August, 1917, and January, 1918, and the relative output during the first $1\frac{1}{2}$ hours of the day shift and first 2 hours of the night shift, is shown in Fig. 3. It will be seen that in August, 1917, the day-shift output was considerably behind that of the night shift, but in January, 1918, there was very little difference between them. This may be due to the workers having by that time acquired the one-break-system habit of taking a good breakfast before work, whereas in August, 1917, they still retained the custom they followed when they started work at 6 a.m. However, the power records did not extend over sufficiently long an interval to warrant a definite conclusion.

It should be stated that the conditions of supply of material to the day and night shifts was just the same in all three factories. There was never a shortage at any time in factories A and C, and though there was at times a shortage in factory B, it came towards the end of the day and night, i.e., the shifts always started with plenty of material. Hence the smaller initial output shown by the day shift in factories B and C is a genuine phenomenon, dependent on smaller capacity for work.

Proof that Five-hour Spells of Work are too long.

If it be admitted that the two-break system, with work before breakfast, is a mistake, must the 10-hour day be worked on the one-break system of two five-hour spells? As the result of conversations with workers, and of my own experience, I am convinced that five hours of continuous work are too long for a man, and considerably too long for a woman. With the possible exception of passive work such as the watching of automatic machines, no type of labour ought to be run continuously for more than four hours if it can be avoided, or it is important to split up the 10-hour day by at least two breaks, only the first break must not occur so early in the morning that it can function as a breakfast interval. Methods of overcoming this difficulty are suggested later on, but I wish first of all to adduce a numerical proof that the five-hour spell is too long. It is an indirect proof which has been briefly referred to previously,* but it is none the less convincing. It was obtained at factory A, where the day shift worked for two five-hour spells, viz., from 7 to 12, and 1 to 6, whilst the night shift worked for three spells, viz., from 6.30 to 10.30, 11.30 to 3, and 3.30 to 6.30, or for intervals of 4, 3½, and 3 hours respectively, separated by breaks lasting 1 hour and half an hour. That is to say, they put in 10½ hours of labour instead of 10 hours, but they worked their longest spell of four hours when they were fresh and vigorous, and worked for shorter and shorter spells as they became more fatigued. Hence a comparison of the output of the day and night shifts, if made under valid conditions, will demonstrate the relative efficiency of the two systems of breaks.

In the "Interim Report" (pages 26 to 40) are quoted very large numbers of data, collected by Capt. Greenwood, Mr. P. S. Florence and myself, to show the relative output of day-shift and night-shift workers. Eight sets of data concerning women were obtained at different factories where the shifts changed over every week, and these data, which relate to the manufacture of cartridges, fuse parts and 9.2-inch projectiles, show that, on an average, the hourly output of the night shift was 3 per cent. less than that of the day shift, whilst in no individual factory was it more than 1.3 per cent. greater than that of the day shift. Data relating to men were obtained at three factories, and they showed a night-shift output which averaged 2 per cent. more than that of the day shift. If the women's and men's data be grouped together, the average night-shift output for the whole of the workers comes to 1 per cent. less than that of the day-shift workers. Factory A forms a striking exception to this general average, for the hourly output of its night shift was most distinctly *greater* than that of its day shift, in spite of the longer hours worked. By no means all of the workers went on to night shift, but such as did do so worked for alternate fortnights of day and night shift, and in order to compare output, it is convenient to group these workers in four-weekly periods, during a fortnight of which they were on day shift, and a fortnight on night shift.

The women turning aluminium fuse bodies generally remained on continuous day shift, but a group of 21 workers were put on the day and night shift system for two months in February and March, 1916, and a group of 26 workers were put on it for three months in April-July, 1916. In March, 1917, most of the women were put on this system, and a block of 70 workers was obtained for a three month period. In Table I is shown the relative hourly output of each of these groups during the first and second weeks of the day shift fortnight, and the first and second weeks of the night shift fortnight. The general mean

TABLE I.—21 to 70 Women Turning Aluminium Fuse Bodies.

Four-week period extending from	Number of workers	Relative hourly output.				Weekly hours of actual work.			
		Day shift.		Night shift.		Day shift.		Night shift.	
		1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.
Jan. 31 to Feb. 27, 1916	21	101	111	111	118	56.6	59.4	56.6	53.3
Feb. 28 to March 26	—	111	117	130	126	62.2	57.1	56.8	55.0
April 17 to May 14, 1916	26	124	117	134	121	56.6	49.8	49.8	42.7
May 15 to June 11	—	133	133	145	136	61.1	61.9	60.2	53.7
June 12 to July 9	—	135	142	157	140	55.9	55.4	54.7	59.8
Feb. 25 to March 24, 1917	70	170	172	181	193	53.4	52.1	57.4	54.9
March 25 to April 21	—	163	172	186	185	40.1	49.0	40.9	50.0
April 22 to May 19	—	167	170	184	183	49.2	49.2	55.6	57.4
Mean	—	138	142	154	150	54.4	54.2	54.0	53.4
		140		152		54.3		53.7	

* "Interim Report," p. 29.

shows that during the night shift fortnight the hourly output was 9 per cent. greater than during the day shift fortnight, the mean excess of output for the separate blocks of women amounting to 10, 6 and 10 per cent. respectively. Taking each fortnight of the general mean separately, we find that the output was 3 per cent. less in the second week of the night shift fortnight than in the first week, whilst it was 3 per cent. greater in the second week of the day shift fortnight than in the first week. Undoubtedly, therefore, night shift work exerted a depressant effect upon output (this is well shown in the "Interim Report" when permanent night shifts were found to have 5 per cent. to 10 per cent. less output than permanent day shifts), but the effect did not show itself for the first few nights, and it continued to exert its influence for the first few days of the subsequent day shift fortnight. In order to eliminate this depressant effect of night shift work, and obtain a more genuine comparison of output under the two systems of work spells, it is better to compare the output of only the first week of the night shift and the day shift fortnights, and we then find that the output under the three spell system was 12 per cent. greater than that under the two spell system.

The rapid increase of output observed during the three statistical periods examined—for it averaged 116, 135 and 177 respectively—was dependent on the reduction in the hours of labour. These averaged 57.1, 55.1 and 50.8 hours per week in the respective periods.*

In Table II is shown the output of a group of 90 men engaged over a seven month period (March 11th to September 22nd, 1917) in the very active and somewhat heavy labour of sizing aluminium fuse bodies. In spite of the average hours of work during the night shift fortnight being 5.8 more per week than during the day shift fortnight, the hourly output was 3 per cent. greater. Taking each fortnight by itself, we find that the output during the second week of the night shift was 2 per cent. less than in the first week, whilst that in the second week of the day shift was 4 per cent. more than in the first week, or the same sort of relationship held as in the fuse-turning women. The output during the first week of the night shift fortnight was 5 per cent. greater than that observed during the first week of the day shift fortnight, or this is the genuine improvement dependent on the substitution of three spells for two.

Both the fuse-turning women and the sizing men were actively employed throughout working hours, so a suitable system of work spells was much more important to them than to workers who stood passively watching automatic machines for most of the time. Two classes of such workers were examined, and in accordance with expectation, it was found that their night shift output corresponded more closely with their day shift output than in the active workers. The first class consisted of women who were milling a screw thread on the fuse bodies, and in this operation they stood passively watching their machines for four-fifths of the total time taken. The output of 26 women over a three month period, and of 42 women

TABLE II.—90 Men Sizing Fuse Bodies.

Four-week period extending from	Relative hourly output.				Weekly hours of actual work.			
	Day shift.		Night shift.		Day shift.		Night shift.	
	1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.
March 11 to April 7	138	137	150	135	50.9	48.1	61.1	55.0
April 8 to May 5	130	138	136	141	31.2	46.4	41.2	50.2
May 6 to June 2	142	143	145	140	37.5	36.6	51.6	38.0
June 3 to June 30	135	139	143	144	42.5	47.3	49.6	48.7
July 1 to July 28	135	137	148	142	38.4	51.3	36.7	50.7
July 29 to August 25	141	158	143	148	44.5	52.7	46.3	61.1
August 26 to Sept. 22	144	148	152	149	48.2	47.9	57.9	56.8
Mean... ..	138	143	145	143	41.9	47.2	49.2	51.5
	140		144		44.5		50.3	

over a two-month period was obtained, and average values for these periods are quoted in Table III. Taking the results as a whole, the night shift output came to 1 per cent. less than the day shift output. The other class of workers consisted of youths of 16 to 18 who were boring top caps, an operation in which

* Cf. Memorandum 18.

TABLE III.—26 or 42 Women Milling a Screw Thread.

Period extending from	Number of workers.	Relative hourly output.				Weekly hours of actual work.			
		Day shift.		Night shift.		Day shift.		Night shift.	
		1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.
Nov. 19 to Feb. 10	26	133	132	131	135	43.7	45.6	46.2	45.1
March 25 to May 19	42	135	135	133	133	39.9	46.5	46.0	49.4
Mean	—	134	133	132	134	41.8	46.0	46.1	47.2
		134		133		43.9		46.6	

they stood passively watching their machines for seven-eighths of the total time taken. A group of 15 workers was examined for a six-month period, and another group of 24 workers for a five-month period. As can be seen from Table IV, the night shift output was 1 per cent. less than the day shift output, just as in the mill thread women.

TABLE IV.—15 or 24 Youths Boring Top Caps.

Period extending from	Number of workers.	Relative hourly output.				Weekly hours of actual work.			
		Day shift.		Night shift.		Day shift.		Night shift.	
		1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.	1st week.	2nd week.
July 3 to Dec. 16	15	129	126	129	126	54.1	55.1	57.9	58.5
Dec. 31 to May 19	24	128	127	133	119	54.4	53.4	56.7	56.5
Mean	—	128	127	131	123	54.3	54.2	57.3	57.5
		128		127		54.2		57.4	

The conclusion to be derived from the whole of the observations may be summarised by saying that when men and women are engaged in *active* work, their output is 5 to 12 per cent. greater if working hours are divided up into three spells of suitable duration (*e.g.*, 4, 3½ and 3 hours) than if they are divided up into two five-hour spells.

How Can Five-hour Spells be Avoided?

The five-hour spells can be avoided in two ways. The first way is to split up the day shift hours in the same way as the night shift hours at factory A, *viz.*, by a long first spell of work followed by two shorter spells. As workers are not usually accustomed to having their dinner before midday, the simplest arrangement of spells would be :—

8 to 12	1 to 4	4.30 to 7.30
4 hours.	3 hours.	3 hours.

This system has the disadvantage that work ends too late to give the workers a chance of doing their shopping, so the following system might be adopted :—

7.30 to 11.30	12.30 to 3.45	4 to 6.45
4 hours.	3½ hours.	2½ hours.

On this system only ½ hour is allowed for tea, and this is too short an interval to enable the workers to leave the workshops and go to the canteen, so it would be necessary to supply them with refreshment by means of travelling canteens. This plan is now adopted with success in many factories, and is often run by volunteer helpers.

The second and probably the better method of dividing up working hours is that adopted at a large cartridge factory (Factory E), where each of the two five-hour spells was cut in half by means of ½ hour

breaks. During these breaks the machinery was stopped, and the workers were supplied with tea and food by travelling canteens. The hours of work were the following :—

7.30 to 10	10.15 to 12.30	1.30 to 4.15	4.30 to 6.30
2½ hours.	2½ hours.	2½ hours.	2 hours.

These hours include no spell of longer than 2½ hours duration, whereas they had previously been :—

7 to 8.30	9 to 1	2 to 4.15	4.30 to 6 or 7.
1½ hours.	4 hours.	2½ hours.	1½ or 2½ hours.

i.e., they were on the two-break system, or they had a breakfast interval which was followed by a four-hour spell. The night shift hours during the two periods were the same as the day shift hours with p.m. substituted for a.m., and *vice versa*, except that on Sunday night the full hours were worked whereas no work was done on Saturday afternoon. Hence the total weekly hours of work during the two periods were generally 61½ and 57 hours respectively for night shift, and 56½ and 52½ hours respectively for day shift.

The output of five groups of experienced workers in the factory was investigated for 38 consecutive weeks, during 23 of which (January 2nd to June 10th) they were under the two-break system, and during 15, under the one-break system. As the workers changed over from day shift to night shift in alternate weeks, they were grouped in fortnightly periods, and the output of the whole group was calculated for a week of day shift and a week of night shift. The groups relate to four cartridge case operations, viz. 29 women on the "second draw," 39 on "head trimming," 26 on the "second cut off," and 20 girls on "mouth reamering," and one bullet operation, viz., 36 women engaged in cutting off bullet sheaths. The average hourly output for both day and night shift on each operation during the two break period was taken as 100, and we see from Table V that the average output of all the workers on day and night shift improved very slowly during the two-break period, being approximately 99, 100 and 101 during the three consecutive 7 or 8 week intervals into which the total period was arbitrarily divided. When the one-break system was adopted, however, the average output jumped to 105 during the seven week period immediately following, and to 108 in the subsequent eight-week period. Assuming that if the system of hours had not been changed the gradual rise of output previously observed would have continued at the same steady rate, we may say that *the change from the two-break to the one-break system improved the hourly output by 5 per cent.* The average hours of actual work are given on the right side of the Table, and they amounted to 51.7 hours per week for the day shift, and 56.0 hours for the night shift during the two-break period, and to 50.3 and 54.5 hours for the respective shifts during the one break period, i.e., they averaged 1.4 hours per week less. The total output of the workers may be reckoned thus :—

For the two-break system	..	..	103 × 53.8 = 5541.
For the one-break system	..	..	108 × 52.4 = 5659

or the total output would have been 2 per cent. greater under the one break system than under the two-break system. Hence the introduction of the ½-hour break during the middle of the morning of the first five-hour spell, though it was still reckoned as work time and paid accordingly, more than justified itself.

The total lost time of the workers could not be determined from the data available as there was uncertainty about absent workers, but the average "broken time" is given in the last two columns of the table. This "broken time" included only the time lost when the workers put in at least 45 hours a week out of a nominal 57 hours or more, or 40 hours out of a nominal 52 hours, and so on. It averaged

TABLE V.—150 Women on Cartridge Operations.

Weeks ending	DAY SHIFT OUTPUT.					NIGHT SHIFT OUTPUT.					Mean of day and night shift outputs.	Average hours of actual work per week.		Percentage of broken time.			
	29 women on second draw.	39 women head trim- ming.	26 women on second cut off.	20 girls reamer- ing.	36 women cutting off bullet sheaths.	Mean.	29 women on second draw.	39 women head trim- ming.	26 women on second cut off.	20 girls reamer- ing.		36 women cutting off bullet sheaths.	Mean.	Day shift.	Night shift.	Day shift.	Night shift.
Two-break system—																	
Jan. 8 or 15 ...	103	99	96	—	—	101	—	—	101	106	—	103	102	53.5	60.5	3.8	2.0
Jan. 15 or 22 ...	—	—	—	105	—	100	104	—	—	—	—	96	101	51.8	59.5	4.6	3.6
Jan. 22 or 29 ...	100	103	—	—	—	101	—	—	92	100	—	99	98	52.3	58.6	4.1	2.0
Jan. 29 or Feb. 5 ...	—	—	91	—	—	94	95	—	—	—	—	99	97	50.8	52.0	7.1	4.3
Feb. 5 or 12 ...	104	91	103	—	—	98	—	—	90	97	—	94	96	52.0	51.3	5.5	3.4
Feb. 12 or 19 ...	—	—	—	96	—	100	95	—	—	—	—	98	98	52.1	53.6	5.7	4.0
Feb. 19 or 26 ...	96	106	—	—	—	101	—	—	96	96	—	96	99	51.6	58.4	5.9	5.4
Feb. 26 or March 4 ...	—	—	102	—	—	101	96	—	—	—	—	98	99	52.2	58.7	5.7	4.7
March 4 or 11 ...	99	106	—	—	—	102	—	—	99	91	—	95	99	55.3	56.2	2.4	4.3
March 11 or 18 ...	—	—	107	—	—	103	99	—	—	—	—	99	101	53.9	56.6	3.9	3.4
March 18 or 25 ...	100	109	100	—	—	104	101	—	—	97	—	99	102	53.6	53.9	9.6	6.7
March 25 or April 1 ...	—	—	100	101	—	101	103	—	—	109	—	101	101	54.1	57.6	3.5	6.6
April 1 or 8 ...	97	105	—	—	—	99	95	—	106	109	—	107	103	55.5	59.3	5.4	4.1
April 8 or 15 ...	—	—	101	—	—	97	95	—	104	101	—	95	96	52.9	59.6	7.9	3.7
April 15 or 22 ...	95	97	—	—	—	96	91	—	99	101	—	103	99	47.3	49.5	6.4	5.2
April 22 or 29 ...	—	—	92	—	—	99	91	—	—	—	—	94	95	37.9	38.7	3.4	4.6
April 29 or May 6 ...	99	101	—	—	—	98	100	—	99	105	—	102	100	47.0	47.5	6.3	7.1
May 6 or 13 ...	—	—	104	—	—	103	105	—	—	—	—	102	102	54.0	49.6	3.4	5.6
May 13 or 20 ...	—	—	—	—	—	103	—	—	112	107	—	109	105	53.4	59.5	5.2	3.8
May 20 or 27 ...	101	100	—	—	—	101	103	—	103	103	—	102	100	53.2	58.4	5.0	4.9
May 27 or June 3 ...	—	—	97	—	—	99	105	—	105	104	—	105	103	51.4	57.5	6.0	4.9
June 3 or 10 ...	96	97	102	—	—	115	102	—	—	—	—	104	102	52.2	57.6	6.5	7.2
June 10 or 17 ...	99	94	—	—	—	99	105	—	109	97	—	103	102	50.1	55.3	6.2	7.5
One-break system—																	
June 17 or 24 ...	—	—	93	—	—	95	101	112	—	—	104	108	101	48.7	55.4	6.8	2.9
June 24 or July 1 ...	101	111	—	—	—	111	—	—	106	—	—	105	106	50.7	54.0	5.3	5.4
July 1 or 8 ...	—	—	102	—	—	108	102	117	—	103	—	108	102	48.8	55.2	6.5	5.2
July 8 or 15 ...	—	108	—	—	—	110	—	—	111	105	—	108	107	49.9	49.8	5.9	5.0
July 15 or 22 ...	—	—	107	—	—	98	108	112	—	—	106	109	104	48.4	54.7	5.9	4.0
July 22 or 29 ...	100	117	—	—	—	105	108	—	114	107	—	110	109	50.8	55.6	6.0	2.7
July 29 or August 5 ...	—	—	107	—	—	102	102	114	—	—	103	106	105	51.3	55.2	8.2	3.4
August 5 or 12 ...	101	109	—	—	—	106	—	—	110	118	—	114	109	51.8	53.0	5.3	7.7
August 12 or 19 ...	—	—	108	—	—	104	105	110	—	—	104	106	106	49.9	55.2	5.2	3.6
August 19 or 26 ...	—	109	—	—	—	105	—	—	111	114	—	112	108	52.5	54.3	3.7	5.0
August 26 or Sept. 2 ...	—	—	108	—	—	105	—	—	110	—	106	108	110	49.5	50.7	6.8	4.3
Sept. 2 or 9 ...	—	109	—	—	—	109	—	—	113	117	—	115	112	50.0	53.3	7.0	6.9
Sept. 9 or 16 ...	—	—	100	—	—	102	—	113	—	—	—	113	105	51.1	53.8	6.1	5.7
Sept. 16 or 23 ...	—	114	—	—	—	114	—	—	103	112	—	108	110	50.4	54.7	5.1	4.3
Mean ...	100	104	101	98	105	101.4	102	104	104	105	101	103.7	102.5	51.1	55.4	5.6	4.7

5.3 per cent. and 4.6 per cent. for day shift and night shift during the two-break period, and 6.0 per cent. and 4.7 per cent. for the respective shifts during the one-break period, or was practically the same. The "actual hours of work" quoted in the table relate only to workers who put in more than 45 hours per week of work out of 57 hours, or 40 hours out of 52 hours, and they are in consequence about three hours per week longer than if all lost time had been taken account of.

The Need for Rest Pauses.

Repeated observation showed that the nominal $\frac{1}{4}$ -hr. breaks just mentioned meant an average stoppage from work of 20 to 25 minutes, and yet we saw that this considerable loss of working time more than justified itself. The reason is that no worker will, or can, work continuously for several hours without taking occasional rests. Especially is this so in all kinds of work requiring continuous activity and attention, as was proved by direct observations upon various groups of workers. In observations made upon four men engaged in hand-tapping fuse sockets, an operation requiring continuous and very considerable muscular activity, it was found that on an average the men took 7 to 9 minutes of voluntary rest pauses in all except the first full hour of work, and as they had all of them been engaged for many months on the operation and were paid at piece rates, there can be no doubt that they found by experience that such pauses improved their total output. It was curious to note, however, that they worked on no sort of system, but often took rests in a most irregular manner. In Fig. 4 are shown the actual times when rests were taken, no pause of 2 minutes or less being registered. We see that the best workman, whose output was 34 per cent. more than that of the worst workman, took frequent rests at fairly regular intervals in the morning of both days he was under observation, but was not so regular in the afternoon.

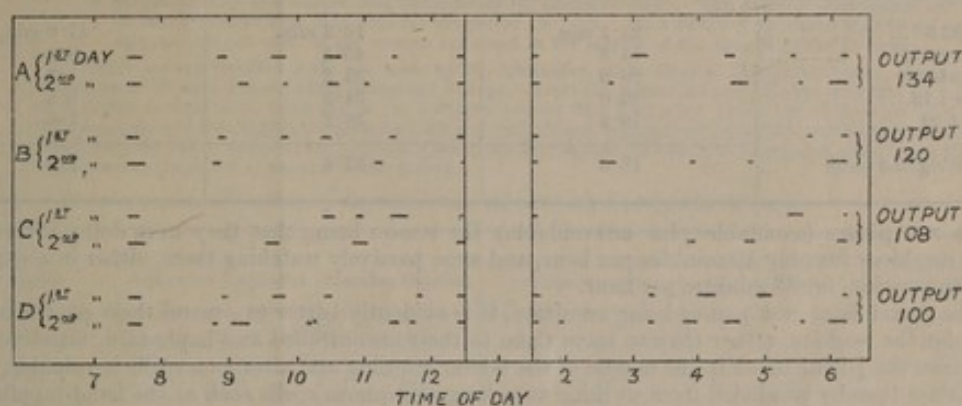


Fig. 4.—Rest Pauses of Men Hand-Tapping Fuse Sockets.

The next best workman, however, though he took regular rests in the morning of one day, worked continuously for four hours in the afternoon, whilst workman C on one day worked continuously for $2\frac{1}{2}$ hours in the morning and $3\frac{1}{2}$ hours in the afternoon. Workman D took an unnecessary number of rests on both days, and accordingly had a low output. Hence these few data indicate that a greater regulation of rest pauses would have conducted to a better output, and that the best system of all would have been to take about 7 minutes off regularly in each hour.

In the less severe operation of sizing fuse bodies observations were made upon 16 men, i.e., four on each day of four days,* and the data recorded in Table VI. show that they took on an average about

TABLE VI.—Average Duration of Rest Pauses, calculated per hour.

Time.	Men hand-tapping fuse sockets.†	Men sizing fuse bodies.	Women turning fuse bodies.		
			Avoidable pauses.	Unavoidable pauses.	Total pauses.
7 to 7.30 ...	25.7	26.8	30.6	4.0	34.6
7.30 to 8.30 ...	2.6	12.0	3.9	12.0	15.9
8.30 to 9.30 ...	9.4	10.5	4.4	12.6	17.0
9.30 to 10.30 ...	9.4	6.2	0.4	9.2	9.6
10.30 to 11.30 ...	7.1	6.0	3.5	2.4	5.9
11.30 to 12.0 ...	11.3	9.9	3.6	2.7	6.3
1 to 1.30 ...	13.2	15.9	20.4	4.9	25.3
1.30 to 2.30 ...	2.4	4.9	2.0	6.3	8.3
2.30 to 3.30 ...	7.4	9.0	4.5	4.9	9.4
3.30 to 4.30 ...	8.2	11.4	4.8	2.9	7.7
4.30 to 5.30 ...	7.8	7.4	2.2	4.7	6.9
5.30 to 6.0 ...	20.3	34.6	20.2	2.6	22.8

* These observations, and those on women turning fuse bodies, were made by Mr. W. Neilson Jones.

† The hours of work in this operation were half-an-hour later than those recorded.

8 minutes of rest per hour, though the rest pauses were not so evenly distributed over the hours as those of the hand-tappers. The very long rest pauses taken in the initial and final hours of the morning and afternoon spells were due to the men beginning work some considerable time after nominal starting time, and knocking off before the nominal stopping time.

In lathe operations the lathes generally need a good deal of attention at the hands of the tool setters, or the workers take "unavoidable" rest pauses: but such rests fulfil their object as well as "avoidable" pauses, and so the observations upon women turning aluminium fuze bodies (made for five days on 27 women in all) showed that the average avoidable plus unavoidable rest pauses in the last two full hours of work in the morning spell, and the four full hours of work in the afternoon spell, averaged a fairly steady eight minutes per hour, or the same time as was observed in the men engaged in sizing and hand-tapping. As can be seen from the data in Table VI., this eight minutes might be made up almost entirely of unavoidable pauses (*e.g.*, between 9.30 and 10.30), or chiefly of avoidable pauses (*e.g.*, between 3.30 and 4.30).

In operations involving the passive watching of machinery for most of the working hours the avoidable rest pauses are naturally reduced very greatly. For instance, five women engaged in boring 9.2-inch shells were found, in the 3½ hour spell for which they were watched, to lose only 3.7 minutes per

TABLE VII.—5 Women Boring 9.2-inch Projectiles.

Time intervals.	Active work, reckoned per hour.	Passive work, reckoned per hour.	Rest pauses, avoidable and unavoidable.
10 to 10.15	23.2 min.	19.2 min.	17.6 min.
10.15 to 11.15	14.8	45.2	0.0
11.15 to 12.15	20.6	38.2	1.2
12.15 to 1.15... ..	19.0	34.2	6.8
1.15 to 1.30	19.2	39.2	1.6
Weighted mean ...	18.6	37.8	3.7

hour in rest pauses (avoidable plus unavoidable), the reason being that they were doing active work on the machines for only 19 minutes per hour, and were passively watching them, either in a sitting or standing position, for 38 minutes per hour.

The principle of rest pauses being admitted, it is evidently better to control these pauses to some extent for the workers, rather than to leave them to their uncontrolled and haphazard initiative. For this reason the ½-hour break in the middle of the 5-hour morning and afternoon spells is valuable, as the workers are thereby precluded from working very long continuous spells such as the hand-tapping men did sometimes. The probability is that they would get into the habit of spontaneously taking a further short rest pause in the middle of each 2½-hour spell, or would thereby secure a pause in every 1½ hours of the working day.

If a shorter working day than the 10-hour day be adopted, somewhat similar plans of dividing up the hours could be employed. If a 9-hour day be worked, the hours might be divided up into a 3½-hour spell from 8 to 11.30, a 3-hour spell from 12.30 to 3.30, and a 2½-hour spell from 3.45 to 6.15; or what would probably be better, two 4½-hour spells might be worked, but with ½ hour breaks in the middle of each. If an 8-hour day be decided on, the simplest plan would be to work two 4-hour spells, and this might likewise prove the best for many types of labour, but for very vigorous and active work it might still be best to split up the eight hours by two breaks into spells of, *e.g.*, 3, 2½ and 2½ hours, or by ½ hour breaks in the middle of each 4-hour spell.

Summary.

The total weekly hours of night shifts ought to be shorter than those of day shifts instead of longer, as is the usual custom. If 10 hours be worked each day (or a 54 to 55-hour week) only nine hours should be worked each night.

Day shift workers on the one break system were found to work up to their maximum output each morning rather more quickly than the night shift worked up to *their* maximum: but day shift workers on the two break system, in which work was begun at 6 a.m., and was followed by a breakfast interval at 9 a.m., had 7 per cent. to 18 per cent. less output in these three pre-breakfast hours than the night shift workers had in their first three working hours. This was presumably due to the night shift having had a good meal before starting work.

Five-hour spells of work are too long, for it appeared that by cutting up the 10-hour day into three spells of, *e.g.*, 4, 3 and 3 hours, separated by two breaks (the first of which is too late to function as a breakfast break) the output might be increased 5 per cent. to 12 per cent. above that experienced when two five-hour spells were worked. What is probably a better system still of avoiding five-hour spells is to stop work for ½ hour in the middle of each spell, and provide the workers with refreshment by means of travelling canteens. The introduction of one such extra ½-hour break in a cartridge factory, together with the abolition of the breakfast interval, increased the hourly output 5 per cent.

Rest pauses are essential in active work, for both men and women engaged on it were found to stop work spontaneously for about eight minutes per hour, on an average.

H. M. VERNON. M.D.

APPENDIX D.

SUMMARY OF CAPTAIN GREENWOOD'S MEMORANDUM ON "LOST WORKERS."

At the request of the Committee, Captain Greenwood undertook to collect information* in regard to the admission, discharge or disappearance of women workers in munition factories, and as to the principal causes.

In the course of his inquiries he made investigations in 16 factories, or sections of factories, employing, together, 40,000 women workers.

Although the majority of operations carried out in munition factories do not require a high degree of manipulative dexterity, hardly any are such that practice does not lead to increased precision of work and therefore of rapidity of output. Thus in the manufacture of cartridge cases—perhaps the simplest type of operation—it is generally agreed that a woman worker cannot obtain her maximum degree of efficiency until she has been engaged some weeks on her task. It follows that a factory at which the operators are constantly leaving and being replaced cannot attain the same level of output as one in which the working population is stationary.

The problems at issue differ in certain respects in war time and peace time. Under war conditions there has been a constant and urgent demand for labour. As a result, discontinuity and intermittency due to seasonal or other causes are practically non-existent. On the other hand, this urgent demand for labour has probably tended to encourage workers who were for any reason discontented with their present surroundings promptly to seek other forms of employment. They have not been deterred by the fear that when a job is lost no other may be found. Further, the demand of the Military Authorities for recruits and the schemes of dilution have not only directly affected the wastage amongst men but indirectly the wastage amongst women.

No similar inquiries have hitherto been attempted in this country. In America the results of certain recent investigations by Mr. Joseph H. Willits carried out in Philadelphia have been published under the title "Steadying Employment" in the annals of the American Academy of Political and Social Science for May, 1916. One example may be quoted:—

A particular shop in a Carpet Mill was selected for intensive study. The dates of engagement and discharge of the employees were tabulated for the period 1907-15. As a result it appeared that 48 per cent. of the men and 38 per cent. of the women remained in the service of the firm less than 10 weeks.

A wider and less detailed study was made by Mr. Alexander, of the General Electric Company, of a large number of factories of all sizes in the United States and Europe. From the figures collected it appeared that on 1st January, 1912, 38,668 persons were employed in the factories and on 31st December 46,796, or an increase of 8,128. The records also showed that during the period 44,365 persons had been engaged, so that 36,237 had dropped out of employment during the year; that is to say, five and a half times as many people had to be engaged as constituted the increase in the number employed at the end of the period.

From a large munition factory Captain Greenwood collected the following figures:—

Month.	Number Employed.	Number Started.	Number left for various reasons.	Number left without reason.	Number employed at end of month.
June	4,340	622	138	253	4,571
July	4,571	695	48	87	5,131
August	5,131	464	67	220	5,308
September	5,308	578	174	45	5,667
October	5,667	1,054	236	248	6,237

It will be seen that during the four months from the end of October 2,791 women were engaged and 1,125 left the number of engagements was thus 167.5 per cent. of the net increase in four months. Further, during these four months together with the previous month the firm lost 1,516 women workers. In only 663 of these cases—or 43.7 per cent.—was the cause of leaving known to the firm: the balance had simply vanished.

The facts are next given in regard to the Cordite Department of a large Munition Factory. From these it appears that during the 12 months ending 28th August, 1916, an increase of 624 workers resulted from 1,031 new engagements amongst men; while an increase of 914 was obtained from 1,527 new engagements amongst women—percentages of 165 and 167 respectively, figures which compare favourably with those previously quoted.

More detailed investigation was found to be practicable at a factory at present organised in two main departments—one producing cases and bullets, the other carrying out cartridge and grenade filling operations. The two sections are denoted by the figures L 1 and L 2 respectively. Records have been kept by the firm of the name, age, previous occupation, character and reason for leaving, which permitted of data being collected for the periods January 1st, 1911—4th August, 1914, and for the period 4th August, 1914, to 1st December, 1916.

Causes of leaving were classified by Dr. Greenwood into three categories:—

- (i) Those who left on account of ill-health;
- (ii) Those who left for some sufficient reason other than that of health, including:—
 - (a) Girls who left to be married;
 - (b) Girls moving from the district;
 - (c) Girls required at home on account of illness there or, in the case of married women, to keep house;
 - (d) Girls who found the wage earned insufficient;
 - (e) Girls discharged from the firm not for misconduct but because they were unsuitable, or because the factory was slack;
 - (f) Girls considered by the Factory Surgeon to be physically unfit though not complaining of illness.
- (iii) Those who left for no reason or for an insufficient one, including:—
 - (a) Girls discharged for misconduct.
 - (b) Girls leaving for other employment without a signed reason;
 - (c) Girls wanting a change, or dissatisfied, or stating the work to be unsuitable.

The great majority in this category gave no reason at all.

* Captain Greenwood's Memorandum on "The Causes of Wastage of Labour in Munition Factories employing Women" is being published, as a Special Report, by the Medical Research Committee.

Analysis shows that of 1,000 girls entering the factory during the war period 132 did not outstay the second month. Even if there had been no loss from sickness or other reasonable cause, 1,000 would still have been reduced by 10 per cent. for no sufficient reason. Moreover, these figures are an under-estimate, since the records take no account of the large number of girls who have worked in the factory only for a few minutes or days. Further, the workers were not generally removed from the register until after they had left for some time. Even disregarding these considerations the figures show that at a factory of high standing, thoroughly familiar with the industry, which they have not entered upon for the first time since the war, the absolute loss of workers occurring was serious. Workers leaving with less than two months' service can on the average have made but a very small contribution to the output of munitions; while on the debit side of the account is the trouble to which they have put the Officials of Labour Bureaux and the Administrative Staff of the factory, as well as in some cases the demands made upon the transport facilities of the country. A comparison of the figures shows that the war time experience is somewhat more favourable than that of peace time, but this advantage is decidedly less when only losses without reasonable cause are considered. The loss of effectives amounting to at least 10 per cent. of the original strength in a period of employment so short that little useful service has been rendered must be attributed to some or all of the following causes:—

- (i) The default of the employee herself, such as caprice, unwillingness to submit to discipline, love of the excitement of change;
- (ii) The fault of the employer as displayed in want of judgment in the selection of a candidate for employment, the conditions of which are unknown to the applicant but known to the employer;
- (iii) Similar lack of judgment on the part of the Officials of the Labour Bureaux.

No National system of organisation can eliminate these causes of wastage, but it may be possible to diminish them.

The next factory considered (L 7) is in the open country, six miles by rail from the nearest town, and still further from any large city. It is very isolated. There is no village in the immediate neighbourhood, and no sleeping accommodation. The vast majority travel at least six miles to and from their work. The work is divided into that of the Cordite and the Gun Cotton Departments, and is therefore roughly similar to that of L 2. Ample provision is made for the care of workers' health and comfort. In these respects the factory is probably unsurpassed by any other in the country. Any woman absent for more than two days without communicating with the management is automatically discharged, but in practice all these cases are followed up and the sick visited.

Comparison of figures shows that the loss in L 7 was little more than a third of that in L 2. Two possible causes for this difference may be suggested:

- (i) A smaller proportion of the women were previously engaged in industrial employment, and it is possible that those who have had no previous experience of factory life are really more likely to remain steadily at work than old factory hands; or it may be that country people are less prone to change than those drawn from urban districts.
- (ii) The more favourable conditions of employment have more than counterbalanced any initial instability of the population.

One point must at least be regarded as definitely established, viz.: that existing rates of loss in many factories are unnecessarily high, and that so long as they continue the effective mobilisation of labour for National service has not been even approximately realised. When expressed in terms of the whole munition making female population the avoidable losses must amount to many thousands.

The third factory examined was situated in a Midland Industrial City. It is organised in two branches, one manufacturing fuses (L 4), the other loading them (L 5). The general conditions of employment were good, being intermediate between those of the two factories previously considered. The general result of the investigation is that the factory as a whole is better off than L 1 and L 2, and worse off than Factory L 7 in the matter of wastage, while it occupied a similarly intermediate position between the two factories in welfare efficiency.

Three factories employed on manufacturing projectiles of 6 inch or larger calibre were next examined. Taking the figures of these three factories together it appears that the rates of loss at ages above 22 are significantly greater than for girls between 18-22. It appears that the unusually heavy losses are seriously contributed to by ill-health and other sufficient causes—causes of leaving for which the employees themselves are not responsible. No doubt the accuracy of statements purporting to describe reasons for leaving are not likely to be of a high order; however, there is no reason to suggest that the proportion of inaccurate replies in one factory is likely to differ sensibly from the percentage in another. The information as to the nature of previous employment was incomplete, but it would appear that the percentage of industrially employed women is greater than in L 1, L 2 or L 7, and it is possible that this contributes to frequent changes of employment, there being good opportunities to obtain another place.

While women at these factories undergo no specific medical examination their work is appreciatively heavier than the work of the Fuse and Cartridge Factories. The large percentage of women—especially older women—who leave on alleged medical grounds is clearly consistent with the view that the occupation is on the whole unsuitable for such women.

Inquiry was next directed to 10 further factories doing heavy work and to an Explosive Supply Factory and a National Cartridge Shop doing light work. The figures in regard to these factories hardly admit of the same degree of detailed consideration. It was not possible to the same extent to eliminate variations of production or programme though all reasonable endeavours were made to do so. Such variations, while they should affect only losses due to reasonable causes, indirectly affect also losses due to insufficient reasons.

Looking, however, at the figures as a whole, certain general considerations are suggested. In the first place while the survival rates diminish with age almost invariably among heavy factories, this is not so in the light group. The age group 18-22 is in a more favourable position than the later groups amongst the "heavy" employees, while the differences observable in the "light" group are almost negligible. The older women differ from the younger not only in age but also in that a higher proportion of them are married. It appears that the double handicap of age and home duties is insufficient to diminish perceptibly the resisting powers of the older women so far as light physical labour in factories is concerned. For the heavier type of work this ceases to be true. It would appear to follow that the recruitment of women over 22 for heavier factories is relatively disadvantageous.

A comparison is made between an H 3 Factory and an L 6 Factory, both of which are situated in the same part of the country and conform to high standards of general management. The conditions in fact are closely similar except as regards the type of work. The figures for three months' wastage are not significantly different at the ages of 18-22 nor at the ages of 23-27. At ages over 28 the light factory loses appreciably fewer women than the heavy factory, and it seems legitimate to infer that labour in the heavy factories is really less suitable for older women.

Much importance cannot be attached to the recorded incidence of sickness. The data are not attested by medical evidence and may be no measure of the true incidence of sickness upon munition workers. Still it is worth noting that out of nearly 37,000 women under observation for at least a month, illness or medical unfitness is given as the cause of leaving 1,651 times. The losses from ill-health are practically the same at all ages in light factories while they increase after the age of 22 in the heavy factories. Under 23, girls have fewer sickness losses in the heavy than in the light factories.

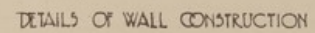
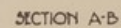
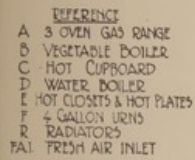
The data at present available are insufficient to enable any conclusions to be drawn as to possible relationships between wastage and hours of labour.

Captain Greenwood thus summarises his general conclusions:—

- (i) It has been proved that the magnitude of the wastage amongst women workers in munition factories is considerable, and that there is much discontinuity of employment even in the best organised factories which must prejudicially affect output.
- (ii) It has been shown that much of this wastage is inexplicable, or at least unexplained. The greatest proportion of the losses is unaccounted for. Of a total number of about 11,000 women who left, about 6,700 gave no

DESIGN FOR CANTEEN

ACCOMMODATION FOR 100 DINERS

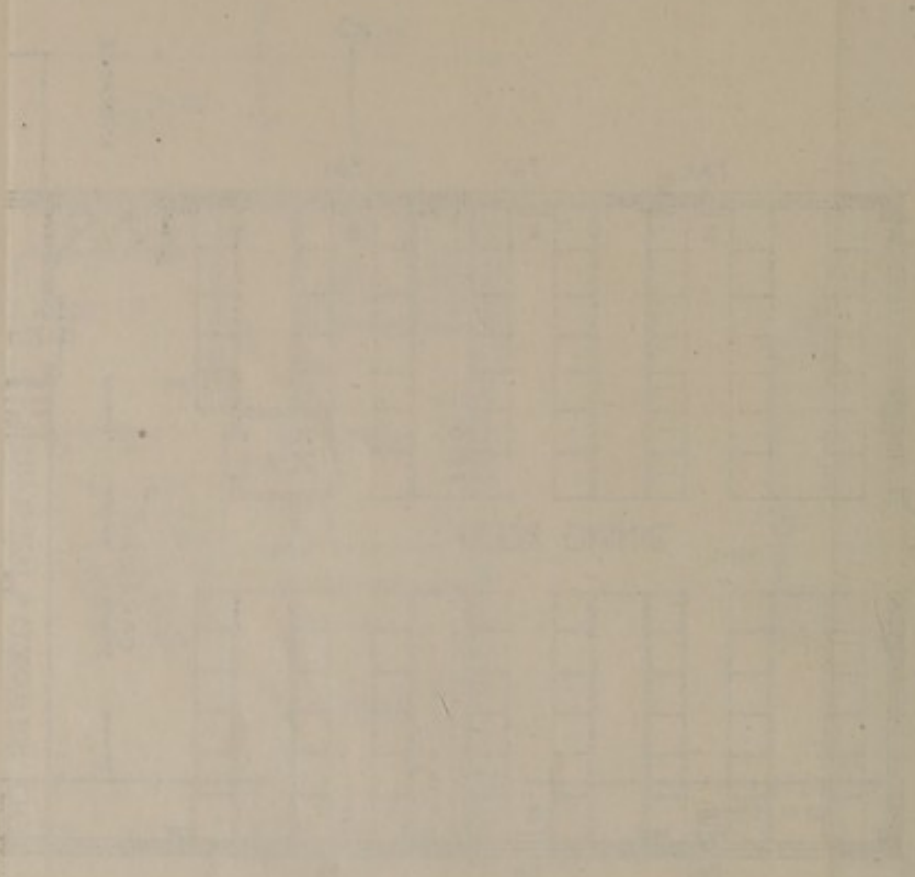


PLAN

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(1748) 1840. 8190. 1000/10. 2. 0. 8. 10. 10

DESIGN FOR CANTEN ACCOMMODATION FOR 100 DINERS



reason for doing so or an insufficient one; this is not a satisfactory state of affairs. There is no panacea for the disease, but there is one promising remedy. This is organised welfare work. It has already been suggested that in factories where there are organised welfare departments the wastage unaccounted for is below the average. While no absolute connection can be proved, the importance of welfare work is certainly suggested. Intelligent and sympathetic following-up of absentees is likely to produce good results. It is suggested that wherever any factory loses more than 20 per cent. of its entrants within three months, a special inquiry into the reasons should be instituted. In some cases of course sufficient reasons—such as housing difficulties—may exist.

- (iii) It appears that the general strain of factory life in itself was not worse borne by older than by younger women, even in factories engaged on chemical work which has often been associated with specific danger to the health of certain individuals. On the other hand, when the general strain of factory conditions is combined with more than a very moderate degree of actual physical work, women over 23 come less well through the ordeal. The difference is sufficiently distinct to make an attempt at systematic recruiting of the older women for the physically lighter labour, and the younger women for the more strenuous tasks, worthy of practical attention, the reason being that the older women—of whom a larger proportion are married and have young children than of the girls under 23—have not sufficient reserves of energy to meet the double demand made upon them.

APPENDIX E.

CATERING EQUIPMENT.

The following is a list of articles required. The number to be ordered will depend on the size of the canteen and the accommodation for which it is to provide, but the undermentioned basis of calculation may be of assistance to determine the original equipment of a canteen: Knives, forks, spoons (dessert and tea), cups and saucers, one for each person seated, allowing for a few dozens over; plates, double and seating accommodation. The same size of plates should be used for meat and pudding. Tumblers, egg cups, soup bowls and small plates, half the seating capacity; jugs, sugar basins, mustard pots and salt cellars, tablespoons, about one-tenth of the seating capacity.

The cost of equipment, &c., is steadily increasing, and it is, therefore manifestly impossible to give any fixed figures. Speaking generally, however, the complete equipment should cost approximately:—

47s.	per head for 100 persons seated.
32s.	500
30s.	1000

Catering Office Equipment.

Chairs.	Desk.	Safe for money.
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Dining Room.

Cash till.	Curtains or blinds for window (dark).	Tables (c).
Covering for tables and counter (a).	Scraper mat at door.	Wastepaper baskets (d).
Chairs or benches (b).		

Cutlery.

Carving knives and forks.	Spoons (dessert), 7-in. in length.	Spoons (table), 8-in. in length.
Forks, 7-in. in length (e).	Spoons (mustard).	Spoons (tea), 5-in. in length.
Knives, 9-in. in length (e).	Spoons (salt).	Steels.

Glass and Crockery.

Basins (sugar).	Jugs (water).	Plates (small), 7-in.
Bowls (soup), liquid capacity 1 pint.	Meat dishes (assorted sizes).	Salt pourers.
Cups and saucers, liquid capacity, 8 oz.	Mustards.	Teapots (g).
Egg cups.	Peppers.	Tumblers, liquid capacity, $\frac{1}{2}$ pint.
Jugs (milk).	Plates (meats and puddings), 9 $\frac{1}{2}$ -in. one size only (f).	Vinegars.

Linen.

Dusters.	Kitchen rubbers.	Roller towels and roller.
Glass cloths.	Muslin strainers.	Swabs.
Hand towels (small).		

Cooking Apparatus (h).

For 100 persons.—	For 250 persons.—	For 500 persons.—
One double-oven range for roasting and baking, with hot plate for boiling, frying, &c.	One 3-oven range for roasting and baking, with hot plate for boiling, frying, &c.	One large roasting oven.
One hot closet and warming cupboard, about 48-in. long by 30-in. high by 24-in. deep.	One hot closet and warming cupboard, about 72-in. long by 30-in. high by 30-in. deep.	One 3-oven range.
One 15-gallon boiler for vegetables, &c.	One potato and pudding steamer.	Hot closets and warming cupboards to form part of each serving counter.
One 15-gallon boiler for tea water, &c.	One 20-gallon boiler for vegetables.	Carving table with hot closet under for warming plates.
Apparatus for supplying hot water through the sink taps.	One 25-gallon boiler for tea water.	One potato steamer.
	One 10-gallon boiler for soup.	One pudding steamer.
	Apparatus for supplying hot water through the sink taps.	One 25-gallon boiler for vegetables.
		Two 25-gallon boilers for tea water.
		One 20-gallon boiler for soup.
		Apparatus for supplying hot water through the sink taps.

Kitchen, Scullery, and Larder Requisites, &c.

Basins (pudding).	Potato peeling machine (i).	Knives (cooks').
Basins (pudding, one person).	Saucepans.	Lemon squeezers.
Bins (flour).	Saucepans (milk).	Scales and weights (j).
Bins (sanitary).	Saw (butchers).	Sinks (not less than 3 ft. by 2-ft. by 1-ft. (k)).
Bowls (enamelled).	Chairs (kitchen).	Sink baskets.
Bread knife.	Chopper (meat).	Sink brushes.
Bread cutting machine.	Chopping board.	Scoop.
Broom (bass).	Corkscrews.	Sieves (wire).
Brushes (scrubbing).	Cullenders.	Spoons (iron).
Brushes (sweeping).	Dish covers (wire).	Spoons (wooden).
Bucket.	Dustpan and brushes.	Step ladder.
Canister (tea).	Fish kettle.	Table (rigid).
Meat hooks.	Flour dredger.	Teapots (enamelled).
Meat safe.	Frying pan.	Tins (baking).
Milk measurer.	Graters.	Tin opener.
Mincing machine.	Gravy strainer and ladle.	Tools (mixed).
Oval pots with covers.	Jugs (enamelled).	Towel rack.
Pastry board and rolling pin.	Kettles.	Trays (japanned or wood).
Pie dishes (enamelled).	Knife boxes.	Urns (l).
Plate covers (tin) (f).	Knife cleaning machine (i).	

(a) In some canteens there is no covering for the tables and counters, and if these are made of good quality wood and kept well scrubbed no covering is required. On the other hand some kind of covering imparts a better furnished appearance. The covering generally used is linoleum or American cloth. A new form of rubber covering has also lately been placed on the market.

(b) Chairs are recommended in preference to forms, as they are more comfortable for the customers.

(c) The arrangement of the tables should provide for easy access to the service counter.

(d) Wastepaper baskets, preferably wire ones, should be placed about the dining room; they have a considerable effect on the general tidiness of the room. Trolleys can be used for the collection of dirty crockery, &c.

(e) Only one size of knife and fork is necessary, preferably with solid metal handles. Rustless steel knife blades, although more expensive save a considerable amount of labour in cleaning.

(f) The provision of flat topped covers for the plates of food is suggested, as these keep the food hot and render them more easily stored in the hot closets.

(g) Individual pots of tea for each customer are not altogether desirable, as it has the effect of slowing down the service. In some canteens an increased charge for a tea pot service is made.

(h) Cooking by gas, coal, or steam is most in favour, and to an increasing extent electricity.

A good plan is to furnish the different cooking apparatus manufacturers with particulars of the number to be catered for, leaving them to submit a scheme for the apparatus. Some provision has generally to be made for those of the workers who require warming up facilities for food brought by themselves.

(i) In a large canteen, say one seating over 500 persons, it may be advisable to have these articles power driven.

(j) Where large quantities of food have to be purchased, a platform scales is required, as well as a small cook's scales.

(k) Teak sinks are recommended for washing up crockery, and glazed fireclay sinks for vegetable preparation, &c. There should always be a separate sink for the cook's own use. Power driven washing up machines are suggested where a large trade is done.

(l) It is essential that the tea served in a canteen should be as excellent as possible, and great care should be taken to ensure absolute cleanliness in the urn or other article in which it is contained. Urns with earthenware linings are strongly recommended.

APPENDIX F.

HOSTEL PLANNING AND EQUIPMENT.

PLANNING.

Where a hostel is housed in an existing building little scope for planning exists. The following suggestions are accordingly concerned only with temporary hostels built especially for the purpose. Such hostels are generally built of materials such as wood, cemented coke breeze blocks or concrete slabs.

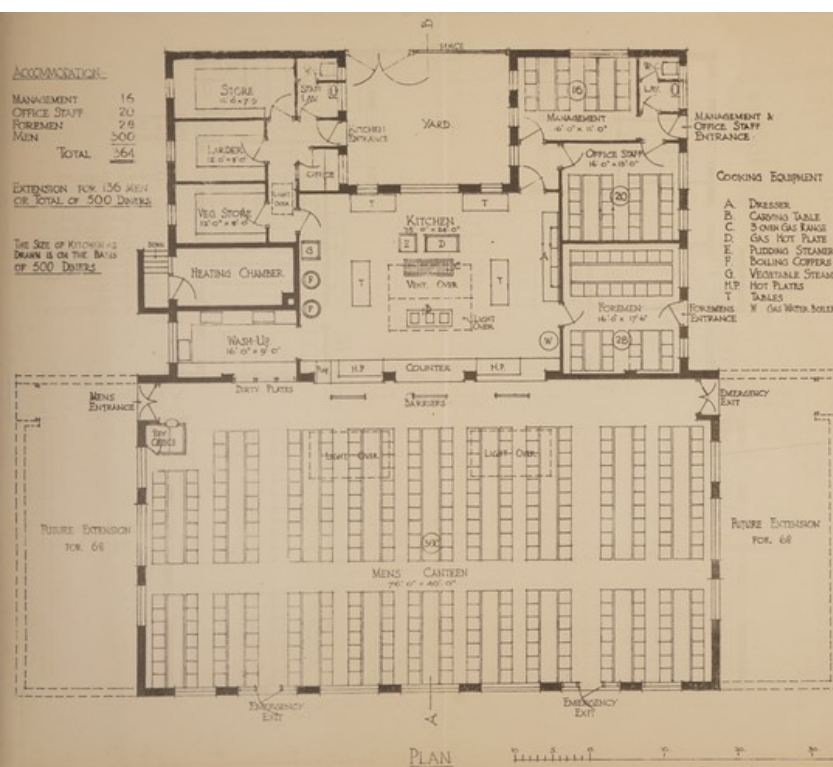
Size.—For efficient management the numbers to be accommodated should not exceed 500. If provision is required for larger numbers two or more separate hostels should preferably be provided.

Plan.—The attached plan (facing page 168), which has been prepared by the Building Construction Department of the Ministry of Munitions, suggests how a hostel for 400 girls may be arranged. The administrative block should be centrally situated; the sleeping blocks should be entered from the central block and consist of corridors with cubicles opening out of them on either side.

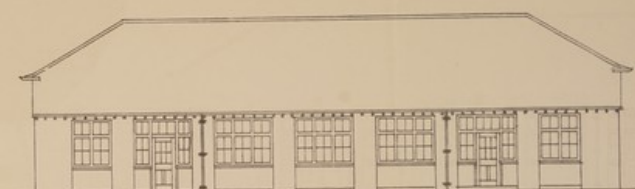
Single storey buildings are usual, but an upper storey in the sleeping blocks has been found satisfactory and economical.

Administrative Block.—The entrance to the hostel should be through this block; the gate-matron's lodge should be situated close to the entrance. The block should include the canteen, recreation rooms, staff dining recreation rooms, waiting room for tenants' friends, private rooms for the superintendent and her assistant and their business offices. Care should be taken to separate the superintendent's quarters, offices, &c., from the main common rooms in such a manner as to secure a reasonable measure of quiet.

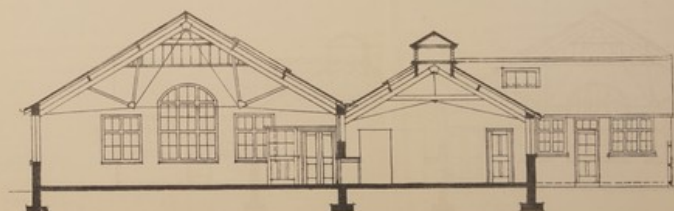
Hospital Block.—Every large hostel should have a small ward, isolation room, surgery and two private rooms for the hospital matron.



DESIGN FOR CANTINEEN ACCOMMODATION FOR 364 DINERS WITH EXTENSION TO 500 DINERS

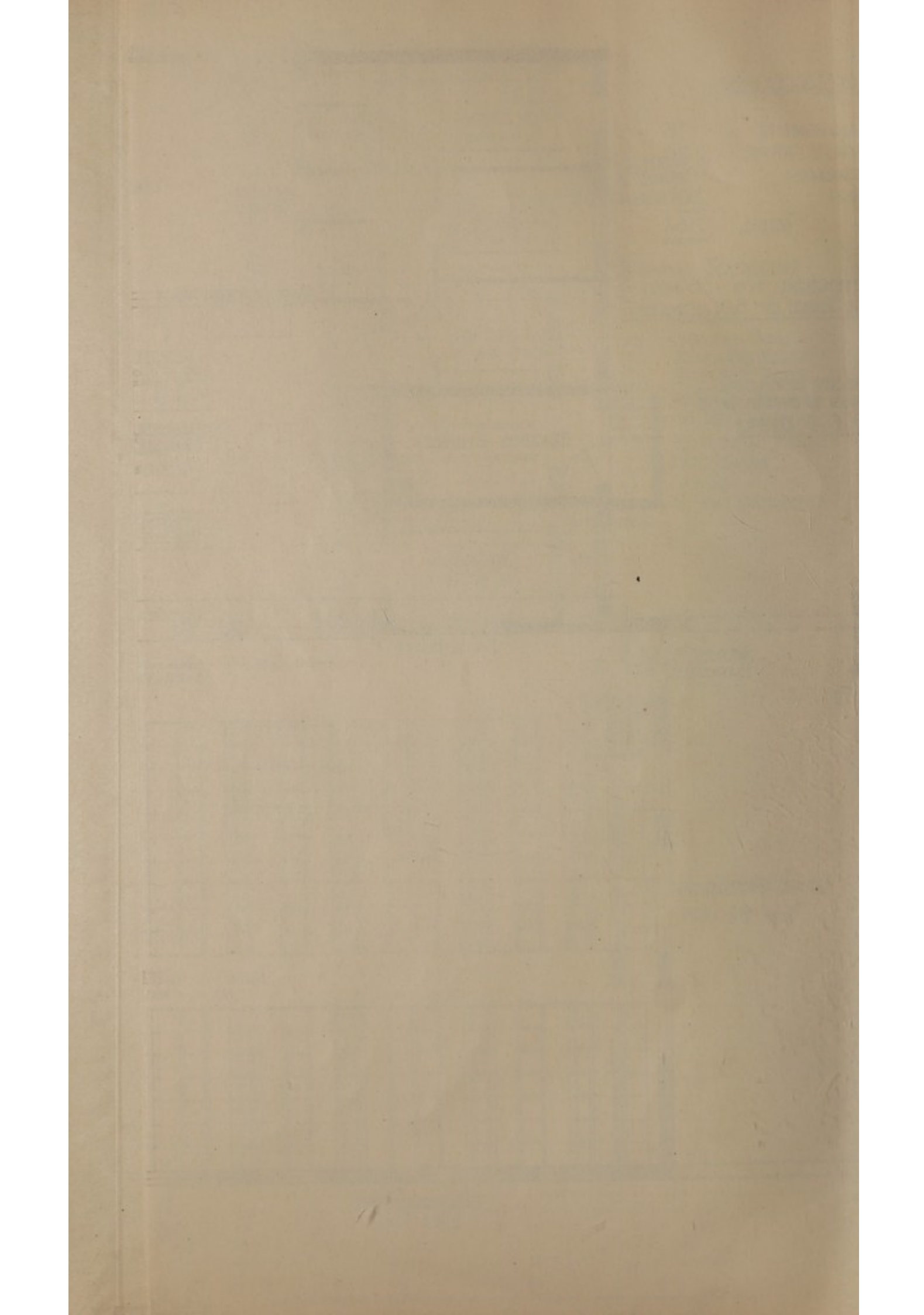


ELEVATION OF CANTINEEN



SECTION A-B

D.N. DYKE A.R.I.B.A.
H.M. OFFICE OF WORKS
LONDON



Recreation Rooms.—The recreation rooms should be ample in space for the number of tenants. For the dimensions in proportion to the number of tenants, see details in Table I. In a large hostel, the recreation rooms should consist of:—

- (1) A large hall for dancing, concerts, social evenings, &c., with a stage and dressing room.
- (2) A quiet room where tenants can read and write and see friends undisturbed.
- (3) A small common room attached to each sleeping block.
- (4) A staff common room (servants' hall) where the staff can rest apart from the other tenants of the hostel.
- (5) A matrons' common room, not attached to the sleeping blocks, where they can be undisturbed by the tenants.

Dining Room and Kitchen.—The kitchen and sculleries should be adjacent to the dining room and divided from the dining room by a counter which, in the case of the scullery, should be fitted with hatchways through which the dirty plates are passed.

It is desirable in large hostels that two or more dining rooms should be provided rather than that one dining room should accommodate all the tenants, the unit for a dining room being preferably 100. The dining rooms should be divided by folding doors, which can be thrown open for entertainments.

Sleeping Accommodation.—Single cubicles are preferred by the tenants, though a certain number of double cubicles are useful. The cubic area of a cubicle should not be less than 400 cubic feet. 6 feet by 9 feet by 8 feet forms a satisfactory cubicle. Cubicles should be partitioned* from each other right up to the roof. The windows may be either sliding or casement. A space of 6 inches should be left between the bottom of the door and the floor to allow for ventilation.

Drying Room and Laundry.—There should be a drying room attached to each sleeping corridor for airing clothes, and for drying wet outdoor clothes. This room should be fitted with hot pipes and hooks. A laundry where tenants can do their own washing is also essential.

Heating.—Central heating should be installed in all temporary hostels, radiators should be fitted for the living rooms and a hot water pipe of 3-inch bore should be passed through each cubicle about a foot from the floor.

Lighting.—Electricity is the best form of lighting for a temporary hostel.

TABLE I.—Approximate superficial area of floor space per person for the various rooms in connection with the erection of Hostels for Girls.

1 No. of girls.	2 Dining hall.	3 Kitchen.	4 Scullery and food preparation.	5 Stores, larder, vegetable, milk, and meat stores.	6 Recreation room.
30	10 ft. super.	8 ft. super.	4 ft. super.	4 ft. super.	Up to 50 girls allow 8 ft. super. for each.
50	8 "	6 "	3 "	3 "	50 to 100 girls allow 5 ft. super. for each.
100	8 "	4 "	2 "	2 "	100 and above 4 ft. super. for each.
250	8 "	2½ "	1½ "	1½ "	Stage, ante and class rooms to be added extra.
400	8 "	2 "	¾ to 1 ft. sup.	1½ "	
800	8 "	1½ "	¾ ft.	¾ ft.	
1,000	8 "	1 "	¾ ft.	¾ to 1 ft.	

N.B.—The figures in column 2 allow 20 in. space for each girl at table, tables 24 in. wide, about 4 ft. space between tables, gangways 4 ft. wide, and ample space in front of counter.

The above figures do not include provision for the staff dining room, sitting room, office and lavatory, or for the boiler house.

TABLE II.

The above table would permit of the following space in a hostel for 400.

Room.	Ft. super. per person.	Total area of room.	Dimensions of rooms.
Dining hall	8 ft.	3,200 ft.	100 ft. by 32 ft.
Kitchen	2 ft.	800 ft.	40 ft. by 20 ft.
Scullery and food preparation ...	¾ ft. to 1 ft.	350 ft. to 400 ft.	Say 2 rooms each 20 ft. by 10 ft. or 1 room 15 ft. by 15 ft., 1 room 15 ft. by 10 ft.
Stores, larder, vegetable, milk and meat stores.	1½ ft.	450 ft.	These would be divided up as best suit plan.
Recreation room	4 ft.	1,600 ft.	Say 50 ft. by 32 ft. or 55 ft. by 30 ft. Ante-rooms extra.

* Cement slabs have been found preferable to matchboarding owing to—(1) The liability of wood to harbour vermin. (2) The scarcity of wood in war time. (3) The security from fire.

EQUIPMENT.

Furniture for Recreation Rooms.—The recreation rooms should be furnished with strong easy chairs, sofas or settees, writing tables in the quiet rooms, and in the large recreation room there should be a piano and a stage with a small dressing room attached. It is difficult to give the number of sofas and chairs which should be supplied in relation to the number of tenants housed, as all the tenants seldom use the common room at one time owing to the different shifts worked. It will, however, probably be sufficient if the easy chairs are provided at a ratio of about 1 to 12 of the tenants housed.

Cubicle Furniture.—Iron bed, size 6 foot 6 inches by 2 feet 6 inches, spring mattress, cleaned wool overlays, two sheets and four blankets. One small chest of drawers or large locker, one looking-glass.

Washing and Sanitary Accommodation.—Basin in iron frame in cubicle or separate washing cubicles in the lavatories. The former are preferable from the point of view of the tenant, but they entail a large amount of extra work upon the staff. One lavatory basin should be provided for every 10 tenants, if separated; one for every 15 should suffice if for common use. One bath should be provided for every 20 tenants. There should be one w.c. for every 12 tenants.

A schedule of equipment is given at the end of this Appendix.

FOOD IN HOSTELS.

Amount.—The primary consideration in catering for munition hostels is that the food supplied should be sufficient to provide the energy necessary for the work which the residents have to do.

Memorandum No. 19 gives 3,500 to 4,000 calories*† per day to a man employed on medium work, an average adult woman worker requires rather less (0.8 or 0.9) than a man. Sample diets are given showing how the desired amount of calories can be obtained and the proportion of the three different classes of foodstuffs (protein, fat, carbohydrates) can best be distributed.

The following amounts of the three main foods given in hostels (before the Regulations of the Ministry of Food were in Force) have been tested and found satisfactory :—

Women	Meat	...	...	...	...	...	3½ ozs. to 8 ozs. per head per day.
	Bread	...	...	...	...	...	3 lbs. to 6½ lbs. per head per week.
	Margarine	...	...	...	...	...	4 ozs. to 8½ ozs. per head per week.
Men	Meat	...	...	...	...	...	6½ ozs. to 12 ozs. per head per day.
	Bread	...	...	...	...	...	6 lbs. to 7 lbs. per head per week.
	Margarine	...	...	...	...	...	4½ ozs. to 8½ ozs. per head per week.

Variety.—Variety affects efficiency both physically and psychologically. One of the secrets of successful hostel management lies in preserving the tenants' interest in their meals. It is a common experience in hostels that the nerve strain of heavy munition work on operatives produces a disposition to be difficult about food, and in hostels where there is little discontent it is generally found that variety of food is studied.

Meals provided.—The number of meals given in the hostels varies from two to four. Four are given when the works are near enough for the residents to return home during the intervals. The types of meals provided are as follows :—

Breakfast.—Porridge (in some parts of the country); a meat dish, e.g., fish, bacon, sausages; tea, bread and margarine, jam.

Dinner.—Meat, two vegetables, pudding or stewed fruit. A cup of tea is sometimes given. In some hostels, mostly in poorer ones, meatless days are observed.

Tea.—Bread and margarine, jam, cake, tea.

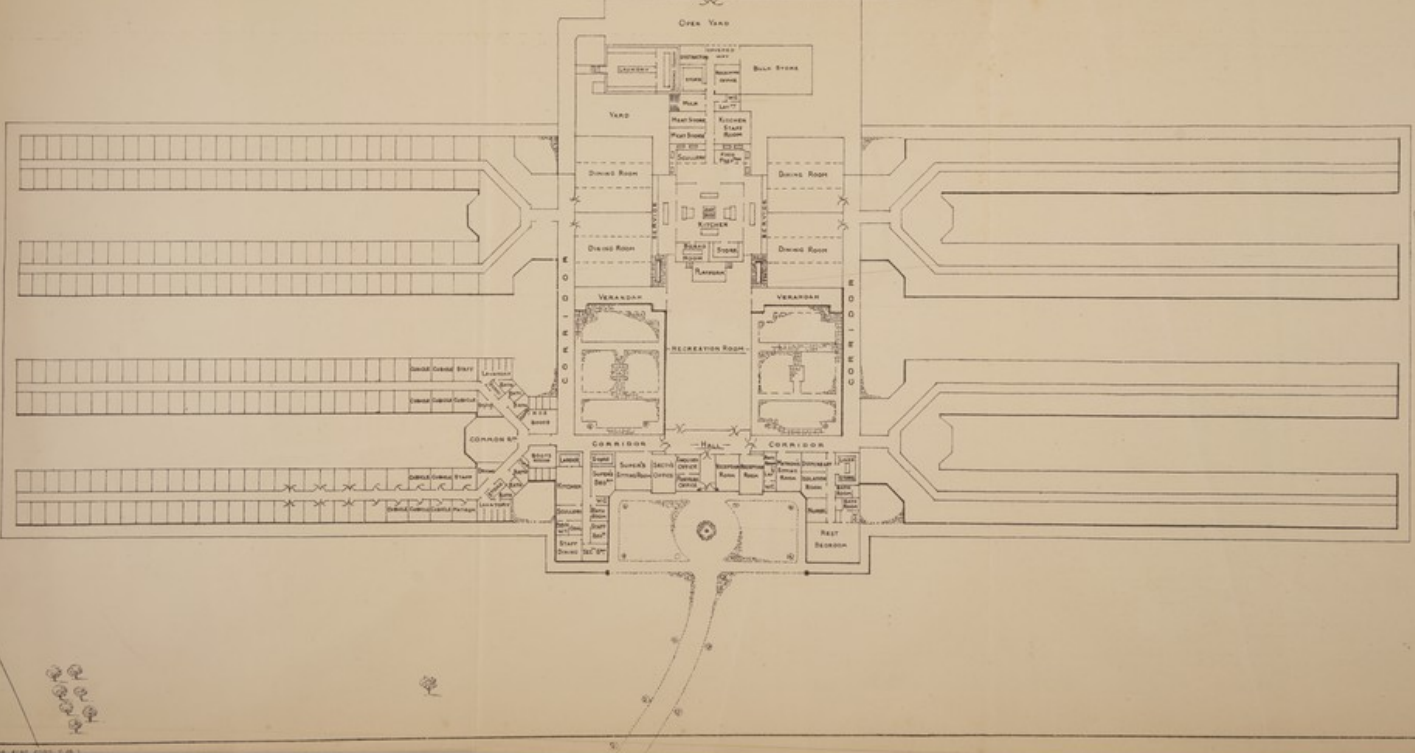
Supper.—Cold meat or a made-up dish, or a milk pudding, bread and cheese, tea, coffee or cocoa. In men's hostels a hot meat supper is often provided.

Food provided.—It is important to provide the staple dishes of the district, because the digestive organs find it easier to digest food to which they are accustomed. Among such dishes the following have been noted. In the southern Midlands and the south the kind of food which is popular is heavier than that which is customary in the north. More meat is eaten on the whole, and suet puddings, jam rolls, &c., are included more frequently. In the north of England and Scotland more porridge is eaten. In many Scottish hostels no meat dish is provided at breakfast in addition to porridge. Fried fish and chips are favoured by many Yorkshire and Scottish workers in preference to meat. Meat turnovers and shepherd's pie, broth and boiled beef are popular Scottish dishes also. In general, meat is not considered so indispensable by Scottish working people as it is in England. This applies especially to women.

* The energy expended in mechanical work (1 calorie) is equivalent to the energy expended in lifting 1 kilogram through 425.4 metres.

† For the calorie values of individual food stuffs see a report drawn up by a Committee of the Royal Society and published by H.M. Stationery Office under the title of "The Food Supply of the United Kingdom," Cd. 8421, price 4d

TYPICAL HOSTEL FOR 500 GIRLS
Scale 30 ft.-1"



TYPICAL HOSTEL FOR 500 GIRLS

Scale 30 ft. = 1 in.

For tea and breakfast oatcake and barley meal scones are eaten in the north. Potato dishes have been tried with considerable success. Maize has been found to be unpopular and indigestible. Suet puddings and rolls are thought by the workers to be sustaining. Meat pasties are also popular.

Provision of lunches to be taken to the factory is a difficult matter. Carried food is found to be unsatisfactory for two reasons:—

- (1) It becomes dry and unpalatable if in the form of sandwiches.
- (2) If it is in a made-up form its digestibility is certain to suffer in the process of re-heating.

It is not, however, possible to abolish the system entirely. It is much cheaper for girls to pay an inclusive fee and take lunch from the hostel. There is a strong prejudice, especially in the north in favour of bringing food to work rather than buying it at the canteen. In many small works there is no canteen, only a mess-room. The following lunch, provided at a women's hostel where catering is satisfactory, gives an idea of what is necessary:—

1 slice of meat roll (made with very little meat and strongly flavoured with onion).

1 square of jam tart.

2 rounds of bread and cheese.

$\frac{1}{2}$ round of bread and butter.

Dry tea or cocoa.

In one women's lodging house the lodgers feed themselves on 1s. 3d. per day. For this they are only able to have meat twice a week. Typical meals are as follows:—

Breakfast.—Bacon or kipper, tea, bread and margarine.

Dinner.—Fried fish, tea, bread and margarine.

Tea.—Bread and margarine, and tea.

On the days when meat is bought the women have only a cup of tea in the morning, and combine breakfast and dinner in the meat meal.

The feeding of men in navvy huts is receiving much attention now. One managing contractor who had had experience of housing navvies in various parts of Scotland has decided to abolish the mess-room altogether, and to have the canteen only, so that he may have the feeding of the men under his own control. In this connection comfort in the canteen is of importance. Navvies are notoriously restless, but men who are comfortably fed are more likely to stay on the work, and managers are beginning to try the effect of more attractive surroundings.

Methods of buying.—Skillful buying combined with the most economical use of foodstuffs is the secret of successful catering.

Those hostels which are attached to a large factory have a great advantage in this respect in that the buying is done centrally, and the hostel reaps the benefit of wholesale prices, and in some cases will avoid competition with other hostels. Large hostels have a similar advantage over small ones. There is, however, great scope for a matron's ability in retail buying, because prices often vary in different parts of the same town, although seeking out the best and cheapest shops is a severe tax on her time and strength. The difficulty and cost of transport has to be reckoned with if supplies are brought from a distance. Good storage accommodation is essential if buying is done on a large scale. Methods of buying are, of course, materially affected by rationing or other war-time emergency conditions.

The prevention of waste.—Waste on the part of the tenant can be prevented in two ways:—

- (1) By making dishes so palatable that very little is left on the plates at meals.
- (2) By using up all scraps.

Variety and attractiveness are the most difficult qualities to ensure in catering. Monotony in menus leads to food being left. Twice-cooked food soon becomes unpopular if served too often, and the traditional British method of cooking vegetables is unattractive in the extreme.

The second method, viz., using all scraps of food left, is carried out by most matrons according to their ability. In some places, if the tenants know what is being done in this way, they are apt to object on hygienic grounds. It was found in the case of two hostels under the same management that in one the tenants thought it unwholesome to use bones taken from the plates for the stockpot, while in the other hostel the tenants quite approved of it.

As to the ways in which saving is effected, it is found that educated cooks are the most enlightened and expert. All bones and scraps from plates, except starchy scraps and green vegetables, can be used in the stockpot. Waste bread can be used without danger if it is baked and grated. It can be mixed

with flour for puddings, etc. In connection with methods of cooking it has been established by experiments made in King's College that slow cooking of meat in a gas oven effects a saving of 9 lbs. in every cwt. Experiments in the methods of cooking dried pulses have shown the economy of using the water in which these are cooked as a basis for stock of soup.

A la carte catering, though in other respects more difficult, may be a method of avoiding waste in so far as workers can choose what they wish to eat. This cannot be carried out in small hostels. It is also open to objection on the ground that many girls cannot be relied on to select a suitable and nourishing diet.

MANAGEMENT.

The superintendent is the most important factor in hostel management. A hostel superintendent should possess a tactful, sympathetic and understanding personality.

In *Women's Hostels* she should be an educated woman, and to be really successful she must, as far as possible, know her tenants personally and take an interest in the social side of their life. To manage a colony composed of people differing widely as to age and social standing, is not easy. Nor are the tenants the only persons to be considered, for the management of the staff often requires considerable skill, especially in large hostels.

The value of having *educated women as canteen workers* is well known. Where they have been employed it has been observed that not only has the waiting been more efficient, and the food better served, but there has been a marked improvement in the tone and general behaviour of the girls.

Voluntary workers to organise recreations and amusements in the hostels have been found to be a great asset. They bring an outside element into the hostel which is much needed. In some instances the hostel staff has been drawn entirely from voluntary workers, but this has not proved to be altogether satisfactory.

Tenants' Committees.—The committee is elected by the tenants from among themselves and in co-operation with the superintendent, makes and enforces all rules, hears complaints, and is generally responsible for the behaviour of the tenants. It is noticeable that in hostels where these committees are working there is a feeling of *esprit de corps* among the girls to an extent unknown in other hostels.

Rules in Hostels.—It has been found in hostels that the minimum amount of rules produces the best results in behaviour. Where there are few restrictions the girls feel that they are being trusted, and this is a fact which they appreciate. In no instance has it been found that the girls have taken advantage of the greater amount of freedom.

Recreation in Hostels is an important factor in making for happiness and good feeling among the tenants. Hostels are often situated in isolated areas where outside recreations and entertainments are beyond the reach of the tenants. At many hostels therefore regular schemes for outdoor and indoor recreation have been organised.

Women Patrols are doing a valuable work at some of the large hostels, but their employment must be considered as an emergency precaution rather than a part of an ideal form of management.

Men's Hostels.—Good male warders are necessary for all men's hostels, and there should be one on duty all night as well as in the daytime. In every possible case tenants committees should be formed, and the hostels run as residential clubs. The household work of the general run of the men's hostels is best done by a staff of maids under a competent matron, if suitable quarters can be arranged. A good standard as regards cleanliness and minor comforts has been secured in some hostels for skilled men by the appointment of an educated woman to supervise the household work.

Staff.—The following are suggested as the average proportions of staff to tenants required in munition hostels:—

Housing 100 and over:

Proportion of staff to tenants, 1 to 10.

Housing between 50 and 100.

Proportion of staff to tenants, 1 to 8.

Housing under 50.

Proportion of staff to tenants, 1 to 6.

The following are the usual rates of pay at *women's* hostels:—

Superintendents	...	...	...	...	...	£200 to £250 per annum all found.
Assistant superintendents	...	...	...	...	...	20s. to £3 1s. 6d. per week all found.
Secretaries	...	...	...	...	...	25s. to 30s. per week all found.
Head Matrons	...	...	...	...	...	£2 10s. to £4 4s. per week all found
Nurse Matrons	...	...	...	...	...	35s. to 40s. per week all found.
Matrons	...	...	...	...	...	12s. 6d. to 30s. per week all found.
Games Mistress	...	...	...	...	...	25s. to £2 5s. 2d. per week all found.
Canteen Superintendent	...	...	...	...	...	£3 17s. all found.
Canteen Supervisors	...	...	...	...	...	20s. to £2 10s. per week all found.
Storekeepers	...	...	...	...	...	25s. to 35s. per week all found.
Cooks	...	...	...	...	...	15s. to 35s. per week all found.
Maids	...	...	...	...	...	12s. to 16s. per week all found.

The following are the usual rates of pay in *men's* hostels, which are generally less well staffed than women's hostels :—

Superintendents* and Head Matrons		£100 to £200 per annum all found.
Assistant Matrons		21s. to 25s. per week all found.
Cooks		20s. per week.
Waitresses and maids		12s. to 15s., except in one group of hostels where the head maid gets 19s. per week.

RECREATION FOR HOSTELS.

Classes.—Educational schemes are being much discussed at present in connection with hostels, chiefly because hostels seem to be good centres for developing classes. The following considerations show, however, that great caution must be used in starting schemes in hostels :—

- (1) The hostels are, or should be, homes for the time being. Residence is entirely voluntary and therefore rules and restrictions should be the minimum necessary. Educational schemes imposed from outside may tend to destroy this home feeling.
- (2) Most munition work is heavy, and the shifts are long. Tenants have not much energy at the end of the day to devote to serious study.

Classes, however, are becoming more and more popular in hostels. The best way to develop them is as a rule to ascertain from a committee of tenants what is wanted, and then to propose a scheme. The large hostels are obviously the most interesting fields for development. The Y.M.C.A. have set on foot a scheme for giving courses of lectures at hostels and canteens. Eight of the large hostels have taken advantage of this scheme. The tenants have chosen the subjects of the lectures from a syllabus issued by the Y.M.C.A., the most popular being descriptions of the various fronts illustrated with lantern slides. The object of lectures should be not so much to increase knowledge of particular subjects as to increase breadth of view, and to provide distraction from the strain of long and monotonous work.

In the case of hostels which belong to societies such as the Y.M.C.A. and the G.F.S., there is often an institute out of which the hostel originally grew, and non-resident members attend lectures and classes there. In the past, sewing, dressmaking, singing and Bible-classes were chiefly carried on. Since the war, lectures on hygiene, sick nursing, and first-aid, dancing classes and literature have become more popular. In one hostel, housing girls from 16 years of age, the old-fashioned Scottish plan is followed of having the schoolmaster twice a week at the hostel to teach arithmetic, literature and singing. In some of the small North Country hostels, the matrons have domestic circles for sewing, reading, etc.

Libraries.—There is great demand for libraries of modern books in hostels. There are libraries which have existed for many years in the Institutes of various societies, but some of them would be improved by the addition of new books. A certain sum has just been set aside by the Welfare and Health Section of the Ministry of Munitions out of which small grants will be made for books and pictures in hostels. These books should be chosen by the residents themselves and made the nucleus of a library to be formed gradually by subscription. Newspapers and magazines should be taken in. In one Government hostel the public library sends books, and changes them periodically from lists selected by the girls. This is a good plan, but a library which is subscribed for is more valued.

Games.—Games are much easier to provide in large than in small hostels. In one or two hostels there is a trained games mistress, and hockey and football are played in winter, lawn tennis in summer. In small hostels there is rarely any ground available. Where there is sufficient space a tennis court or Badminton court to which men friends can be invited may be provided.

Organised games are not always popular, chiefly because the girls have not played them at school. Where quite young girls are housed, hockey, football, etc., are more likely to succeed. Organised games are being tried in factories and hostels, but in many cases the hours of work prevent workers from taking advantage of them. In one hostel drills are held by the Woman Police Inspector, and are well attended. In the case of small hostels matrons may be able to encourage outdoor recreation by advising girls to join their factory athletic clubs, local clubs, etc.

Gardening.—Grants have been made for gardening tools and seeds from the fund which the Maharajah Scindia has given to the Ministry of Munitions. The results have been very satisfactory. The girls have taken up gardening with great zest, and the waste ground between the blocks of cubicles has yielded good crops of vegetables.

HOSTEL FINANCE.

Cost of building a temporary hostel of wood, concrete blocks or other temporary material necessarily varies with the size, local conditions and changes in cost of labour and materials. It may, however, be roughly estimated at 7d. per cubic foot for structure only, or at from £40 per head for a small hostel to £20 per head for a large one. This figure should cover the requisite dining and recreation rooms, but is exclusive of drainage, fencing, paving and road making.

Cost of furniture and equipment may be put at from £17 10s. to £20 a head in adapted hostels; including kitchen equipment. In large temporary hostels the cost is only about £8 to £10 exclusive of kitchen equipment.

* At our large hostels the Superintendent's salary averages £327 10s.

Cost of maintenance.—The cost of catering to the management may be estimated on the basis of the prices prevailing in November, 1917, at :—

Men.		Women.	
Number provided for.	Cost.	Number provided for.	Cost.
	s. d.		s. d.
50	15 10	50	13 9
100	14 6	100	13 2
300	13 6	300	12 7
500	12 6	500	11 3
1,000	12 0	1,000	10 8

Other expenses of maintenance (e.g., salaries, rent, rates, lighting, heating, etc.) may be estimated at from 5s. to 7s. per head per week.

Hostel charges.—The above figures suggest that in order that a hostel may be self-supporting it is necessary that a charge of from 21s. to 17s. a week should be made to men, and from 19s. to 17s. to women. Admittedly in theory hostels should be self-supporting, but in practice there are grave difficulties in the way of doing so. It would involve in general hostel charges being higher than those for lodgings. Many workers live in hostels because there is no other decent accommodation available, and it is in their own and the national interest that they should do so, on the other hand it is unjust that circumstances beyond their own control should place them at a financial disadvantage, especially as they have often showed considerable patriotism in volunteering for employment in places remote from their own homes. This particular difficulty might be met by paying them higher wages, but to do so would involve fresh difficulties through their being paid at a higher rate than their fellow-workers, who are able to live in lodgings or at home. Moreover hostels vary in cost, the smaller and more popular being the more expensive. In consequence of these difficulties it has been usual for charges to be determined according rather to the circumstances of the locality than to the cost of working, and recent inquiries suggest that they tend to be fixed somewhat below rather than above the local charges. Hostels are, in fact, normally run at a loss.

Grants from the State.—Since it is in the interest of all parties to encourage the provision of hostels by voluntary bodies, grants are payable in aid of initial charges in cases where it can be shown that if these charges are paid off the hostel would be self-supporting. Under certain conditions private firms have been allowed to charge initial cost against excess profits; loans for a similar purpose can also be granted within certain limitations. In view of their special importance and their difficulties of working, clearing hostels may under certain conditions receive a maintenance grant of 6d. per person per day.

SUGGESTED SCHEDULE OF EQUIPMENT AND FURNITURE FOR A HOSTEL TO ACCOMMODATE 400 GIRLS.
(This schedule may also be taken as applicable to a skilled workmen's hostel, though not to one for navvies.)

(a) *Administration Block.*

Office—

- 1 knee-hole writing table, 5 ft. by 2 ft. 9 in.
- 1 armchair.
- 1 writing table 4 ft. by 2 ft. 3 in.
- 2 small chairs.
- 1 scuttle and shovel.
- 1 safe.
- 2 cupboards, 3 ft.

Staff Room—

- 1 rug, 7 ft. by 5 ft.
- 1 dining table.
- 1 sideboard.
- 6 small chairs.
- 2 elbow chairs.
- 2 cupboards, 3 ft.

Superintendent's Bedroom.

- 1 3-ft. iron combination bedstead.
- 1 mattress.
- 1 canvas platform.
- 1 wool bolster.
- 1 feather pillow.
- 4 sheets.
- 3 pillow slips.
- 3 blankets.
- 2 counterpanes.
- 1 down quilt.
- 1 dressing chest.
- 1 washstand.
- 1 toilet set.
- 1 chair.
- 1 water bottle and tumbler.
- 1 bedside rug, 4 ft. 6 in. by 2 ft. 3 in.
- 1 large rug.
- 1 coal scuttle and fire irons.

Superintendent's Bath Room.

- 1 chair.
- 1 toilet fixture.
- 1 hanging mirror.

Superintendent's Sitting Room—

- 1 carpet.
- 1 table with drawer, 4 ft. 6 in. by 2 ft. 6 in.
- 1 circular table, 3 ft.
- 1 table cover.
- 4 small chairs.
- 1 armchair.
- 1 easy chair.
- 1 curb fender.
- 1 coal cauldron.
- 1 fire set.

Staff Kitchen—

- 1 kitchen table, 5 ft. by 3 ft., and 1 drawer.
- 3 Windsor chairs.
- 1 hearth rug.
- 1 pair house steps.
- 1 clothes horse.

Kitchen Utensils, Hardware, Cutlery, Crockery, Table Linen

Towels, &c., for Staff—

- 1 dinner service for 6 persons.
- 1 tea service for 6 persons.
- 12 meat plates.
- 12 soup plates.
- 12 tea plates.
- 2 meat dishes.
- 12 large cups and saucers.
- 12 small cups and saucers.
- 12 egg cups.
- 12 tumblers.
- 3 China cruets.
- 6 milk jugs (assorted).
- 1 1-quart-milk jug.
- 1 1-pint milk jug.
- 3 sugar basins.
- 2 slop basins.
- 2 jam dishes and spoons.
- 2 glass water jugs.
- 2 enamelled pails.
- 2 12-in. enamelled pie dishes.

Kitchen Utensils, Hardware, Cutlery, Crockery, Table Linen, Towels, &c., for Staff—continued.

1 9-in. enamelled colander.
 2 4-pint milk cans.
 1 1-quart graded milk measure.
 3 trays (assorted).
 1 6-in. enamelled ladle.
 2 12-in. enamelled basins.
 6 7-lb. canisters.
 1 2-lb. tea canister.
 1 bread pan.
 1 2-quart teapot.
 1 1-quart teapot.
 1 1-quart coffee pot.
 2 12-in. fry-pans.
 3 saucepans.
 1 4-gallon saucepan.
 3 galvanised pails.
 1 slop pail.
 15 large knives and forks.
 15 small knives and forks.
 15 dessert spoons.
 15 table spoons.
 15 tea spoons.
 15 egg spoons.
 3 salt spoons.
 3 mustard spoons.
 2 carving knives and forks.
 1 steel.
 2 bread knives.
 1 egg whisk.
 1 egg slicer.
 1 tin opener.
 1 wooden mixing spoon.
 1 iron mixing spoon.
 1 potato-masher.
 1 cook's fork.
 1 flour-dredger.
 1 sink-basin.
 2 wire dish covers.
 1 apple cover.
 1 coal scuttle.
 1 shovel.
 1 poker.
 1 kitchen fender.
 1 flue brush.
 2 flat irons.
 1 iron stand.
 1 ironing blanket.
 1 ironing cloth.
 1 clothes basket.
 36 clothes pegs.
 1 2-ft. 6-in. pot stick.
 1 hand-wringer (18-in. roller).
 2 soft brooms.
 1 hard broom.
 2 scrub brushes.
 1 mop.
 2 blacklead brush sets.
 2 dust-pans.
 2 soft brushes.
 2 Turk's-head brushes.
 6 table cloths.
 12 table napkins.
 12 drying cloths.
 6 glass cloths.
 12 dusters.
 12 sweat cloths.
 12 house flannels.
 4 18-in. calico pudding-cloths.
 12 bath towels.
 24 hand towels (Huckaback).
 24 hand towels (Turkish).
 6 roller towels.
 roller fittings.
 1 knife-box.
 1 knife-board.
 1 toasting-fork.
 1 mincing machine.
 1 9-in. wire sieve.
 1 bread board, 24 in. by 10 in.
 1 meat board, 16 in. by 10 in.
 1 bread-platter.
 1 rolling-pin.
 1 pair spring scales (to 14 lbs.).

Kitchen Utensils, Hardware, Cutlery, Crockery, Table Linen, Towels, &c., for Staff—continued.

1 electric torch.
 1 lemon-squeezer.
 1 hammer.
 2 small axes.
 2 toilet holders.
 1 alarm clock.
 1 clock (without alarm).
 4 soap-holders.
 1 screwdriver.
 1 box opener.
 12 baths.
Maid's Bed Room—
 1 2-ft. 6-in. combination iron bedstead.
 1 wool mattress.
 1 wool bolster.
 1 mattress slip.
 1 pillow.
 4 pillow slips.
 3 sheets.
 3 blankets.
 1 counterpane.
 1 combination dressing-chest and washstand.
 1 toilet set.
 1 chair.
 1 bedside rug.
Scullery—
 1 table, 4 ft. by 2 ft. 3 in.
 1 mat.
Porter—
 1 chair.
 1 coal scuttle.
 1 shovel.
 1 small table.
Linen Store—
 1 chair.
 1 coal scuttle.
 1 shovel.
 2 cupboards, 3 ft.
Dispensary—
 3 chairs.
Bath Room and Lavatory.
 2 toilet fixtures.
 1 hanging mirror.
Nurse's Sitting Room—
 1 large rug.
 2 small chairs.
 1 easy chair.
 1 small table (with drawer).
 1 table.
Nurses' Room—
 1 3-ft. combination iron bedstead, with bedding as before
 1 combination dressing chest and washstand.
 1 toilet set.
 1 chair.
 1 bedside rug.
 1 water bottle and tumbler.
Isolation Room—
 1 2-ft. 6-in. iron combination bedstead.
 1 mattress.
 1 mattress cover.
 1 bolster.
 1 pillow.
 4 pillow slips.
 3 sheets.
 3 blankets.
 1 counterpane.
 1 combination dressing-chest and washstand.
 1 toilet set.
 1 bed-pan.
 1 chair.
 1 bedside rug.
Sick Ward—
 5 2-ft. 6-in. bedsteads with bedding as before.
 5 chairs.
 5 lockers.
 5 chambers.
 1 bed-pan.
 1 table.
 1 chair.
 5 bedside rugs.
 5 hanging mirrors.
 1 carrying-chair.

(b) *Suggested Equipment for Five Blocks of Cubicles each Block containing 80 girls, 2 maids, and 1 matron.**Cubicles (each Cubicle has a cupboard fixture)—*

410 2-ft. 6-in. iron combination bedsteads.

(Bedding as for Isolation Room.)

410 chambers.

410 lockers.

410 bedside rugs.

410 hanging mirrors.

410 enamelled mugs.

5 Matrons' Rooms—

5 iron bedsteads with bedding as before.

5 combination dressing-chests.

5 toilet sets.

5 large rugs.

5 easy chairs.

5 water bottles and tumblers.

5 small tables.

5 Common Rooms—

30 easy chairs.

60 small chairs.

10 rugs.

20 circular tables (3 ft.).

10 cupboards (3 ft.).

Towels—

830 Turkey towels.

830 Huckaback towels.

60 roller towels.

(c) *Canteen and Dining Hall.*

(To seat 384 persons.)

Dining Hall—

64 trestle tables (5 ft. 3 in. by 1 ft. 10 in.).

84 chairs.

Orckery—

504 dinner plates.

504 soup plates.

504 pudding plates.

504 tea plates.

504 cups and saucers (breakfast).

200 egg cups.

72 sugar basins.

72 slop basins.

72 water jugs (1 quart).

500 tumblers.

72 salt dredgers.

72 pepper pots.

72 mustard pots.

36 vinegar bottles.

36 teapots (two persons).

36 cream jugs.

24 meat dishes (assorted sizes).

Cutlery—

6 pairs carving knives and forks.

504 table knives.

504 cheese knives.

504 table forks.

504 dessert forks.

504 teaspoons.

504 dessert spoons.

144 table spoons.

72 salt spoons.

72 mustard spoons.

4 steels.

Linen—

48 dusters.

48 glass cloths.

144 small towels.

36 roller towels.

48 kitchen rubbers.

20 muslin strainers.

36 swabs.

200 table cloths (2½ yards by 1½ yards) (or American cloth to fit table tops).

Kitchen Utensils—

20 enamelled bowls.

30 large pudding basins.

12 baking-tins for meat.

12 cake tins.

12 large pie dishes.

1 potato masher.

3 milk pails.

6 milk cans.

24 enamelled jugs.

4 ladles.

1 bread-pan.

Kitchen Utensils—continued.

6 bins for flour, &c.

4 strainers.

4 graters.

1 knife machine.

1 mincing machine.

1 potato-peeling machine.

1 bread-cutter.

1 meat chopper.

1 axe.

6 cook's knives.

6 cook's forks.

3 tea urns.

3 fish kettles.

3 large fry-pans.

3 small round fry-pans.

6 oval pots and covers (3 to 6 gallons).

12 iron saucepans (4 4-pint, 4 8-pint, 2 12-pint, 2 16-pint).

12 enamelled saucepans (various sizes).

6 coffee pots.

12 enamelled teapots (2 pints).

24 teapots (one person).

6 colanders.

3 large kettles.

3 hard brooms.

6 soft brooms.

6 bannister brushes.

6 dustpans.

6 scrubbing brushes.

6 Turk's head brushes.

3 blacklead brush sets.

12 Jap trays.

6 egg whisks.

6 egg slicers.

2 meat chopping-boards.

3 pastry boards.

3 rolling pins.

12 knife boxes.

4 flour dredgers.

6 wire dish covers.

1 weighing machine.

1 set of scales and weights (to 28 lbs.).

sink baskets.

6 wire sieves.

200 plate covers.

6 iron spoons.

12 wooden spoons.

1 step-ladder.

3 tin openers.

3 corkscrews.

1 hammer.

2 screwdrivers.

1 box-opener.

12 slop-pails and covers.

6 galvanised pails.

3 clothes baskets.

1 clock.

6 water cans.

Staff Dining Room—

4 tables (5 ft. by 2 ft. 6 in.).
 24 small chairs.
 1 cupboard (3 ft.).
 6 easy chairs.
 Scuttle and fire irons.

Canteen Superintendent's Room—

1 writing table.
 1 armchair.
 1 table with drawer.
 2 chairs.

Recreation Room (with Annexes).

12 easy chairs.
 75 chairs.
 12 tables (2 ft. by 2 ft.).
 4 cupboards (3 ft.).
 3 writing tables (5 ft. by 2 ft. 9 in.) } For
 1 table (4 ft. by 2 ft. 3 in.) } Ante-
 1 blackboard and easel. } rooms.

Laundry—

1 wringer.
 2 buckets (3 gallons).
 20 yards ironing felt.
 1 skirt board.
 1 sleeve arm.
 10 iron stands.
 18 irons.
 6 washing boards.
 2 laundry brushes.
 2 clothes baskets.
 1 large clothes horse.
 4 dozen clothes pegs.
 6 pot sticks.

General—

Door mats.
 Scraper mats.
 Dust bins.
 Linoleum to floors.
 Blinds to windows.
 Fire extinguishers.

APPENDIX G.

MEDICAL CERTIFICATES OF INCAPACITY FOR WORK.

[Booklets of medical certificates on the lines set out below can be obtained on application to the Health and Welfare Section of the Ministry. They are intended to be used for persons employed on Munitions of War who are found to be unfit to follow their present occupation. They are for factory purposes only.]

MINISTRY OF MUNITIONS FACTORY CERTIFICATE.

I hereby certify that on 20th March, 1917, I examined (Name) John Smith (Sex) M.
 (Age) 44 (Address) 21, High Street, London, who states his or her present occupation to be fitter and who in my opinion is rendered (i) unfit to follow that occupation through disease of (ii) :—

- (1) Respiratory Tract, viz. : Broncho-Pneumonia
 (2) Digestive Tract, viz. :
 (3) Circulatory System, viz. :
 (4) Central Nervous System, viz. :
 (5) Special Sense Organs, viz. :
 (6) Locomotive System, viz. :
 (7) Skin, viz. :
 (8) Other conditions, viz. :

Is immediate rest from work necessary Yes

Absence from work (iii) ^{is} likely to be necessary for longer than a week.
 is not

(Signed) W. Robinson (Registered Medical Practitioner).

(Date) 20th March, 1917

(Address) High Street, London

To be filled up by the Firm :—

(1) Period of absence Days

(2) Name and Address of Firm

(i), (ii), (iii) see Notes.

IMPORTANT.—This Certificate must be sent to the Factory the same day that it is obtained completed from the Doctor.

Notes.

(i) The words "unfit to follow that occupation" are to be understood to include not only cases in which the patient's illness (or injury) renders him physically incapable of performing his work, but also cases in which the illness (or injury) is of such a nature that the patient's health would be seriously endangered by continuing to perform it.

(ii) The exact diagnosis should be entered under the appropriate heading. If an exact diagnosis cannot be recorded the system of the body principally affected should be indicated by initials. See sample forms at end of the book and back of cover.

(iii) The words "is not" or "is" (as the case may require) to be struck out where it is possible to make this prognosis.

As suggestions for filling in a diagnosis in the appropriate category, the following examples are given :—

1. Respiratory tract, e.g., Bronchitis, pulmonary tuberculosis, pneumonia, adenoids.
2. Digestive tract, e.g., Tonsillitis, indigestion, appendicitis, diarrhoea, colitis, gastric ulcer, gastric carcinoma.
3. Circulatory system, e.g., Anæmia, morbus cordis, angina pectoris, varicose veins.
4. Central nervous system, e.g., Debility, tabes, neurasthenia.
5. Special sense organs, e.g., Astigmatism, cataract, otorrhoea.
6. Locomotive system, e.g., Rheumatism, sciatica, lumbago, chronic arthritis.
7. Skin, e.g., Scabies, industrial dermatitis.
8. Other, e.g., Nephritis, measles, salpingitis, lead poisoning.

APPENDIX H.

POLICE, FACTORIES, &c. (MISCELLANEOUS PROVISIONS), ACT, 1916, SECTION 7.

Factories and Workshops.

7.—(1) Where it appears to the Secretary of State that the conditions and circumstances of employment or the nature of the processes carried on in any factory or workshop are such as to require special provision to be made at the factory or workshop for securing the welfare of the workers or any class of workers employed therein in relation to the matters to which this section applies, he may by Order require the occupier to make such reasonable provision therefor as may be specified in the order, and if the occupier fails to comply with the requirements of the order or any of them, the factory or workshop shall be deemed not to be kept in conformity with the Factory and Workshop Act, 1901.

(2) The following shall be the matters to which this section applies:—

Arrangements for preparing or heating, and taking, meals; the supply of drinking water; the supply of protective clothing; ambulance and first aid arrangements; the supply and use of seats in workrooms; facilities for washing; accommodation for clothing; arrangements for supervision of workers.

(3) Orders may be:—

- (a) Be made for a particular factory or workshop, or for factories or workshops of any class or group or description;
- (b) Be made contingent in respect of particular requirements upon application being made by a specified number or proportion of the workers concerned, and may prescribe the manner in which the views of the workers are to be ascertained;
- (c) Provide for the workers concerned being associated in the management of the arrangements, accommodation, or other facilities for which provision is made, in any case where a portion of the cost is contributed by the workers; but no contribution shall be required from the workers in any factory or workshop, except for the purpose of providing additional or special benefits which, in the opinion of the Secretary of State, could not reasonably be required to be provided by the employer alone, and unless two thirds at least of the workers affected in that factory or workshop, on their views being ascertained in the prescribed manner, assent.

(4) If, in the case of any order proposed to be made for a particular factory or workshop, the occupier, or, in the case of an order for factories or workshops of a particular class or group or description, the majority of the occupiers of factories or workshops of that class or group or description, dispute the reasonableness of the requirements in the proposed order or any of them, the objection shall be referred for settlement to a referee selected in accordance with rules made under this section, but the Secretary of State may so refer any objection though not made by a majority of the occupiers if he thinks desirable.

(5) Save as otherwise expressly provided in the order, the occupier of a factory or workshop shall not make any deduction from the sum contracted to be paid by him to any workman or receive any payment from any workman in respect of any provision made in pursuance of an order under this section, and, if he makes any such deduction or receives any such payment, he shall be guilty of an offence against the Truck Act, 1831, and shall be liable to the penalties imposed by section nine of that Act as if the offence were an offence mentioned in that section.

(6) The Secretary of State may make rules as to the time within which, and the manner in which, notice of objection to any order may be made, and as to the selection of, and the procedure before, a referee and the cost of the proceedings before a referee (including the remuneration of the referee).

(7) Any order made under this section may be revoked at any time in whole or in part by the Secretary of State, without prejudice to the making of a further order.

(8) This section shall not apply to domestic factories or workshops.

(9) The Secretary of State may by a special order made in accordance with the provisions of section one hundred and twenty-six of the Factory and Workshop Act, 1901, extend the matters to which this section applies to matters other than those mentioned in this section.

Orders under this Section have been made by the Home Office in regard to:—

- (a) *Drinking Water*, dated October 9th, 1917 (see page 98, on which the substance of this Order is given).
- (b) *First Aid*, dated October 12th, 1917. (The terms of this Order are given in Appendix I, page 133.)
- (c) *Manufacture of Tinplates*, dated October 5th, 1917, dealing with the provision of protective clothing, cloakrooms, messrooms and facilities for washing.
- (d) *Use of Bichromate of Potassium or Sodium in Tanning*, dated 22nd March, 1918, dealing with the provision of protective clothing, First Aid appliances, cloakrooms, messrooms and washing facilities.
- (e) *Use of Bichromate of Potassium or Sodium in Dyeing, other than Job-Dyeing*, dated 22nd March, 1918, dealing with the provision of protective clothing, First Aid appliances, cloakrooms, messrooms and washing facilities.

APPENDIX I.

FIRST AID.

ORDER, DATED OCTOBER 12TH, 1917, MADE BY THE SECRETARY OF STATE UNDER SECTION 7 (1) OF THE POLICE, FACTORIES, &c. (MISCELLANEOUS PROVISIONS) ACT, 1916, IN REGARD TO AMBULANCE AND FIRST AID ARRANGEMENTS AT BLAST FURNACES, COPPER MILLS, IRON MILLS, FOUNDRIES, AND METAL WORKS.

In pursuance of Section 7 of the Police, Factories, &c. (Miscellaneous Provisions) Act, 1916, I hereby make the following Order, and direct that it shall apply to all factories in the following classes:—

Blast Furnaces.
Copper Mills.
Iron Mills.
Foundries.
Metal Works.

First Aid.

1. In every factory to which this Order applies and in which the total number of persons employed is 25 or more, the occupier shall provide, in readily accessible positions, "First Aid" boxes or cupboards in the proportion of at least one to every 150 persons.

The number of "First Aid" boxes or cupboards required under this provision shall be calculated on the largest number of persons employed at any one time, and any odd number of persons less than 150 shall be reckoned as 150.

Provided

- (i) That an ambulance room maintained in conformity with paragraphs 6, 7 and 8 of this Order may be counted as one of the "First Aid" boxes or cupboards required by this Order.
- (ii) That the requirement of "First Aid" boxes or cupboards shall not apply to a blast furnace if an ambulance room is provided and maintained as aforesaid.

2. Each "First Aid" box or cupboard shall contain at least:—

- (i) A copy of the First Aid Leaflet issued by the Factory Department of the Home Office.
- (ii) Three dozen small size sterilised dressings for injured fingers.

- (iii) One dozen medium size sterilised dressings for injured hands or feet.
- (iv) One dozen large size sterilised dressings for other injured parts.
- (v) One bottle of eye-drops, and
- (vi) Sterilised cotton wool.

Each "First Aid" box or cupboard shall be distinctively marked, and if newly provided after the date of this Order shall be marked plainly with a white cross on a red ground.

3. Nothing except appliances or requisites for First Aid shall be kept in a "First Aid" box or cupboard.

4. Each "First Aid" box or cupboard shall be kept stocked and in good order and shall be placed under the charge of a responsible person who shall always be readily available during working hours.

A notice or notices shall be affixed in every workroom stating the name of the person in charge of the box or cupboard provided in respect of that room.

Ambulance Room.

5. In every factory to which this Order applies and in which the total number of persons employed is 500 or more, the occupier shall provide and maintain in good order an Ambulance room.

6. The Ambulance room shall be a separate room used only for the purpose of treatment and rest. It shall have a floor space of not less than 100 square feet and smooth, hard and impervious walls and floor, and shall be provided with ample means of natural and artificial lighting. It shall contain at least:—

- (i) A glazed sink with hot and cold water always available.
- (ii) A table with a smooth top.
- (iii) Means for sterilising instruments.
- (iv) A supply of suitable dressings, bandages and splints.
- (v) A couch.
- (vi) A stretcher.

7. Where persons of both sexes are employed, arrangements shall be made at the Ambulance room for their separate treatment.

8. The Ambulance room shall be placed under the charge of a qualified nurse, or other person, trained in First Aid, who shall always be readily available during working hours, and shall keep a record of all cases of accident and sickness treated at the room.

Ambulance Carriage.

9. At every factory to which this Order applies and in which the total number of persons employed is 500 or more, the occupier shall, for the purpose of the removal of serious cases of accident or sickness, provide on the premises and maintain in good condition a suitably constructed ambulance carriage, unless he has made arrangements for obtaining such a carriage when required from a hospital or other place in telephonic communication with the factory.

10. This Order shall come into force on the 1st December, 1917.*

GEO. CAVE,

One of His Majesty's Principal Secretaries of State.

Home Office, Whitehall,

October 12th, 1917.

APPENDIX J.

MINISTRY OF MUNITIONS MEMORANDUM ON THE DUTIES OF WELFARE SUPERVISORS FOR WOMEN.

(Sometimes called Employment Superintendents.)

NOTE.—It is not suggested that all these duties should be imposed upon the Employment Superintendent directly she is appointed. The size of the factory will to a certain extent determine the scope of her work, and in assigning her duties regard will of course be had to her professional ability to cope with them.

These officers are responsible solely to the firms that employ them, and in no sense to the Ministry of Munitions.

The experience which has now been obtained in National and other factories making munitions of war has demonstrated that the post of Welfare Supervisor is a valuable asset to factory management wherever women are employed. Through this channel attention has been drawn to conditions of work, previously unnoted, which were inimical to the well-being of those employed. The following notes have, therefore, been prepared for the information of employers who have not hitherto engaged such officers, but who desire to know the position a Welfare Supervisor should take and the duties and authority which, it is suggested, might be delegated to her.

POSITION.

It has generally been found convenient that the Welfare Supervisor should be directly responsible to the General Manager and should be given a definite position on the managerial staff in connection with the Labour Employment Department of the Factory. She is thus able to refer all matters calling for attention direct to the General Manager, and may be regarded by him as a liaison between him and the various departments dealing with the women employees.

DUTIES.

The duty of a Welfare Supervisor is to obtain and to maintain a healthy staff of workers and to help in maintaining satisfactory conditions for the work.

In order to obtain a staff satisfactory both from the point of view of health and technical efficiency, it has been found to be an advantage to bring the Welfare Supervisor into the business of selecting women and girls for employment.

* An explanatory leaflet has been issued by the Home Office and may be had on application.

I. The obtaining of a Healthy Staff.—Her function is to consider the general health, physical capacity and character of each applicant. As regards those under 16 years of age, she could obtain useful advice as to health from the certifying surgeon when he grants certificates of fitness. The management can, if they think fit, empower her to refer for medical advice to their panel doctor other applicants concerning whose general fitness she is in doubt. This selection of employees furnishes the Welfare Supervisor with a valuable opportunity for establishing a personal link with the workers.

Her function is thus concerned with selection on general grounds, while the actual engaging of those selected may be carried out by the overlooker or other person responsible for the technical side of the work. In this way both aspects of appointment receive full consideration.

The management may find further that it is useful to consult the Welfare Supervisor as to promotions of women in the factory, thus continuing the principle of regarding not only technical efficiency but also general considerations in the control of the women in the factory.

II. The Maintaining of a Healthy Staff.—The Welfare Supervisor should ascertain what are the particular needs of the workers. These needs will then be found to group themselves under two headings :—

- (a) Needs within the factory—Intramural Welfare.
- (b) Needs outside the factory—Extramural Welfare.

Intramural Welfare.

I. Supervision of Working Conditions.—The Welfare Supervisor may be made responsible for the following matters :—

- (a) *General behaviour of women and girls inside the factory.*—While responsibility for the technical side of the work must rest with the technical staff, the Welfare Supervisor should be responsible for all questions of general behaviour.
- (b) *Transfer.*—The Welfare Supervisor would, if the health of a woman was affected by the particular process on which she is engaged, be allowed, after having consulted the foreman concerned, to suggest to the management the possibility of transfer of the woman to work more suited to her state of health.
- (c) *Night Supervision.*—The Welfare Supervisor should have a deputy for night work and should herself occasionally visit the factory at night to see that satisfactory conditions are maintained.
- (d) *Dismissal.*—It will be in keeping with the general suggestions as to the functions of the Welfare Supervisor if she is consulted on general grounds with regard to the dismissal of women and girls.
- (e) *The maintenance of healthy conditions.*—This implies that she should, from the point of view of the health of the female employees, see to the general cleanliness, ventilation and warmth of the factory and keep the management informed of the results of her observations.
- (f) *The provision of seats.*—She should study working conditions so as to be able to bring to the notice of the management the necessity for the provision of seats where these are possible.

II. Canteen.—Unless the factory is a small one it would hardly be possible for the Welfare Supervisor to manage the canteen. The management will probably prefer to entrust the matter to an expert who should satisfy the management in consultation with the Welfare Supervisor on the following matters :—

- (1) That the canteen provides all the necessary facilities for the women workers; that is to say, suitable food, rapidly and punctually served.
- (2) That canteen facilities are provided when necessary for the women before they begin work so that no one need start work without having taken food.
- (3) That the canteen is as restful and as comfortable as possible so that it serves a double purpose of providing rest as well as food.

III. Supervision of Ambulance Rest Room and First-Aid.—While not responsible for actually attending to accidents, except in small factories, the Welfare Supervisor should work in close touch with the factory doctor and nurses. She should, however, be responsible for the following matters :—

- (1) She should help in the selection of the nurses, who should be recognised as belonging to the Welfare staff.
- (2) While not interfering with the nurses in the professional discharge of their duties, she should see that their work is carried out promptly and that the workers are not kept waiting long before they receive attention.
- (3) She should supervise the keeping of all records of accident and illness in the ambulance room.
- (4) She should keep in touch with all cases of serious accident or illness.

It would further be useful if she were allowed to be kept in touch with the Compensation Department inside the factory with a view to advising on any cases of hardship that may arise.

IV. Supervision of Cloak-rooms and Sanitary Conveniences.—The Welfare Supervisor should be held responsible for the following matters :—

- (1) General cleanliness.
- (2) Prevention of loitering.
- (3) Prevention of pilfering.

The management will decide what staff is necessary to assist her, and it should be her duty to report to the management on these matters.

V. Provision of Overalls.—The Welfare Supervisor should have the duty of supervising the protective clothing supplied to the women for their work.

Extramural Welfare.

The Welfare Supervisor should keep in touch with all outside agencies responsible for :—

- (1) Housing.
- (2) Transit facilities.
- (3) Sickness and maternity cases.
- (4) Recreation.
- (5) Day nurseries.

In communicating with any of these agencies it will no doubt be preferable that she should do so through the management.

III. *Records.*—(a) The Welfare Supervisor should for the purpose of her work have some personal records of every woman employee. If a card-index system is adopted, a sample card suggesting the necessary particulars which it is desirable should be kept by Welfare Supervisors is supplied to employers on request.

(b) The Welfare Supervisor should have some way of observing the health in relation to the efficiency of the workers, and if the management approved this could be done :

(a) By allowing her to keep in touch with the Wages Department. She could then watch the rise and fall of wages earned by individual employees from the point of view that a steady fall in earnings may be the first indication of an impending breakdown in health.

(b) By allowing her to keep in touch with the Time Office she should be able to obtain records of all reasons for lost time. From such records information can be obtained of sickness, inadequate transit and urgent domestic duties, which might otherwise not be discovered. Here again, if a card-index system is adopted a sample card for this purpose can be obtained from the Welfare and Health Section on request.

(c) By keeping records of all cases of accident and sickness occurring in the factory. Sample ambulance books and accident record cards can also be obtained from the Welfare and Health Section.

APPENDIX K.

CONDITIONS UNDER WHICH EXPENDITURE ON THE PROVISION OF WELFARE SUPERVISION, CANTEENS, CLOAK-ROOMS, RECREATION, &c., IN CONTROLLED ESTABLISHMENTS CAN BE REGARDED AS AN EXPENSE FOR PURPOSES OF EXCESS PROFITS DUTY.

Expenditure on Welfare Conditions within the Factory.

The provision most frequently required includes :—

- (1) Salaries of Welfare Supervisors, overalls and protective clothing.
- (2) Canteens, mess rooms, rest and ambulance rooms, cloakrooms and changing rooms, lavatories, baths, sanitary accommodation and similar structures.

(1) Expenditure on the salaries of Welfare Supervisors and the provision of overalls, protective clothing, &c., may be allowed in full as a working expense if approved by the Ministry.

(2) In order to encourage firms to make better provision for the welfare of their workers it has been decided to allow them to charge in their accounts as a working expense, a proportion (varying according to circumstances) of any outlay of this nature when making up their accounts for the purposes of the Excess Profits Duty.

Expenditure on ambulance rooms and first-aid equipment will generally also be allowed in full as a working expense, but where the Ministry consider that the expenditure is excessive or that the rooms are permanent structures, which will have a substantial value after the war, the expenditure will be treated as capital expenditure and a suitable amount will be written off as an allowance against excess profits, having regard to the probable post-war value of the rooms.

In the case of canteens and mess-rooms the Canteen Committee of the Central Control Board were empowered to recommend that the cost of the building and equipment may be written off, if it is considered by the Committee to be reasonable and economical ; where this cost or any part of it was treated as a trade expense under this concession the canteens or mess-rooms must be maintained permanently in use for the purpose for which they were provided.

In the case of other accommodation some allowance in respect of the cost is given in certain cases in assessing the Excess Profits Duty, but schemes must be submitted to the Ministry beforehand, and they will only be approved if the Ministry are satisfied not only that the improved accommodation is necessary, but also that the scheme is reasonable and economical in construction and cost. It is a condition of the acceptance of this concession that the firm undertakes to bear the cost of maintaining the accommodation, not only while it remains "controlled" but afterwards.

Contributions to Recreation Schemes outside the Factory.

Where a recreation scheme has been approved by the Welfare and Health Section of the Ministry of Munitions, the Board of Inland Revenue are prepared to allow contributions on a capitation basis to be made by "controlled" establishments subject to the following conditions :—

- (a) The Board of Inland Revenue desire that applications shall be based on a capitation estimate, i.e., a rough estimate of the number of workers for whom it is proposed to cater must be drawn up, and a grant of so much a head asked for.

- (b) Managers of the factories concerned must be consulted from the first with regard to such schemes, as the money, in the case of controlled firms, does not come as a direct grant from the Treasury, but when the scheme is approved by the Welfare and Health Section any sum contributed by such firms is allowed as an expense for Excess Profits Duty.

This means that while the firm have full discretion in making a contribution, any contribution is in fact largely from money which would otherwise pass to the State.

- (c) Schemes should allow for expansion and should cater for a reasonable proportion of those employed. They may include both men and women, and provide for indoor and outdoor recreation.
- (d) The chief expenditure contemplated should be concerned with initial establishment or extension of premises, as ordinary running expenses should be covered mainly by the workers' own subscriptions.
- (e) In the case of schemes started on a comparatively modest scale a small capitation grant should be asked for, a proviso being made that an additional grant may be necessary later should the scheme prove a success. A grant of 6d. or 7d. a head may be sufficient at first, which may later require to be increased to 2s. 6d. or 3s., but if only a small number of workers is catered for out of possibly some thousands of employees it should be made clear whether:—

- (i) Other recreation schemes are catering for the rest.
- (ii) The proposal is to use a central club for committees and organisations which will affect large numbers outside its actual walls.
- (iii) Any schemes, such as dances or sports, are contemplated which will include large numbers.

In the case of National Factories the Treasury is prepared to consider similar contributions. The procedure as far as the Local Recreation Committee is concerned is the same as for a controlled factory, i.e., the manager of the factory must approve the application for a grant, and the scheme must equally have the approval of the Welfare and Health Section of the Ministry of Munitions.

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