Report of Mr. Charles Watson on the works necessary for the proper and efficient ventilation of Hampstead Workhouse.

[OCTOBER 16th, 1866.

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REPORT

OF

MR. CHARLES WATSON

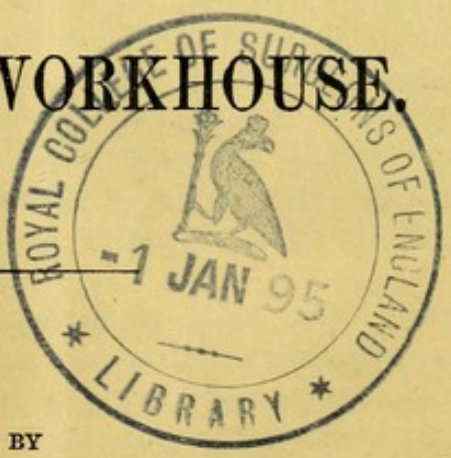
ON

THE WORKS NECESSARY FOR THE PROPER AND EFFICIENT

VENTILATION

OF

HAMPSTEAD WORKHOUSE.



PRINTED BY

G. S. JEALOUS, AT THE "HAMPSTEAD AND HIGHGATE EXPRESS" PRINTING WORKS, HOLLY MOUNT, HAMPSTEAD.

1866.

THE VENTILATION OF HAMPSTEAD WORKHOUSE AND INFIRMARY.

TO THE BOARD OF GUARDIANS OF THE PARISH OF ST. JOHN, HAMPSTEAD.

26, *Bartholomew Villas, Bartholomew Road, Kentish Town.*

London, October 16th, 1866.

In compliance with your request I have devoted two days to a thorough examination of every apartment of the Workhouse and the Infirmary. I have now the honour to report on its present means of ventilation, and on the means of securing a thorough ventilation of the entire premises.

After many years' practical application of ventilation to many Workhouses, and to all kinds of public and private buildings, and to nearly the whole of Windsor Castle, I have no hesitation in stating that the suggestions made for the improvement of the ventilation of Hampstead Workhouse and Infirmary, contained in the report, and the extracts from the report, of Dr. Edward Smith, which you forwarded to me, are, in my judgment, quite inadequate to meet the requirements of your Workhouse.

Each inmate of the house requires at least 1000 pints of the external air supplied to him or her, uninterruptedly, every hour, to secure healthy respiration; and that amount of air must be supplied as rapidly and constantly as nature demands it, and that is at every breath that is drawn.

Each inmate poisons the air at every breath, and much

more rapidly in sick wards than in the wards of the able-bodied inmates. The water-closets, nurses' sinks, slops, the diseases of the inmates and other impurities and sources, pollute the air. All these impurities must be removed, and replaced by as much pure external air, the purest the locality can supply, without inconvenience and danger to the inmates from cold draughts of air, so as to make it almost an impossibility to detect by the sense of smell, or by the test of lime-water, the presence of any impurity.

Whatever ventilating apparatus may be applied to your Workhouse should be adequate to secure these results. When these results are obtained, a ward that affords 300 or less, to 500 cubical feet to each inmate, can be made as healthy as if the inmates breathed in the open air, and much more healthy than where 1000 to 1500 cubical feet are supplied to each inmate where the ventilation is defective and inadequate to supply the thousands of pints of air hourly, as nature demands, to the inmates, and to withdraw the air as rapidly as it is made impure by breathing diseases and other causes.

It is not imperative for the maintenance of health, and the restoration to health, to provide 1500 cubical feet of space in each ward of a workhouse or infirmary for each inmate to secure a continuous presence in the ward of an abundant supply of pure air. The ventilating appliances are defective when 1500 cubic feet are imperative.

It is not necessary to have open doors and windows, which cause dangerous and uncomfortable cross draughts of air, and a waste of heat in winter, to secure thorough ventilation. The corridors and the wards should be of a uniform temperature throughout the entire buildings. This can be secured if the corridors are heated by hot water, or by steam passing through cast-iron pipes, or by other equally efficient modes of heating. The ascending heated air will pass into each ward through the fanlights now so properly applied to each ward. This arrangement will effect a great saving of coals in the wards, but would not necessarily dispense with the use of open fire-grates in any of the wards where found necessary. When the temperature is uniform throughout the buildings draughts of air are very gentle, or generally cease altogether. Doors and windows should be kept shut in winter, as, when open, they make it very difficult, if not impossible, to maintain a uniform temperature throughout the house. When, at any time, the wind blows from the north and from the

east, and when the weather is stormy and boisterous, and the air foggy or misty, the doors and windows should be shut. An efficient ventilating apparatus will give power to do all this.

The ventilation should be perfect without any assistance from open doors and windows, or other sources, and be entirely independent of them, so that, when these are shut during the night, or, indeed, if always kept shut, if thought desirable, every ward, although filled with its full number of inmates, and the corridors should be filled with air as pleasant to the sense of smell as it is out of doors in the most healthy part of the locality, and no bedroom smell be perceived in any of the wards at any time during sleeping hours.

Tobacco smoking I presume, is prohibited in the sleeping wards; where there is abundant ventilation the smell of it in a ward would be retained a considerable time.

It is a fact that should never be lost sight of in connection with ventilation, that strong draughts, or currents of air, are not necessarily ventilation. These do as much or more injury to persons than does the bad air, and only partially remove the bad air. There may be strong draughts, and yet not a complete exchange of the air of a building.

The interior arrangements in Hampstead Workhouse and Infirmary, of the staircases, corridors, and separation partitions, are admirably adapted to secure the objects for which they were erected, and to secure a thorough, efficient, and economical application of my ventilators.

The arrangement of corridors with wards at each side of the corridor, is now being adopted for the most approved modern Workhouses, as affording great facilities for supervision, ventilation, and heating, and of supplying the pure air of a warmer temperature in winter to the wards than it can be obtained when it is brought in direct to the wards from the external air. The Leeds Union Workhouse, for about 1000 inmates, is a good specimen of that mode of arrangement. The architects of that Workhouse gained the second prize for a similar arrangement of buildings for the proposed Edinburgh New Workhouse and Infirmary.

In December of 1863 I had the honour to report to you that four of my large ventilators going out at the roof over the corridors would thoroughly ventilate the corridors, and, instead of bad air entering from the corridors into the wards,

good air would do so. The Board very prudently and wisely determined to try the effect of two large ventilators over the corridors before incurring more expense. The result of that partial application is quite apparent to those gentlemen who have a painful recollection of the unpleasaut condition of the air of the corridors and wards before these two ventilators were applied to the corridors. In my examination of the buildings in 1863, even with the doors and windows opened, the bad air produced in me constant expectoration, headache, and pain at the chest. In my examination of Tuesday and Wednesday, the 9th and 10th inst., the air in the corridors and wards that were ventilated by me were not in the least unpleasant, and did not produce the least unpleasant feeling. The cross draughts from the open windows and doors did, however, cause the exercise of much caution to prevent the catching of severe colds. My manager aud myself felt stiff in the limbs for a few days from exposure to these draughts, and many of the inmates complained of the severity of these draughts at all times, but especially in cold and stormy weather.

My opinions and statements given above are confirmed by the Children's Employment Commission, Second Report, dated August, 1864. The Commissioners who signed the Report were, Hugh Seymour Tremenhere, Richard Dugard Grainger, and Edward Carleton Tuffnell.

Mr. Lord, Assistant Commissioner reports:—"The work-"rooms ordinarily used by milliners and dressmakers, whether "in wholesale or retail trades, would be in most cases unob-"jectionable, were precautions taken to provide such ventila-"tion as would ensure the escape of the foul air, and the "admission of fresh air, without causing draughts. In many "of the large establishments of silk mercers, and others of "that class, contrivances for this purpose have been more or "less successful, especially the invention of Mr. Watson, "which, although applied in most cases to large rooms, such "as those of Messrs. Shoolbred, has been, at Messrs. Howell "ahd James's, adopted with great benefit to ventilate a "number of ordinary apartments, which open on to a common "well staircase."

Mr. Lord and Messrs. Shoolbred's, Tottenham Court Road.—"The value of ventilation is signally illustrated by the state "of Messrs. Shoolbred's workrooms. In respect of mere "numbers that room would be called over-crowded; but so

"excellent was the system for maintaining, without draughts, "a constant supply of fresh air, that I perceived no offensive "closeness on either of the three visits that I paid. The "number then in the room was 100, which gives 202 cubic "feet per head." "When at its fullest the proportion is "only 169 cubic feet per head; but I was told that even "then it did not become oppressive."

At page 113 of Second Report, Mr. Knight, of Messrs. Shoolbred's stated in evidence:—"Three years ago we had "650 persons in our employment. I do not know our "numbers now, but probably they have increased." . . "There "are now more than 80 mantle-makers in our employ; "at the busiest time the number is 128." "They are closely "packed then, all in this room, but there are two of Watson's "ventilators, and the room never becomes oppressive. All "our workrooms, except the carpet-seaming room—(this room "has since been ventilated by Mr. Watson)—are ventilated "by that means." "Until we adopted Watson's ventilators "the air of our shop, which, though extensive, is also low-"pitched, used to become very offensive on a busy afternoon. "We had several letters and communications from physicians "and others on the subject, and, indeed, perceived it ourselves "if we came in from the open air; but now there is nothing "whatever, after the most crowded day, at all objectionable "or unwholesome. *That* we owe entirely to Watson's venti-"lators." "The machinists never work after seven, p.m." . . "The place in which they work used to be close and un-"pleasant, till we had a Watson's ventilator there. The "rapid motion of the machines give rise to a great increase "of heat by mere friction, and the more active exercise of "the limbs causes more animal heat to be thrown off from "the workers than when the needle is worked by the hand."

Richard Dugard Grainger, Esq., one of the Commissioners, states, on pages 61 and 62 of Second Report:—"Some few "years ago a member of this Commission (Dr. Grainger) had "an opportunity of seeing, with the late Dr. Southwood "Smith, and the late Mr. Austin, C.E., of the General "Board of Health, some interesting and very successful "experiments on a new and simple mode of ventilation, "invented by Mr. Watson, of Halifax, the principle being "that of establishing a double current, as in the case of coal "pits, by what is technically called the 'up-cast shaft' and "the 'down-cast shaft,' for the extraction of the heated foul

"air, and the supply of fresh air from without. This method "has been extensively introduced into all kinds of public "institutions, including factories, places of work, bedrooms, "stables, &c., in different parts of the kingdom, and, as far "as we have been able to learn, with the greatest advantage. "It possesses the great quality of being self-acting, the "heated foul air, which requires to be removed, producing "an upward current, and that in the proportion of the "amount and impurity generated by breathing and com- "bustion. We are informed that, by admitting air at the "ceiling, all draughts are prevented, the entering air being "diffused as it descends. By this plan, also, the fresh air is "drawn from an elevated part of the building, where it is "purer, a point of great importance, especially in crowded "dwellings and localities."

For the thorough ventilation of your Workhouse, the Infirmary, &c., I beg to recommend as follows:—

THE GENERAL VENTILATION OF THE HOUSE.

1. Two additional syphon zinc ventilators to be applied to the corridors, and placed, the one at the staircase leading to able-bodied women's wards, south, and the other over the stairs leading to the Night Nursery. Trellis work to be applied as before where necessary. The trellis work which was to have been applied to one of the present corridor ventilators to be put up.*

2. Open up the basement floor to the special action of the corridor ventilators, by removing the glass panes in the ground floor at the entrance to the women's end, and by removing the glass casing at the top of stairs at ground floor, which leads from the basement. This arrangement will produce a thorough diffusion of good air down to the entire basement floor; it will remove the dampness and the peculiar musty smell from the basement.

At present there is perforated zinc fixed on the door panels of the three cellars used for storing herbs, meat, and ale. The windows of these cellars are kept open, and the wind blows the smells from these provisions through the perforated zinc door panels up into the house, producing also strong cold draughts of air, which much annoy the inmates.

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* Ventilators, £35. Fixing ditto, £18. Trellis work, £5.

I propose the removal of the perforated zinc panels in the doors, and making them up with wood or glass, so that the doors would be air-tight, and the cold draughts prevented, and I propose to put my glass louvre ventilators into the windows of these cellars, which would make them first-rate keeping cellars. I also p ropose to put a glass louvre ventilator into the window of Knife Room, which would ventilate it and the Pottery Closet. I also propose a glass louvre ventilator to the window of the coal cellars, and three wood louvre ventilators to the doors of the coal, wine, and wood vaults.

The Able Men's Day Room.—The perforated zinc at door leading up-stairs should be removed, and glass substituted for it; a strong spring should be put on this door, and on the outer door, to prevent strong draughts of cold air rushing up-stairs. The windows should be arranged to be *partly opened at the top at all times.**

3. *Ground Floor.*—I propose three of my glass louvre ventilators for the windows, and another for the water-closet, in the day nursery also, to be placed in the window which reaches up to the ceiling.

I propose putting my wood louvre ventilators, for the ventilation of the following rooms, into the walls that separate these rooms from the corridors.†

Ground Floor—	
Aged Women's Day-room . .	2 ventilators.
Clerk's Water-closet . .	1 „
Clerk's Office . . .	1 „
Waiting-room for Board-room .	2 „
Aged Men's Day-room . .	2 „
One-pair Floor—	
Aged Women's Dormitories, north and south	4 „
Aged Men's Dormitories, north and south	4 „

4. Two-pair floor.—The dormitories, south, for able-bodied women and men require each two additional gratings in the ceiling, to connect them with the ventilator fixed, and the one proposed to be fixed there for the corridor.‡

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* For all under head No. 2, finished and fixed, complete, £38 10s.

† Ventilators under head No. 3, £72. Fixing, £20. ‡ Fixed complete, £8.

5. The Children's Night Nursery requires a ventilator to go out through the slates, and one of my glass louvre ventilators to be placed in the window of the water-closet which is in the room.*

SPECIAL VENTILATION.

1. The kitchen. The smell of cooking, and the heat from the kitchen and scullery that now passes through the doors into the house, may be prevented doing so, and these rooms be made cooler and more comfortable for the kitchen inmates, if one of my large zinc ventilators is taken up from the ceiling of kitchen and through the two rooms on the one and two pair floors and out through the slates. The smell of cooking and heat that now passes into the corridors, is removed by the corridor ventilators.†

2. The Master's sitting-room could be well ventilated by a zinc ventilator passing out through the slates at the cove in the ceiling.‡

3. Water-closets, bath-rooms, and sinks on one and two pair floors, adjoining the Infirmary Wards, viz., the sink and bath-room, and water-closet for thirty persons at the door of No. 3 Insane Ward, can be thoroughly ventilated, and the smells from them be prevented getting into the wards or the corridors. These are used for men.§

The sink and bath-room, and water-closet for women, on the same floor, can be equally well ventilated.

The sink and bath-room, and water-closet for men at the door of No 5 Sick Ward for children, on the two-pair floor can be equally well ventilated.

The sink and bath-room, and water-closet on the same floor for women, can be equally well ventilated.

The ventilators for these four clusters of sinks, bath-rooms, and water closets would go upwards and direct out through the slates to the external air.

THE INFIRMARY WARDS IN THE HOUSE.

1. The air from the Infirmary Wards, except No. 3, which has only three beds, the nurses' sinks, the bath-rooms and the

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* Ventilators, £12 5s. Fixing, £6 10s.

† Ventilator, £44. Fixing and casing it up in two rooms, £22.

‡ Ventilator, £10. Fixing, £6.

§ All under head No. 3.—Six ventilators, £72. Fixing, £42, not including altering sinks, nor making good partitions, which may cost £10.

water-closets, I would not admit into the corridors, but would ventilate these apartments each of them separately yet thoroughly.

The lying-in, or No. 4 Ward, and the children's sick, or No. 5 Ward should each have a zinc ventilator going out from the ceiling through the slates, so that these two wards may be used separately, or be thrown into one ward.*

The women's Nos. 6 and 7 Sick Wards should each be separately ventilated; the staircase in these wards should be removed, and the present opening in No. 6 Ward for stairs be closed up; this will give additional accommodation for three beds in No. 7 Ward. No. 6 Ward has already a ventilator as large as the one in the Board-room, and it is placed in the north-west corner. No. 7 Ward requires a ventilator to go from it through the slates between the two windows at the south wall. The gratings in floor and ceiling to be removed.

Ward No. 8, now used temporarily as a women's ward; and Ward No. 1 for men, require to be ventilated separately, and as already described for Wards Nos. 6 and 7 for women.

No. 1 Ward for men has already a ventilator that goes out at the slates; it is as large as the one in the Board-room.

No. 3 Sick, or Insane Ward for men may safely be ventilated into the corridor by the swing window over the door of ward.

No. 2, Men's Surgical Ward, requires a ventilator to go out from the ceiling through the slates, and from the centre of the room.

All the sick wards, except No. 3, may thus be isolated at all times, and be thoroughly ventilated without receiving a supply of pure air from any other source than from the ventilators. The air from the corridors would however be so pure when the additional ventilation of the corridors and the water-closets was executed, that air entering into the sick wards from the corridors would be quite healthy.

THE FEVER OR INFECTIOUS WARDS, AND RECEIVING WARDS.

1. The two upper wards of lower building, used for fever and infectious cases of men and women, can be thoroughly

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* All under head No. 1 includes—Five ventilators, £90. Fixing, £43. The removal of the stairs in No. 6 and 7, and No. 1 and 8, not included in fixing. The casing of ventilators passing through Wards No. 1 and No. 6 is included in the fixing.

isolated and ventilated by taking a zinc ventilator from the ceiling of each ward out through the slates. There should be a ventilator at the top of each of the two staircases leading to these wards, to prevent infection spreading to other parts of the house.*

The two receiving wards for men and women on the ground floor can be thoroughly ventilated by a ventilator of zinc passing upwards from the ceiling of each ward against the windows, wall, and out through the slates.

TRAMPS' WARDS AND WAITING-ROOM FOR OUT-DOOR APPLICANTS.

1. The two wards for tramps can be thoroughly ventilated by one of my wall louvre ventilators placed above the door of each ward, and communicating with a zinc ventilator placed over the staircase, which would also ventilate the water-closets in the staircase.†

The Waiting-room for out-door applicants which holds sixty persons; and the Bath-room at Men's Receiving Room, can be well ventilated by my wall ventilators placed in the partition walls, and by the ventilator placed over the staircase to Tramps' Wards, which is not required for the tramps during the day-time.

SUNDRY MATTERS.

The Dining-room can be improved by additional ventilation from the corridor if required.

The Porter's-room should have an opening made in the wall above the door of his bedroom.

On a careful and minute examination of the Buildings, I found nothing to prevent a practical carrying out of the foregoing suggestions.

The corridors and water-closets at Windsor Castle are ventilated by me in the manner I now propose for Hampstead Workhouse. Many of the Master's Houses for Boarders at the chief seats of learning in England; many workhouses and infirmaries; many hospitals for the middle and upper classes, and hundreds of family residences for the nobility, clergy and gentry are ventilated as I have suggested that the corridors and wards leading out of them should be ventilated at your Workhouse.

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* Ventilators for Fever Wards and Receiving Wards, and two staircases to Fever Wards. Six Ventilators, £73. Fixing and casing with wood; £47.

† One Ventilator, £15. Six ditto for walls, £23. Fixing, £15.

I can give you the names of gentlemen who receive boarders from the middle and upper classes, who have made their boarder's one bedroom into two bedrooms because they found that the two smaller bedrooms were each as healthy as was the larger one, after the rooms and corridors and staircases were thoroughly ventilated in the manner I have suggested for your Workhouse.

A veterinary surgeon in London, the owner of about 100 horses, could keep only four horses healthy in a six-stall stable; after my ventilators were applied to it he could keep six horses in that stable in better health than he previously could the four horses. These facts prove that health depends not so much upon the cubical space allotted to persons and animals, as to thorough and powerful, yet pleasant and healthy ventilation.

The water-tanks in the roofs of your Workhouse, containing water used for cooking and drinking purposes, are not covered. Water so exposed has a strong affinity for air mpurities and for retaining them. These cisterns should be oovered, and an air-pipe from each tank be taken out through he slates.

Further information or explanation will be cheerfully given.

I have the honor to remain,
Yours respectfully,
CHARLES WATSON,
Sanitary Engineer.

P.S.—The sums stated for fixing include all trades, unless where specified.

The ventilators would not exceed the sums stated.

In all cases the sums stated would cover the cost, or be the maximum cost.

If the fixing cost less, less would be charged.

The more of the work that was done at once, the greater would be the saving of the cost of fixing.