

## **Healthy homes, and how to make them / by Wm. Bardwell.**

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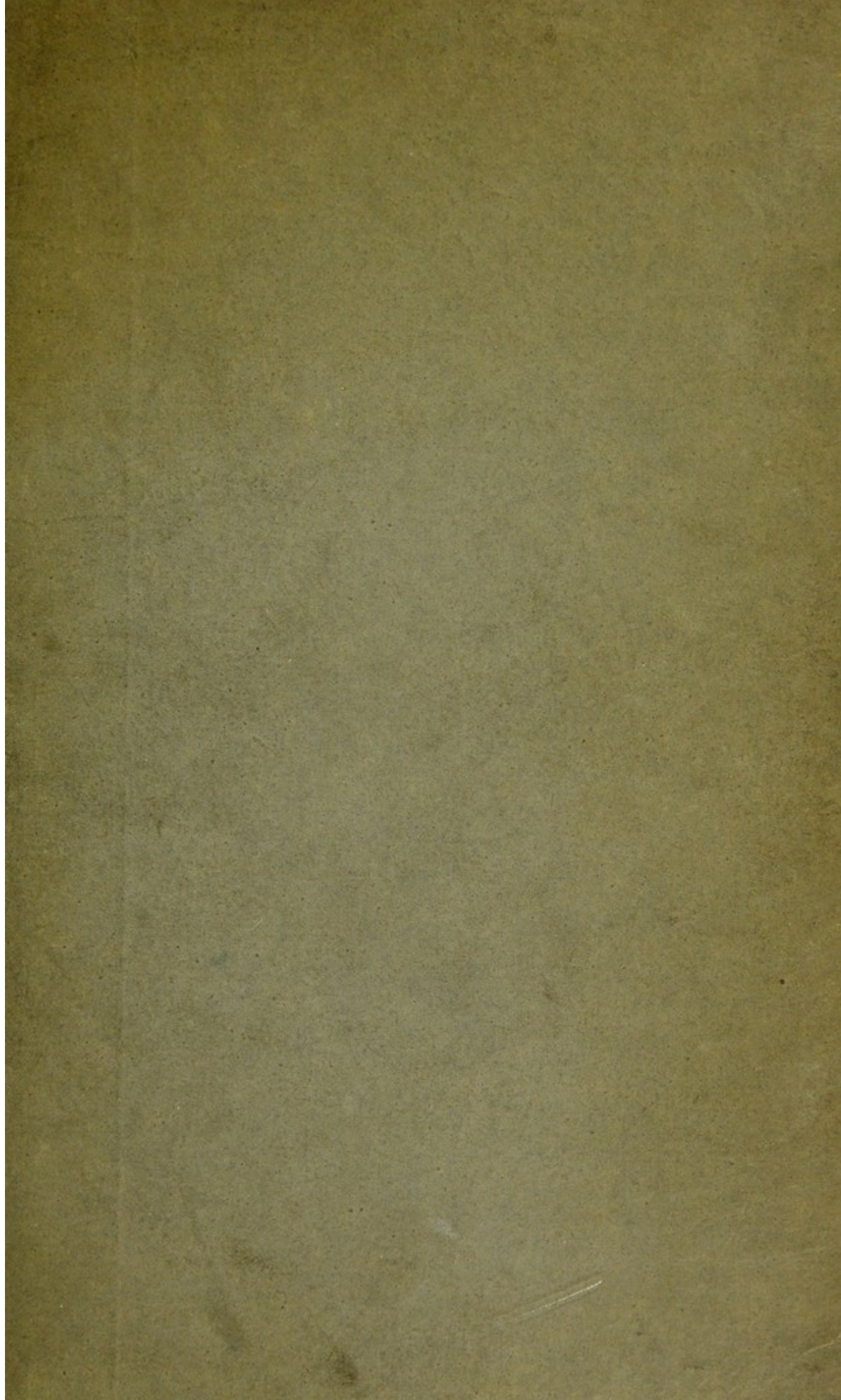
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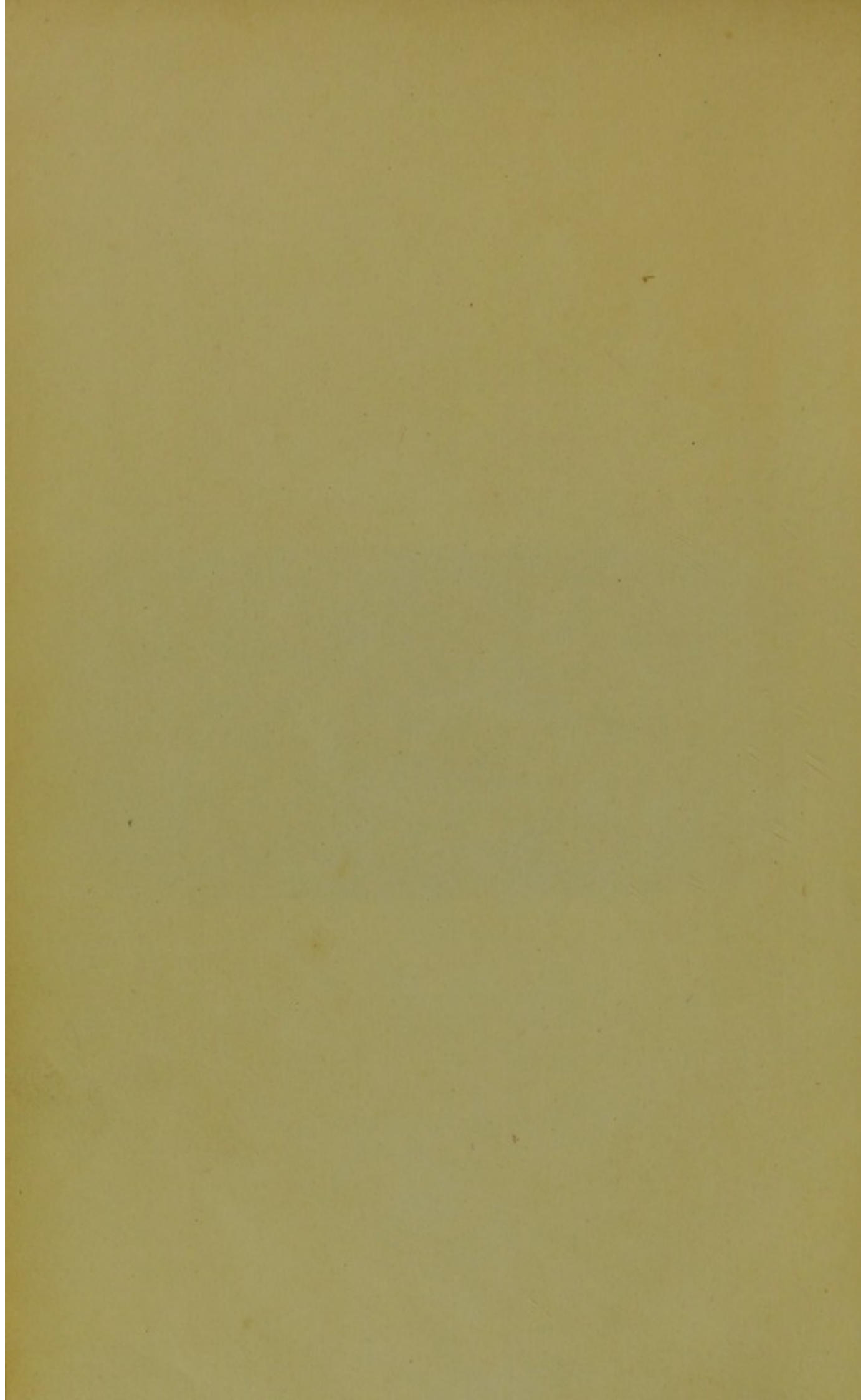
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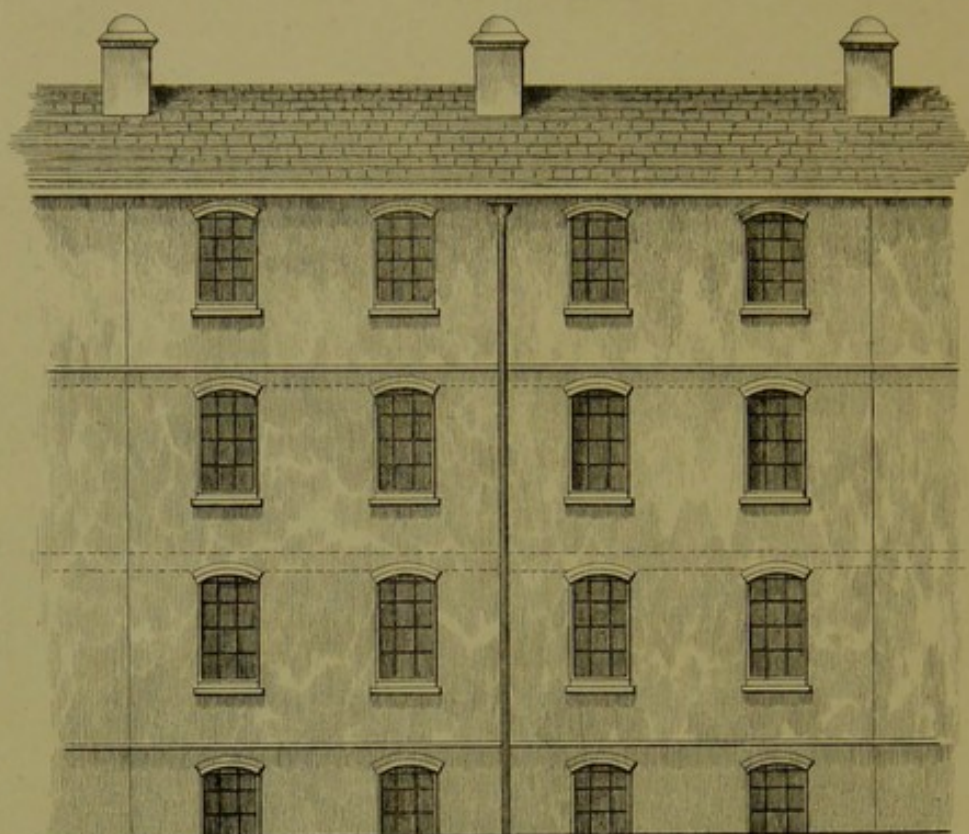
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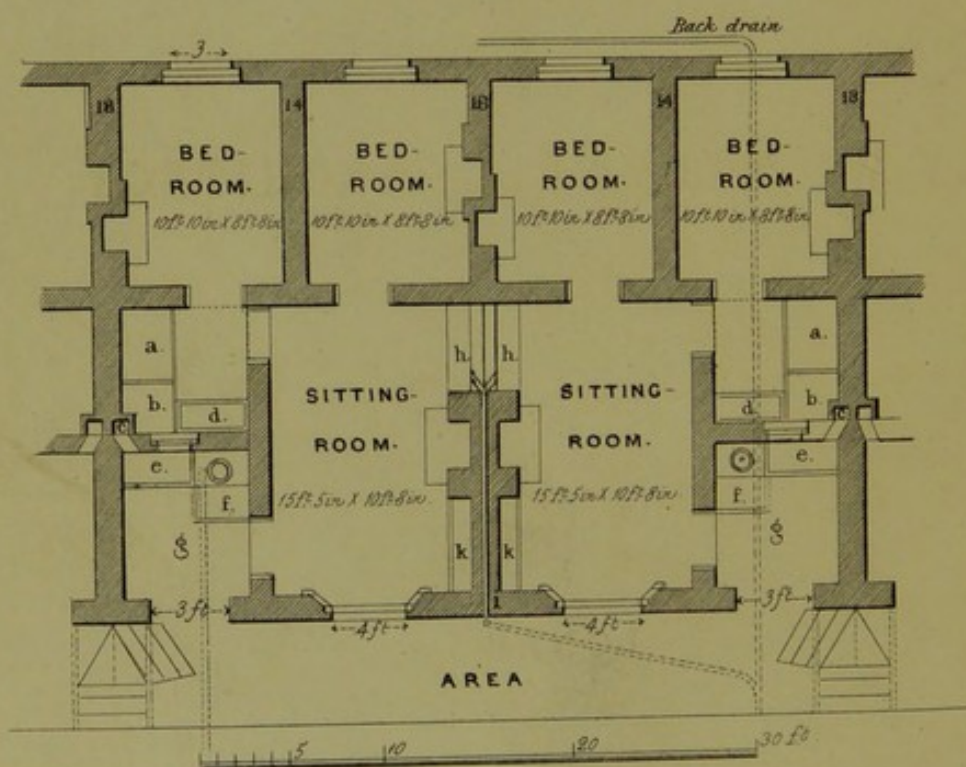








BACK ELEVATION.



PLAN OF BASEMENT FLOOR.

a a Pantry. b b Coals. c c Dust-shaft. d d Sink. e e Dust-bin  
f f Water-closet. g g Porch. h h Drying-closet. i i Pipe for air to d<sup>o</sup>  
passing between backs of fire places. k k Dwarf-closet.

# HEALTHY HOMES,

AND

## HOW TO MAKE THEM.

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BY WM. BARDWELL, ARCHITECT.

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LONDON:

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AND  
TROPICAL MEDICINE  
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W. E. A. T. H. J. H. O. M. E. S.

RIGHT CONTAINS FOUR ALPHABETICALLY

AND

THESE THINGS AND PRACTICAL ATTENTION

W. E. A. T. H. J. H. O. M. E. S.

OF THE HOUSE

HAS GIVEN HIM THE HIGHEST PLACE AMONG

EXISTANT RESEARCHERS

THESE THINGS

THESE THINGS

THESE THINGS

THESE THINGS

THESE THINGS

THESE THINGS

THESE THINGS

THESE THINGS

THESE THINGS

TO THE  
RIGHT HONOURABLE LORD VISCOUNT PALMERSTON;  
WHOSE  
DEEP, PROMPT, AND PRACTICAL ATTENTION  
TO THE SOCIAL EVILS  
OF THE EMPIRE,  
HAS GIVEN HIM THE HIGHEST PLACE AMONG  
SANITARY REFORMERS,

**This Little Work,**  
PRESCRIBING SIMPLE AND EFFECTUAL REMEDIES,  
FOR EXISTING SANITARY DEFECTS,

IS

(With his Lordship's kind Permission)

RESPECTFULLY DEDICATED, BY

HIS OBEDIENT HUMBLE SERVANT,

WILLIAM BARDWELL.

# HEALTHY HOMES.

"Here are thy walks, O sacred Health!  
The monarch's bliss, the beggar's wealth,  
The seas'ning of all good below!  
The sov'reign friend in joy or woe!"

"Home is the resort  
Of love, of joy, of peace, and plenty, where  
Supporting and supported, cherished friends  
And wife and children mingle into bliss."

"The mild majesty of private life,  
Where Peace with ever-blooming olive crowns  
The gate; where Honour's liberal hands effuse  
Unenvied treasures; and the snowy wings  
Of Innocence and Love protect the scene."

# HEALTHY HOMES.

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NO ONE can doubt the vast importance of the subject treated of in the following pages. HEALTHY HOMES are essential to the general well-being of society ; without the genial influence of health, the very mainspring of happiness is absent, and no artistic contrivance will give more than seeming comfort, where health is even conscious of being exposed to hourly danger. Although, indeed, healthy homes may not always prove happy, unhealthy homes invariably harbour wretchedness. Either state extends its arm to every class in the community. The wealthy aristocrat, residing in what may be designated "purchased immunity," as well as the unlucky denizen of some intolerably filthy court, is open to the insidious and pernicious consequences of habitations destitute of all pretensions to health.

Alas ! that the number of houses which come within this category should be so lamentably numerous ; no street in London is without its harrowing testimony to their prevalence. The finest squares are within a few perches of unhealthy deplorable dens. The most exalted in the land, live within short distances of pitiable proof of the dreadful effects of unhealthy homes. As the atmosphere which surrounds the upper classes does not sweeten that of the lower, so that which has been sweeping off the impurities of the unhealthy homes adjacent, is but too apt to deposit its pernicious burthen in more favoured localities. Contagion is a dreadful all-devouring despot, and to ward off his encroachments on yourself, the condition of your neighbour must be rendered as securely healthful as possible.

What a history of woe would the details of sanitary injustice furnish from every second street in London ? Daily you encounter men and women whose wretched aspects tell too faithfully to what they owe the ghastly look and haggard gait. You can observe the members of families in certain streets gradually disappear, until a forlorn survivor is left to transport his pining frame to another quarter, and give room to

a fresh family supply, which in turn feeds the domestic demon—an unhealthy home. If you care to examine the component parts of this monster, you will find prominent the fatal cesspool, which sends up its deadly emanations, or the defective drain, which as readily poisons the surrounding air. It is no argument for common sense to urge that such things have been from time immemorial. Modern progress, it is to be hoped, has weakened the power of, if not annihilated, every ancient absurdity. The one we have just hinted at, is more with the former than the latter class—more diminished than destroyed. One body of men, in whose honour I wish to mention it,—the medical profession,—have with no uncertain voice denounced the dangers here complained of. None could be found so competent to trace the effect to its true cause; and the opinion they have expressed accords with what I have long since formed. On this opinion I have, with considerable confidence, based the remedies proposed. They are, I am persuaded, calculated to meet the dangers which abound; and, from the simple and economical principles on which they can be worked, no one can have occasion to fear giving them a fair trial.

It is plain to any one who gives the subject one moment's thought, that the defective state of the sanitary arrangements of London, forms not a mere "shadow," but a cloud of the very deepest hue and the most threatening aspect. With an almost incredible increase of population, there have been comparatively no progressive strides to provide for its better and healthier distribution. Corporate bodies look on bewildered and inactive, or waste time, which could be better employed, in radically puerile discussions on the most extravagant means of remedying present and proximate evils. Successive governments have confused the grave and general importance of the subject; but from some motive, or no motive, have taken such steps as have proved unfit to grapple with the danger. Science has presented much, and propounded more; but the mischief still stalks untouched. It would hardly repay the investigation, to enquire why so little has been effected; or why so long a time has been suffered to elapse, without testing such proposals as appeared best framed to supply a confessed and deplored deficiency. For my purpose it is enough to know that things are no better, but perhaps much worse, than they were years ago. My chief object is, to direct attention to what seems to me the best, the simplest, and the most economical means, of rendering the homes of our people healthier, and therefore happier, than they at present are.

There is, I feel, something truly noble and commendable in a desire—even a desire—to sound the depth of wretchedness, with a view of plucking out those things which contribute to its worst state. But that

nobleness is only crowned, and that commendableness thinks itself sufficiently rewarded, when conscious of any degree of success attending the efforts impelled by the desire. I must, therefore, not be misunderstood, when I claim the merit of the desire, and express myself conscious of having achieved *something* towards its successful accomplishment. What that something is, the reader is invited to judge, by a perusal of this work,—the result, let me be permitted to add, of the most deliberate consideration of a professional intimacy with the subject, of thirty years; but I should never have presumed to “rush into print” with these remarks, had I not been engaged to do so.

If any traces of asperity be visible in such remarks as I have felt bound to make respecting sanitary precautions,—and I am not aware that such are visible,—they must be ascribed to my almost nervous anxiety to witness the speedy adoption of measures of acknowledged utility, and the rejection of those whose value men of scientific standing would have no hesitation in decrying at once. To the toying, if I may so call it, with sanitary nostrums bearing on their very form “condemnation,” our backwardness is mainly owing, and I and others have lost, in consequence, more than the wealth of worlds can supply. This is a matter of too great seriousness to be treated lightly, and sanitary measures must be entertained with a view to their decided promise, and to their intrinsic worth, rather than to ought else. Nor should there be any delay whatever in putting them into active operation. But, I am pained to add that, in both these respects, the public have much grounds for complaint.

I am, of course, prepared for a certain amount of censure. They who find themselves, for different reasons, within the reach of complaint, are generally prone to think evil of him who touches their consciences. If blame did not attach somewhere,—if unhealthy homes did not exist so plentifully,—if a cause of grievance were not,—these pages would not have been written. But the reverse is, alas, too true, and while I take much pains to be as dispassionate and lenient as possible, I endeavour to do the complaint full justice, and place the remedies I have discovered in so fair and distinct a light, that a reader of the most ordinary capacity can hardly fail to appreciate their value. Plain and homely language best suits my subject: I have employed none other.

It is worthy of remark, and a cause of thankfulness, that the noble lord who now holds the office, within the province of which all our sanitary proposals properly come, is himself a most active sanitary reformer. They who have power, almost hopeless of seeing things improved, have in this fact enough to banish despair, and excite new and fair expectations. Lord Palmerston is our Home Secretary; and, than Lord

Palmerston, I must repeat, there is not a more intelligent and energetic sanitary reformer existing. His Lordship is reputed to have said, that he will endeavour to make London the healthiest place in the world. The design is worthy of the man; and I take the liberty of offering him the means of attaining so commendable an end; and I trust they possess sufficient intrinsic merit to induce an immediate application to the great sanitary wants of our cities and towns.

The lady, at whose desire this little work is produced, has seen nothing hitherto designed or erected, in the way of building, fully accordant with her ideas of the requisites of a working man's urban home. The nearest approach to this is in the arrangements of the Metropolitan Buildings at Mile End New Town; but she has grave objections to the sitting rooms at back, and to the bed rooms at the front of the houses; neither does she see the wisdom or the science (under the notion of ventilation) of the large flues at the back of the grates, by which one half of the heat generated by the fire is sent off into the open air.

It is now become pretty well known that, to the larger buildings erected in various parts of the metropolis, the superior artisans and their wives have many serious objections, greatly disliking the species of communism, and the apparent opportunity afforded to numerous parties of unkindly noticing their habits, or prying into their domestic economy. Their pride also revolts against the barrack-like appearance, or character, of these establishments, and they appear to consider themselves more at "home" in the mean little dwellings of the back streets. So difficult is it to overcome long-established usages, or to engraft novelties upon national customs, which have grown into necessities by the force of circumstances. Neither are our people singular in this respect, for although the manners and customs of the continental nations are so widely different from our own, yet it is shrewdly suspected that the same objections are beginning to be made to similar establishments in other countries. Ages will probably elapse before we shall see in England such places as the hotel in New Jersey, on the sea shore, occupying three sides of a square, with a total frontage of 1,318 feet,—just a quarter of a mile,—with a mile and a half of verandah, and accommodating 3,800 persons. Hence it becomes a somewhat difficult matter to design the arrangement of sets of lodgings, to be let at a low rent, combining the means of cleanliness, decency, privacy, and comfort, with such an adequate amount of interest as will induce the capitalist to embark his money in the erection of these dwellings.

It is considered by parties who have had great experience in the matter, that most of the designs for the habitations of the labouring popu-

lation, are more or less faulty,—that some of these designs have been published, and buildings erected from them, in which a want of knowledge of the matter has been betrayed, although the authors of these designs have had premiums awarded them by societies professedly established for the advancement of science and art. There are other buildings, most admirable in plan, but from an injudicious use or selection of materials, or the absence of sanitary precautions in their construction, are almost uninhabitable.

In clearing our way for the work before us, it becomes necessary, in the first place, to glance at one or two of the leading principles of composition for the designs of dwellings, combining comfort, convenience, and economy, as laid down by the late Mr. Loudon, in his admirable works. One of the first is, that of placing the chimneys in the interior walls, rather than in the exterior ones; because, when the chimneys are so placed, *a greater portion of heat is retained within the house*; and because, from the greater degree of heat contained in the mass of brickwork or masonry through which the flues are carried up, the smoke always ascends faster; or, in common language, the flues draw better. In acknowledging the wisdom of this principle, we find the great defect in the arrangement of the model cottages put up in Hyde Park, in 1851, and now on Kennington Common, at the expense of the noble-minded Prince consort, to be, that all the chimneys are in the external walls, thereby also involving the violation of another rule in composition,—that an edifice should be highest in the centre. Truthfulness, again, is an essential in good building,—but in these cottages, this is sacrificed by the show of three gables, which should terminate roofs,—but they do not,—for the roof of these dwellings is nearly flat. It would be difficult to imagine a more useless piece of masonry than a gable placed above a window finished or linteled below the line of the roof; for we must bear in mind that real excellence cannot possibly exist, unless where, corresponding with the outward display of form, there is found an interior arrangement of the same character; and in order that we may judge of what really is excellent in this sense, we ought to examine for ourselves the works of the great Architect of nature:—Take up a tiny shell by the sea-shore, one of the smallest of dwelling-houses erected after His design, but so admirably adapted to the requirements of its occupant, that we may search in vain for unnecessary indentions or projections there.

Notwithstanding all this, the excellent intention of His Royal Highness, Prince Albert, in the erection of these buildings, has been eminently successful, and productive of an immensity of good: for it has stimulated

landed proprietors, owners of large mills, and companies, to the providing and building hundreds of wholesome habitations for their workmen, labourers, and servants. Hence, from the subject having been taken up by this exalted personage, more benefit has been effected within two or three years, than other persons have been able to do in a quarter of a century; in proof of this, I may instance that, in the year 1827, the Bishop of Bath and Wells, Montague Burgoyne, William Allen, Thomas Dean, Thomas Wright, Thomas Munday, and Thomas Livesey, with the philanthropic secretary, Benjamin Wills, formed the nucleus of the Labourers' Friend Society. Five of these gentlemen, having purchased some freehold land on the further side of Shooter's-hill, in Kent, advertised for designs for a Model Cottage for Agricultural Labourers. From the several designs sent in, mine was selected, as the best adapted for the object in view. The principles on which these "healthy homes" should be built, were fully discussed and settled at that time, and were to the following effect:—That every dwelling-house, on the floor containing its living-rooms, should be raised at least eighteen inches above the general surface of the ground; that the chimneys should be placed in the interior walls; that a porch is indispensable; that the exterior walls should be hollow, so that the rooms might be cool in summer, and warm in winter; that the roof should project, so as to throw off the rain-water from the walls; that there should be no valleys in the roof, to bring on decay; that the practicability of the economical application of fuel,—of the collecting, filtering, and preserving the water which falls on the roofs,—and of the collecting and economising the liquid and other manure produced in and about the dwelling,—should all be kept in view; that the smallest possible quantity of materials should be introduced, consistent with the durability and the accommodation required; and, as a consequence, that improved dwellings might be erected at a remunerative cost.

Every young architect will do well carefully to note these requirements, in order that his designs may be conformable to approved axioms in building. Proceeding from these to the *æstetick* quality, it was considered that every approach to the appearance of a "cockney villa," on the one hand, and of the alms-house on the other, should be carefully avoided; that it should have a distinctive character, so that every one, on seeing them anywhere, should be able at once to say, "That is a Labourers' Friend Society's Cottage." It was hoped to have been the model for millions; many were to have been built in Canada, and in Australia; and plans for that purpose were, I believe, sent out. But the

means of the Society were limited, and not at all commensurate with the ideas of its members. Yet it is satisfactory to know that the erection of these model cottages greatly contributed to direct public attention to the subject, and numerous landed proprietors have introduced an improved style of dwellings for their tenantry, from designs of their own surveyors.

But I am warned that explanation is necessary for the million, who cannot be expected to understand technicalities, and therefore I may remark that these principles resolve themselves into three great objects, which should always be kept in view in designing a building:—*fitness*, *purpose*, and *propriety*. Each of these have their peculiar beauty, the aggregate being the perfection of architectural science.

“Fitness, or use, is the first principle to be considered in all buildings.” Those persons who care very little for any other character in a dwelling, generally pride themselves upon the amount of convenience they have been able to realize in it; for in a dwelling-house, our every-day comfort is so entirely dependent upon a convenient arrangement of the rooms, or plan of the interior, that this is universally acknowledged to be the most important consideration. To have the principal rooms situated on the most favourable side of the house, with regard to aspect, in order that they may be light, warm, and airy; and in respect of view, that they may command the finest prospect, are *desiderata* in every kind of dwelling. In all climates, the stormy quarters are the worst aspects, and the fair-weather quarters the best.

Expression of purpose, or the second principle in construction, should be conveyed by the leading features of a building, or by its whole appearance, so that the end in view, or the purpose for which it was intended, should at once be seen. Whatever tends to do this, must flow out of some quality which connects itself in the mind with the use for which it is designed; and the most perfect mode of insuring admiration for any structure is, to render it expressive of the purpose for which it is built.

Not only should the general character of the structure denote the end in view, but every portion of it should be made, as far as possible, to convey the same impression. The various useful features entering into its composition should all be expressive of the end for which they are intended, and should at least appear to answer their purpose.

The prominent features expressive of purpose, in a dwelling-house, are the chimneys, the roof, the windows, the projections, and the portal or porch; and the architect who desires to raise the character of his structure above mediocrity, will do well to bestow particular attention

upon these several portions of it. Remembering that all the satisfaction which the reason experiences in building, as a useful art, arises from *fitness* and *expression of purpose*, and that all the delight which the imagination receives from architecture, as an art of taste, is derived from beauty of form, and from the *sentiment* associated with certain modes of building.

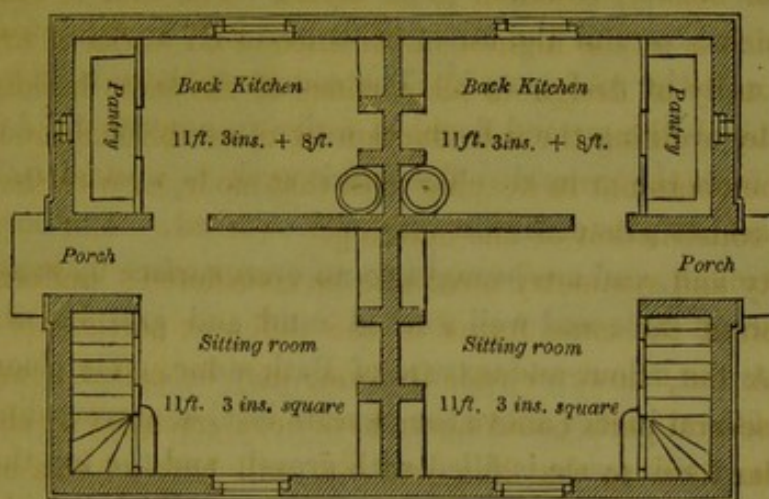
Whatever style of architecture may be adopted in a structure, there are certain leading rules, which should never be lost sight of in its composition, however humble may be the building; for these rules embody the sources of beauty, common to all styles. The first is the principle of *unity*, which is of the highest importance in all works of art. There should be a unity of design in all portions of the same building, and a unity of style, avoiding the introduction in an established mode, of any portion or members not in keeping with that mode, or with the materials used in the construction of the building.

Uniformity and symmetry must also be considered; uniformity being the repetition of the same forms in the different portions or sides of a building. A hut, however rude in form, may be called a work of art, because its several parts could never have been arranged by chance; but give a regular form to that hut, and you will have an idea not only of art, but of cultivated or improved art. There can be no doubt, therefore, that the love of regularity is strongly implanted in the human mind, since regularity is the first principle which displays itself in the works of man, composed with a view to beauty. Hence persons who have little taste or imagination, generally prefer a plain square or cube, to other forms for a house; this being the first principle of beauty which they are able to discover in architecture.

Uniformity in works of art, is artistic regularity; but symmetry is artistic irregularity. There are irregular structures without symmetry; but in all irregular compositions which appear satisfactory, it will be found that there is a kind of hidden proportion which one half of the whole bears to the other; and it is this balance which constitutes symmetry. Those who have but little cultivated taste for architecture, prefer, in general, a regular house to a symmetrically-irregular one, because their reason simply demands to be satisfied; but with minds of a higher order of cultivation, and whose taste and imagination demand a more varied beauty, the irregular building will be chosen, as affording more intense and lasting pleasure.

The most mortifying feature, to a person of cultivated taste, in country architecture, is the violation of correct proportions, of unity of decorations, and of appropriateness of style. These defects arise sometimes from the defective advice or worse plans of the builder employed."

After these remarks, I proceed to state that land was purchased at Shooter's Hill, at a cost of fifty pounds an acre, by one of the gentlemen forming the Labourers' Friend Society, and upon fifteen acres of this land six pairs of model cottages were erected, by himself, and three other members of the Society, at a cost of one hundred and fifteen pounds the pair, being probably the cheapest things of the kind ever built. But, a very few pounds more would have produced our Improved Labourers' Friend Society's Model Cottage, with *four rooms*, instead of



*three*; in fact, the very plan of the Windsor Royal Society's Model Houses, built twenty-five years after. This, however, is only another instance of "two clever men falling upon the same idea," with the small difference, in this case, that the one did so some years before the other. But it must not be supposed that this is given as the perfect model of a cottage, but merely that of a cottage which will pay a good per centage upon the cost of its erection, principally from the fact, that edifices in which the greatest symmetry exists, are generally of the least cost, and therefore simplicity and regularity in the general plan, and its parts, are always conducive to economy.

The Labourers' Friend Society's Model Cottages, built at Shooter's Hill, are thus described by Mr. Loudon in his *Encyclopedia of Cottage and Villa Architecture*.

"477. ACCOMMODATION. These cottages are built in pairs, in such a manner as to have the fire-places in the party walls; the ground plan shows for each cottage, an entrance porch, a kitchen, a pantry, and closet under the stairs. The chamber floor shows two good bed chambers to each cottage, but without fire-places. The privy, pigsty, and other conveniences are built apart, twenty feet from the back of the cottages, and cost about £10 each.

"478. CONSTRUCTION. The walls are raised on grouted foundations, (grout is composed of fresh lime and gravel, mixed with water, and im-

mediately thrown in, beaten down, and left some days to consolidate,) two feet broad, and two feet deep; over which are two courses of twenty-two inches in width, and two of eighteen inches, as a footing, and four courses of fourteen inches, as a plinth. The walls above are nine inches, and hollow,\* and one course of slates, to keep down the damp, is laid before the floors commence. The bricks are hard stocks; the timber, Swedish or Baltic; the window sills and landings, of York stone; the chamber flooring of inch and a quarter deal, ploughed and tongued; (a groove made along the edge of one board, and a tongue or projection worked along the edge of the other to fit into it,) the window casements are of iron, and the roof slated. The course of slates is laid along the walls just beneath the ground floor, in order to prevent the damp rising up the walls from the ground. The brick-work is worked to a smooth face inside and not plastered, but only whitewashed. The outside walls are thus left rough, and are brought to an even surface by rough casting with a mixture of lime and well washed sand and gravel; which when completed has the colour and texture of Bath stone. The floors of these cottages are fifteen inches above the general level of surrounding ground; twelve inches of this space is filled with gravel, and the top three inches with grouting, which forms a hard bottom, upon which is laid a flooring of foot square paving tiles. The roof is projected on cantilevers, eighteen inches or two feet, in order to keep the walls dry."

"480. REMARKS. Considering the size of the rooms, these dwellings are certainly remarkably cheap; and we are informed that, in consequence of the grouted floors and hollow walls, they are the driest cottages in the neighbourhood where they are built; and as all the materials are of the best quality, these cottages will be as durable as they are cheap. They may indeed justly be considered elegant, from the well proportioned openings, the pedimented ends, the low pitch of the roof, and the doric simplicity of their general form. (See plate 2.) The quantity of land annexed to them seems large; but the reason may be that the occupiers are supposed not to have regular employment, and to find a ready market for garden produce."

Thus far says Mr. Loudon, and with a few words of explanation and remark, I conclude this notice of the first buildings of the Labourers' Friend Society, which, modest and humble as they were, nevertheless set the whole scheme in motion.

\* The way in which this was accomplished, in order to avoid the excise duty on bricks, then levied, was by inserting a piece of iron hoop, longitudinally, in the centre of the brick-mould one half its depth, each of the bricks thus moulded, when burnt, appeared as one, and paid duty as such, yet were readily separated into two by a stroke of the trowel.



The quantity of land apportioned to each, was in conformity with a favourite notion of William Allen, who built many cottages for labourers, with this quantity of land to them, at Lindfield, in Sussex, that labourers should have a sufficient quantity of land to occupy their leisure hours, when the operations on the farm were not required.

After these had been built about two years, there were added to eight of them, out of the twelve, an additional roof, under which was constructed a third boarded and ceiled bed-room, 12 feet by 10 feet; a paved wash-house, 10 feet by 8 feet; and a few other conveniences; and the rent was then raised to £10 a year. To each double cottage are annexed two acres and a half of land."

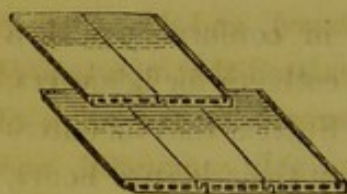
A most admirable invention has since this time been introduced, of making bricks hollow, whereby hollow walls may be obtained without any difficulty. Tubular bricks, besides being non-conductors of heat, are proof against fire, and can be moulded of any dimensions; and as the drying and firing act equally on the inside and the outside of their mass, these bricks are as strong as those which are solid, and therefore are allowed by the Official Referees to be used as "capable, when laid with mortar or cement, of producing solid work, as required by the Act for external walls and the footings thereof."

Tubular bricks have also the following advantages over solid:—They are less conductors of heat, cold, dampness, and noise; consequently the buildings made of them are warmer in winter, cooler in summer, and always dryer. By their difficulty of being penetrated by sound, places of worship and public buildings made of them reflect remarkably the voice of the speaker, and the notes of music. For partition walls they are in-

valuable; and we may also add that they are cheaper than solid bricks of the same quality, owing to the economy of clay, fuel, and transport.

Temporary Churches or Chapels may be erected with hollow bricks, with great facility and economy. I have just heard of one of the latter, which cost only £500, and is let for £500 a year.

There are also patent Tubular tiles, which possess many advantages over the old plain tile, the pan-tile, or slates; as they are non-conductors of heat, the sun's rays on a roof of these tiles has little or no power beyond the outer surface, the heat being cut off by the presence of air in the Tubes running all through the tile. The various practices so frequently adopted with a view to keeping down the temperature of the uppermost rooms in large buildings, factories, workshops, store rooms, farm buildings, dwelling houses, &c. are now no longer necessary, these tiles meeting every want. They also are efficient ventilators, by using those with the tubes left open, the air being admitted in the safest manner, running upwards in the same direction with the roof.



These are two very important improvements in constructive materials, which I should have gladly adopted in the Shooter's-hill cottages, as one of the means for making a Healthy Home.

The Shooter's Hill cottages, costing £57 10s. each, the out-houses to them £10 each, and the land £50 an acre, were let, with an acre and a quarter of ground, at eight pounds a year; thus showing that while at the same time an incalculable benefit is conferred on society, well laid out capital may be very remuneratively expended.

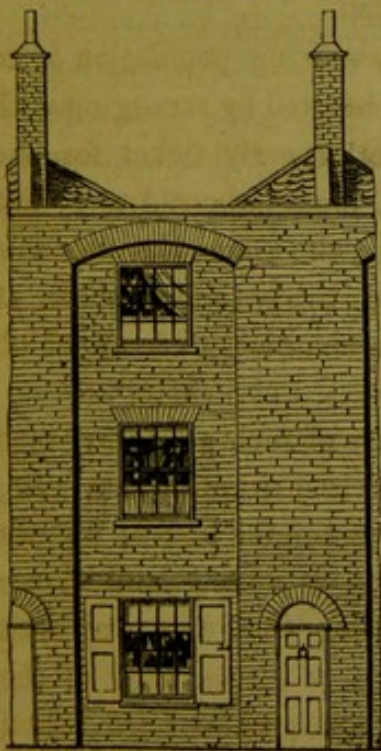
An excellent method of lodging the urban labouring population is to make them suburban at night, and this may be effected by arranging with the Railway Companies, most of which will sell a yearly ticket for one pound six shillings, entitling the holder to be brought about four or five miles, in and out every night and morning; and thus the valuable workman will have the advantage of sleeping in pure country air, at the same or a less sum than he now pays for one pent-up room, which unhealthily encloses himself and family.

I know of several estates near the Metropolis which may be purchased and on which Healthy Homes might be erected to pay admirably well; one of the estates is situated four miles from town, and may be had for one hundred and sixty pounds an acre; another is twenty miles from town, and may be had for twenty guineas an acre. The value of both of these estates will in a few years be quadrupled, as witness most of the land around London, and particularly Battersea fields, which Lord Bacon would call a "a glaring instance," for in 1832, if I had had the money, I

might have bought the whole of these fields for fifty pounds an acre, (having in that year projected a Cemetery thereon, and a bridge of approach,) whereas, in 1854, a thousand guineas would not be taken for any one acre, and three thousand guineas an acre has been asked for some parts of this ground.

That an imperative necessity exists for the provision of Healthy Homes for our industrious classes, let us look at a specimen of one of the BEST places in which they are now lodged, and also at one or two of the worst, imagining the intermediate specimens, which graduate from one to the other by almost imperceptible degrees.

The first is one of a row of houses situated in a paved and cleanly kept thoroughfare, at the back of my house, in Westminster. Its elevation exhibits more than the usual quantity of those objects of the bricklayers' pride, "gauged arches" of "red rubbers;" those above the windows are called flat arches, but possess little of the properties of an arch, consequently there is scarcely a house in London in which we do not see one or more of the window-heads fractured, and dropping to pieces; indeed so universal is this, that it is calculated that upwards of £12,000 a year is spent in repairing these fractures. In the reign of Queen Anne, the window heads were almost invariably segmental, and therefore remain perfect. Two courses of four inch brickwork, forming the segment of a circle, would better satisfy the eye, hence be handsomer, and not cost one tenth part of the sum expended upon the gauged arch. but to render these latter-mentioned great favourites of the bricklayers secure, they should always be supported and tied with an iron bar in the same manner as the opening for the fire-place in a chimney breast.



Our illustration represents a house of eight rooms, with small back yard, containing a wash house, a privy, a dust bin, and a water butt. The front kitchen—the top of the window of which is below the surface of the street, and against its wall the earth abuts, except for a small space in front of the window,—when not occupied by the tenant renting the house from the landlord, it is let for two shillings and sixpence a week, and sometimes for three shillings. The back kitchen is too damp, and the smell of the drain which passes beneath the house is too offensive to permit this room to be occupied

as a dwelling. The front parlour, eleven feet six inches by ten feet six inches, lets for three shillings and nine pence per week; the first floor front room, fourteen feet by eleven feet six inches, lets for four shillings a week; and the second floor front at three shillings and nine-pence. The back rooms are ten feet six inches by eight feet six inches, and let generally at two shillings and six-pence a week. The average height of the rooms is from seven feet to nine feet. It is obvious that in rooms of these dimensions the quantity of furniture must be small; the bedstead of the parents is usually of a kind which allows it to be turned up in the day, and the bed for the children is usually a crib, or one made upon the floor at night, and as there is no provision for ventilation, it is no wonder that the destruction of infant life is very great, while those who survive look pale and sickly.

All the washing-up of plates, dishes, and tea things, must be performed upon a table in the one room, and the slops taken down in a pail to the yard; while in wet weather the drying of the week's washing must also be effected here; and here also is the only place in which the coals and food can be safely kept. How such things can be done at all, must be a mystery to those who are beyond the reach of such trying circumstances.

The wash-house, nine feet by four feet six inches, contains a copper, and is common to the tenants of each room, who arrange to have their washing days alternately. In the back yard the smell of the open privy is most noxious and unhealthy, although the proximity of the water-butt, from the capacity of water for imbibing gases, considerably modifies the baneful odour; yet it must, from imbibing such gasses, be exceedingly injurious to the health of those who drink such water. The usual occupants of these rooms are journeymen carpenters, bricklayers, stone masons, plumbers, tailors, soldiers, policemen, army clothiers and accoutrement makers, brace makers, clerks, town travellers, musicians, old men and women subsisting on small allowances from those who knew them in their younger days, &c. Most of these men earn from thirty to forty shillings a week, and sometimes more, yet seldom more than a pound a week is brought home to the wife, the rest is foolishly wasted elsewhere,\* principally caused, as I imagine, from the improbability of such places forming enjoyable homes. Considerable authority is exercised over the occupants, and strict order enforced by the master or mistress of the house. Sometimes a superior class of occupants is driven hither by poverty, and in one of these rooms, in which he dwelt for a considerable time, an ex-member of Parliament lately died.

\* It is this ten shillings a week in which the seditious orator finds the means to carry on his wicked machinations.

On this plan thousands of houses are built in the Metropolis and its environs, and on this same plan, of red brick, but of two floors only, are built thousand of houses in our country towns and villages, and it is such erections which give that air of despicable meanness to these places, so striking and so offensive to the eye of the traveller from abroad.

One of the worst "represents a location called James's-place, behind Ewer-street. The latter is a long street of dilapidated houses, partly wood, which comes into Gravel-lane. The drainage is here most defect-

ive; and, according to an old inhabitant,

—"In this and the surrounding neighbourhood, were formerly many open ditches, into which the tide regularly ebbed and flowed; these have been covered, and now form 'blind drains.' Even now the tides often overflow parts of this street to a depth from two to three feet. The cellars about here are often flooded."



The houses are dilapidated, and as a matter of course, have cesspools at the back, many of them without even a covering. The health of the people is very bad; fever, we are told, had killed many lately in Ewer-street, and the courts leading from it. In Red Lion-court, a neighbour said 'there have been lately several deaths.' Here are cesspools and choked surface drains, which at the time of our visit were undergoing inspection. The place at the back of Ewer-street, which we have sketched, contains twenty or thirty houses. It would be difficult, either by words or illustrations, to give an idea of the squalid and unhealthy condition of this spot. The houses are unfit for occupation: at the back is a large dust-heap. If this disgraceful and unwholesome accumulation be disposed of at the present time, it may be at a loss to the proprietor; but surely this is not to be set against the lives of men, women, and children? The pavement of this neglected place is broken and uneven, strewn with

refuse amid puddles of water. Sometimes, in parts, the water is up to the knees of the people. The houses are thickly inhabited, chiefly by Irish: there are only four closets, with cesspools, for the use of the neighbourhood, and these we found in a dreadful condition.”\*

Another “glaring instance” will be found in a statement by Mr. Kyne, a Roman Catholic clergyman, who has a chapel on Saffron Hill; of a census lately taken in one part of that district, which will be quite sufficient to give a general idea not only of the court in question, but of the other courts in the district, and of their inhabitants. The following was the result:—Number of persons living in three houses (which are rather small) in the court, 215; of these 103 are children, and 112 adults. Number of common labourers, 8; sellers of oranges, 24; sellers of lucifer-matches, 29; sellers of firewood or faggots, 34; sellers of rags and bones, which they pick up in the streets or by the river side, 25; wood-choppers, 14; the remainder are either infants or have no employment of any kind. If they took one of the houses mentioned above separately—for example, the first, and went from room to room, they would find that in this house there were 53 residents and eight rooms; that four out of the eight were without chair, table, stool, or bedstead of any kind; that in the others there were seven old chairs, two rickety tables, two crazy bedsteads, and one stool. With regard to the children, both male and female, the rev. gentleman made the following remarks:—“There are forty-five courts connected with the Saffron Hill mission; they are nearly all alike, so that the history of one is the history of all.”

Let us look at another picture drawn in an article headed “THE QUIET POOR,” in *Household Words*, of a district in Bethnal Green, called St. Philip’s, Shoreditch; and then ask ourselves, if in a city commanding the wealth of the whole earth, such things can be allowed much longer to exist. Every heart must bleed to think it possible. Yet the whole article has such an impress of truth, that I am constrained to extract some paragraphs, willingly omitting the more harrowing details:

“The little district of which I speak, small as it is, contains the population of a country town. To judge by the eye I should imagine that it covers ground about a quarter of a mile wide, and a quarter of a mile long. It is composed wholly of narrow courts and lanes, with a central High Street or Church Street of shops—itsself a miserable lane. Although the houses are for the most part but cottages, with two floors and a cellar, there are crammed together in them fourteen thousand people. In the whole quarter there is not one resident whom the world would

\* “London Shadows.” To the indefatigable writer of that work we are indebted for the above view.

call respectable; there are not more than about half-a-dozen families able to keep a servant; and there is not one man I believe able to tenant a whole house. The shopkeepers, who make a little outside show, fare indoors little better than their neighbours. As a general rule, each room in each house is occupied by a distinct family; they are comparatively wealthy who afford to rent two rooms; but, generally, as the families enlarge, the more they require space, the less they can afford that costly luxury. The natives of this parish chiefly subsist upon potatoes and cheap fish, buying sprats when they are to be had, and in default of them sitting down to dine on potatoes and a herring. They earn money as they can, and all are glad to work hard when there is work for them to do. The majority of the men are either weavers, or they are costermongers and hawkers. These two classes occupy, speaking generally, different portions of the neighbourhood; the weavers earn a trifle more, and hold their heads up better than their neighbours: they are the west-end people of the district. The whole place is completely destitute of sewerage; one sewer has been made in a street which forms part of its boundary; it has its share in that, but nothing more. The houses all stand over cesspools; and, before the windows, filth, dead cats, and putrid matter of all sorts, run down or stagnate in the open gutters. How do people, who are quiet people, live in such a place?

The summer heat lifts out of the filthy courts a heavy vapour of death; the overcrowded rooms are scarcely tenantable, and the inhabitants, as much as time and weather will permit, turn out into the road before their doors. The air everywhere indeed is stifling, but within doors many of the cottages must be intolerable. I went into one containing four rooms and a cellar, and asked, 'How many people live here?' They were counted up for me, and the number came to six and twenty! The present clergyman of this district—whose toil is unremitting in the midst of the vast mass of sorrow to which he is called to minister—dwells upon wholesome ground outside the district. Within it, there is not a parsonage or any house that could be used as one, and if there were—what man would carry wife or children to a home in which they would drink poison daily? The pastor is very faithful in the performance of his duty; liberal of mind, unsparring of toil; and, although the reward of his office is as little as its toil is great, and he is forced to take new duties on himself to earn a living, yet I know that he pours out his energies, his health, and all the money he can earn beyond what suffices for a frugal maintenance, upon his miserable people. We have need to be thankful that the Church has such sons. The Reverend Theophilus Fitzmumble may be a canon here, a master there, a rector elsewhere, and

a vicar of Little Pogis, with a thousand a year for the care of a few hundred farmers and farm labourers, who rarely see his face. Fitzmumble may be a drone, the thousand a year paid for his ministration at Little Pogis might be better paid to a man who has daily to battle with, and to help such misery as that of which I speak in Bethnal Green. But let us, I repeat, be thankful that Fitzmumble is not the whole Church. It has sons content to labour as poor men among the poor, whose hearts ache daily at the sight of wretchedness they cannot help; whose wives fall sick of fevers caught at the sick beds of their unhappy sisters. Of such ministers the tables are luxurious, for they who sit at meat know that their fare is less by the portion that has been sent out to the hungry: such men go richly clad in threadbare cloth, of which the nap is perhaps represented by small shoes upon the feet of little children who trot to and fro in them to school.

But though the incumbent of this parochial district about which I speak, is truly a Christian gentleman, he has his body to maintain alive, and dares not remain too long in the poison bath of his unsewered district during the hot summer days. He visits then only the dying, and they are not few. 'I have seen,' he said, 'a dead child in a cellar, and its father dying by its side, a living daughter covered with a sack to hide her nakedness when I went in, the rest all hungry and wretched, furniture gone, and an open sewer streaming down into a pool upon the floor.' Again he said, 'I have seen in the sickly autumn months a ruined household opposite the back premises of a tripe and leather factory, which is a dreadful nuisance to its neighbours; it emits a frightful stench, and lays men, women, and children down upon sick beds right and left. In this room opposite the place, I have seen the father of the family and three children hopelessly ill with typhus fever, and the eldest daughter with malignant small pox, while the mother, the one person able to stir about, sat on a chair in the midst of them all deadened with misery. The place by which this household was being murdered has been several times indicted and fined as a nuisance. Every time this has occurred, the proprietors have paid the fine and gone on as before; they regard such fine-paying as only a small item in their trade expenses.

The people in this black spot of London all strive to the last to keep out of the workhouse. The union workhouse planted in a region that is crammed with poor, must be managed strictly, or there will be a fearful outcry about keeping down the rates. Are the poor people in the wrong for keeping their arms wound about each other? There is not a house, a room,—of all I visited the other day, I did not see one room,—

in which there was not sickness. Talk of the workhouse, and the mother says, in effect, "who would nurse Johnny like me? Oh, I could not bear to think that he might die, and strangers cover up his face!" Johnny again cries for his mother, or if he be a man, he says that he would die naked and in the streets, rather than not give his last words to his wife.

The people of this district are not criminal. A lady might walk unharmed at midnight through their wretched lanes. Crime demands a certain degree of energy; but if there were ever any harm in these well-disposed people, that has been tamed out of them by sheer want. They have been sinking for years. Ten years ago, or less, the men were politicians; now, they have sunk below that stage of discontent. They are generally very still and hopeless; cherishing each other; tender not only towards their own kin, but towards their neighbours; and they are subdued by sorrow to a manner strangely resembling the quiet and refined tone of the most polished circles.

What is to be done? Private charity must look on hopelessly when set before an evil so gigantic. Here is but a little bit of London, scarcely a quarter of a mile square: we look at it aghast, but there is other misery around it and beyond it. What is to be done? So much drainage and sewerage is to be done, is very certain. All that can be done is to be done to change the character of a Bethnal-Green home. The Society for Improving the Dwellings of the Poor makes nearly five per cent. on its rooms for families, though it fails commercially when taking thought for single men. The Society professes pure benevolence, and no care about dividends. Let it abandon that profession, abide by it certainly as a guiding idea, but let it take purely commercial ground before the public, and let its arm be strengthened. They who are now paying from five to seven pounds a-year for a filthy room or a cellar, will be eager enough to pay the same price for a clean and healthy lodging. Let model lodging-houses for such families be multiplied, let them return a per centage to their shareholders; and, since the Society is properly protected by a charter, let all who would invest a little money wisely look into its plans. I see the need of this so strongly that I shall begin to inquire now very seriously into its affairs, and I exhort others to do the same, with a view to taking shares, if they be found a safe and fit investment.

Private and direct charity may relieve individuals, and console many a private sorrow in this part of London, but it cannot reach—such charity to the extent of thousands of pounds cannot remove—the public evil. Associations for providing any measure of relief are checked by the necessity for charters to protect themselves against the present unjust laws of partnership."

But the poor are not the only sufferers. There are other places besides Spitalfields, in which the besom of the Home Secretary is most urgently required, for thus writes a correspondent of the "Builder:"

"In our day even bishops and archbishops are content to be poisoned without remonstrance, and under the very nose of Government: (heavens! if we had a Government *with a nose* :) over against that drear abode of the condemned, Millbank Penitentiary, to say nothing of others, is one of the vilest nuisances that ever wafted its poisonous breath to human lungs,—the Lambeth bone-boiler's. During the last visitation of cholera, this man's name became almost a by-word of infamy, yet still the human murder goes on unheeded, unrebuked. I have often, when the wind has set across the river, fairly run for it, to escape the sickening overpowering reek as I have passed along Millbank. How the health of the poor prisoners is affected, is known to the Government—known to us all,—yet still the deadly trade is permitted, and here, as elsewhere, the wrongdoers go on unheeded, unrebuked, unmastered."

Well may the Americans say of themselves "We are a people to whom one might well be proud to belong, energetic above all others in the pursuit of wealth, yet refusing to subject to Mammon the souls and bodies of its citizens; but London, the boasted metropolis of the world, has heaped upon the marshy banks of a polluted estuary (the common sewer and, at the same time, aqueduct of a people as numerous as that which occupies the whole area of Pennsylvania,) every abominable filthiness within the compass of man's devilry amidst the homes of its children."

Education is but of little use to those living in filthy lanes and overcrowded dwellings. The first great means of raising the poorest classes is to reform their habitations, to provide places wholesome and well ordered, at rents which they can afford to pay. We want, first, decent and clean sleeping accommodation, means of washing, &c. for those who are almost destitute; secondly, rooms for poor families, in which the members of them can be kept distinct, at rents varying from 2s. to 3s. a-week; and thirdly, the erection of houses in flats, at rents of from 4s. to 10s. a-week, the extent and finish to be graduated according to the rent.

To purchase the buildings in these dreadful districts, pull down, sewer, and reconstruct "Healthy Homes" on the sites for the first two classes, cannot I fear be accomplished by individual exertion, or even by the exertions of an association, unless assisted by the Legislature, parish rate, or general metropolitan improvement rate. Probably the most just mode is that each town, city, or county, should tax itself for the improve-

ments executed therein. Now, there are in the London district 320,000 houses, and if each house paid to the improvement fund the small sum of one shilling a quarter, a sum so insignificant that no one could possibly feel it, and yet, if properly managed, would be productive of incalculable good; for this sum, trifling as it appears, would amount to no less than sixty-four thousand pounds a-year, a sum which would effect the gradual extinction of habitations so disgraceful to the age in which we live. Instead of a tax, this contribution would probably be a saving; but, I cannot enter fully into this part of the matter farther than to remark, that no man can possibly expect to keep pestilence from his own door unless he keeps it from his neighbourhood. Many men would possibly give fifty or a hundred pounds a-year to such a fund, with the certainty of getting rid of such a focus of contamination for example, as the Kensington potteries, a filthy undrained spot, near which a residence must be any thing but wholesome.

The French find no difficulty in carrying out improvements in their metropolis, whether for sanitary purposes, or to give additional magnificence, or more convenient streets to their truly splendid city. The number of houses demolished in Paris during the last three or four years, and the further number already selected for demolition, are estimated as approaching 10,000, or one-third of the whole city! While the value of the new property placed on the ground is six times greater than that of the old which it has superseded; and thus, not only during the operations has there been increased activity or "briskness of trade" with its consequent increase of comforts, but the value of one-third of the city is increased six-fold.

But the appalling scenes disclosed in these extracts, show that the active interference of the Legislature is instantly required. That an urgent necessity exists for the destruction of those dreadful dens, and the erection of Healthy Homes on their sites.

"Trust not to partial care a general good,  
Transfer not to futurity a work  
Of urgent need."

Money is wanted to purchase these places, and then Healthy Homes will speedily appear in their stead, and light will chase away shadow. The sound principle of this interference has been recognized by the government of France, as a duty to society, and a sum of 10,000,000*fr.* has been set apart for the improvement of the lodgings of the workmen in large manufacturing towns. 200,000*fr.* has been granted to the "Cité Napoléon" in Paris, the first workmens' lodging house that was built. Messrs. Péreire have contracted to build workmen's lodging-houses to

the amount of 4,550,000*f.*, on condition of receiving a subvention from the government equal to one-third of the expense; and they have already constructed two large buildings, one at La Chapelle, and the other at the Batignolles, in which they are bound to let single bed-rooms for unmarried men, at two-pence a night; and apartments for married couples at "six shillings and three-pence per superficial yard, per annum!" Messrs. Heckeren and Kennard have also contracted to build lodging-houses to the amount of 4,140,000*f.*, on receiving a subvention equal to one-third of the expense, and they are raising a vast edifice in the Rue de Montreuil. Messrs. Puteaux, who obtained a recompense for the first plans, have already built four houses on the Boulevard Mazas, and are constructing six others at the Batignolles and at Grenella. In addition to these, workmen's lodging-houses have been built, and grants made at Marseilles and Mulhouse; and arrangements are in progress for building other houses at Rouen, Lille, and other places. Arrangements have also been made for building 110 houses in groupings, *and surrounded with gardens*, in the Rues de Reuilly and Picpus; these houses being on a plan already adopted with success at Mulhouse. On the whole 3,892,082*f.* have been granted in subventions, and consequently 6,107,918*f.* remain to be granted to make up the 10,000,000*f.* The accommodation already provided consists of 5,300 lodgings for unmarried, and 800 for married workmen, at Paris; 150 for unmarried men at Marseilles, and 300 for married couples at Mulhouse.

The contribution,—I would not call it a tax,—might be collected by the poor-rate collector, and paid to the Poor Law Commissioners, who might appoint a clever surveyor to carry out the object. We should thus obtain land, in the most populous districts, in perpetuity, rent free; and lay out and open well-drained streets, from sixty to ninety feet wide, with a few open spaces, for squares and gardens, in which to plant some trees, to assist in keeping the district for ever healthy; and the following description of buildings, if erected on such land, would be self-supporting, and could never be injurious to the health of the inhabitants of the surrounding districts.

The first thing to be attended to is the drainage of the district, and this must be performed by pipe-drains from the houses, and by brick-sewers in the streets; for, although *there would not be much fat in these districts, to clog the pipes*, still it is most reasonable that brick-sewers, in which a man could pass, to clear away any obstruction which might arise, should be provided in the public streets; so that the pavement might not be broken up, as it inevitably must be, in case a stoppage occurs in tubular drains. Where there is the usual mingling of sewage from water-

closets, the soap and soda from laundrys, the dish-washings, and pot-boilings from the sinks, stoppage will seldom take place even in small drains. It is the latter-mentioned part of the sewage which clogs the drains. I have seen a coating of fat nearly two inches thick, which had accumulated in a tubular sewer, and thus occasioned a stoppage which no flush of cold water could possibly remove.

We may then proceed to erect these fire-proof buildings, or let the frontages of such streets and gardens, solely to have such houses built, at ground-rents sufficient, with the rents of the houses, permanently to defray the cost, with a fair interest.

The principal causes of the insalubrity of London houses, and houses in other large towns, are, the wretched expedient of the cesspool, the open privy, the badly-trapped water-closet and sink, and the badly-constructed and ridiculously large brick drains; sometimes, indeed, such is the perversity of the precedent-monger, that a cesspool is formed even where a sewer is adjacent, and a brick drain is made to the sewer, to take the overflow from the cesspool, or to receive the contents raised by pumping. The brick drains are either not trapped at all, or improperly trapped; and consequently rats find their way into them, and so into the house, perforating a thousand passages through walls and beneath floors for the reception of stagnant water, and the admission of dangerously unhealthy gasses.

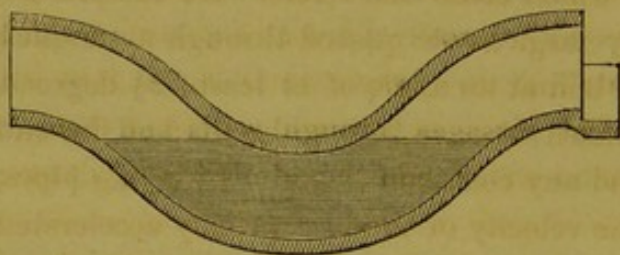
The privy in the poor man's yard, and the dust-bin in the rich man's kitchen offices, are the ever-pregnant sources of malaria and fever. It is quite extraordinary, the immense quantity of animal and vegetable matter, particularly in the summer, which many servants throw, or allow to accumulate and decompose, in the vault or dust-bin. Frequently on passing the area of some mansion, the smell has been so nauseous, that I have been tempted to summon the owner for a nuisance. Yet the noses of the inhabitants became accustomed to the odour, and they passed it by unnoticed; like the dwellers in some of the worst abodes of poverty visited by the author of "London Shadows," who, on one occasion, finding a sickening stench throughout the place, very naturally enquired of the inhabitant if she was not annoyed by the smell: to which the poor woman, quite unconscious of the matter, replied "What smell?"

It is true that we have not arrived at that accuracy of classification to which our neighbours abroad have attained; as, for example, at Cologne, where there are no less than seventy registered stinks! But I should call the smell from the area I have just mentioned, a dead-dog-and-cat-sort of smell; and something of the same kind is often particularly observable, both at commercial Charing Cross, and at aristocratic Knights-

bridge. It is our sense of smell which warns us that we are in danger from such things, and it is pretty certain that whatever offends this sense is more or less injurious to health. Nor can there be a doubt that the epidemic diseases which have ravaged countries, and much of the broken health, and of the permanently imperfect health, which we meet with everywhere, are consequent upon impurities allowed to be kept and to accumulate in the parts of the atmosphere in which men are living.

The remedy for these evils is now cheap and simple, by the use of that admirable invention, the glazed stone-ware pipes and the syphon traps of the same material. I applied them early, in numerous instances, to houses in which, although inhabited by the upper classes of society, sickness and death were frequently present; and happy indeed have I been to see unwholesome houses transformed into healthy homes, and to experience the grateful feelings manifested towards me by the gentlemen whose families were thus benefitted.

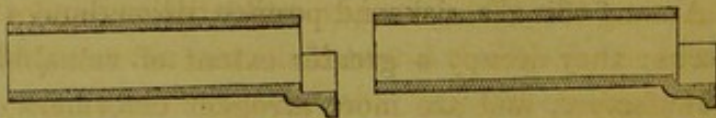
Fill up the cesspools, and let pipes take away all refuse at once from



the houses to the sewer; let those pipes be syphon-trapped at both ends, (as here represented. Do away with the plumber's water-closet, and its noisy apparatus of cranks and wires,

which continually open a communication with the sewer or cesspool, and substitute for this a simple syphon-trapped pan, and bell-pull valve to cistern. The cost of these arrangements will be but a very few pounds, the interest of which is but a very few shillings, not a tithe of the periodical amount of the doctor's bill, and far less than the expense annually entailed by the offensive plan, without reference to the damage from rats and damp, and the money-cost of illness and death. The evil is of immense extent, and should be dealt with vigorously; for of this be assured, **THAT NO HOUSE CAN BE A HEALTHY HOME WITHOUT PIPE DRAINAGE.**

Of these pipes, those with half-socket joints, as shown in the cut,



should invariably be used, as if any one length is broken by accident, or a stoppage takes place, that length can be easily taken out and a fresh one inserted; whereas, the spigot-and-faucet-jointed tubes can never be removed or replaced, without deranging the whole drain.

In laying of drains, great care should be taken that they have a sufficient fall, the greater the better; and the best practice is, to lay them

on a bed of concrete; no sinking can then take place. The place of discharge of the liquid, should never, in any case, be an open cesspool. In places where there are streets regularly drained, the pipes for carrying off our household fluids must empty into the street sewer. In agricultural districts, where it would be utterly inexcusable to throw it away,—valuable manure as it is admitted by all to be,—the place of deposit must be the liquid-manure tank, which should be placed at as great a distance from the house as possible. The drain-tubes used should, in all cases, be of hard-burnt, well-glazed earthenware; the conical drain-tubes being the most easily and surely laid; a tube of four inches diameter will be ample enough for all ordinary small cottages. Having drained many houses with these pipes, for many years past, I find that a four-inch pipe, if laid with a current of one-quarter of an inch in each foot, quite sufficient for one sink and one water-closet; but where there are two or more sinks, and two or more water-closets, I have always used a six-inch pipe. I had occasion to examine, some short time ago, a very large establishment, in which some bad smells were complained of; all the sewage of this very large house passed through a six-inch pipe; but then this pipe was laid at an angle of at least  $22\frac{1}{2}$  degrees. I directed a syphon-trap (as shewn in page 28,) to be fixed at the end of the drain, and I have not had any complaint since. In laying pipes, it must be remembered that the velocity of fluids is greatly accelerated by a good fall, and there is little doubt that all the sewage of this vast metropolis (not including the rain-fall) would pass through a six-foot tube, laid at an angle of  $22\frac{1}{2}$  degrees.

To prevent the escape of unhealthy and noxious gasses from ascending to the interior of the house from the drains, it is absolutely essential that all outlets should be carefully trapped. There are many forms of stench-traps now before the public, all of which are generally efficient. In laying drains, of whatever construction, it is necessary to make the joints water-tight; the escape of the liquid only serves to hasten the blocking-up of the drains, by the accumulation of solid matter.

Among the offensive and pestilential nuisances in London are its gas-works: they occupy a greater extent of valuable space than any other manufacture, and are more arrogant deformers of architectural beauty than any other erections in all the metropolis.

Every one of those hideous gas-tubs represents so many more poor families thrust into crowded death-dens,—so much more smoke thrown into the murky atmosphere that chokes us,—and are so many veritable forts, securing, by their invisible poison batteries, the great citadel where pestilence holds civilization at bay.

On this matter the President of the Civil Engineers, Mr. Simpson, in his inaugural address, when speaking of the manufacture and purifying of gas in the midst of densely-populated districts, says "The present system is objectionable, and we must be prepared for great changes." Mr. Clegg, Jun., proposes a consolidation of the Eleven Companies, and one single station for works down the river at Gallion's Reach. Gallion's would be a very good situation for works, to supply part of the north side of the metropolis, if the liquifaction consequent on so great a distance would not be too much. Bugsby's, I think would be the best situation for works for the supply of the south side of the river; and perhaps a station in the most secluded place near town, on the line of the Great Northern, and of the Northern and Western Railways, to complete the supply of the north side. At all these stations coals would be obtained much cheaper and easier than at present. After alluding to the order of the French Government for the removal of all gas-works beyond the barriers of Paris, the President went on to remark:—"There is no reason why such a wise measure should not be adopted for London, and for all the large towns in the kingdom. Large establishments, in the vicinity of towns, for the manufacture and delivery of gas into the present gas-holders, of existing companies, would be a measure of general benefit, in a sanitary point of view, and as a commercial question it merits careful consideration." To this it may be added, that if the works are placed as suggested above, there will be no necessity for gas-holders in any other places.

The dust and dirt of the Metropolis is not to be wondered at, when it is stated that 200,000 tons of horse-dung fall in the streets every year; when shop-keepers and servants are allowed to sweep out their dust into the streets; and while macadamized roads, which are one half of the year dust, and the other half mud, are perseveringly continued. Strange, that for the sake of providing an easy carriage-road for a few persons, the public should be so annoyed, when these same carriage persons might accomplish the thing much better by the application of India rubber to their carriage-wheels. Shopkeepers and others should be fined for sweeping any dust or refuse into the streets, and the horsedung should be collected, as soon as it is dropped, by Mr. Cochrane's orderlies. This dung must surely, as manure, be worth £1 per ton; and £200,000 a year, ought to go far towards paying the expense of collecting it. As to the rumbling, rattling, ill-ventilated machine, called an omnibus, it must be admitted to be a disgrace to the Metropolis. The plea of the proprietors, when urged to put on a better description of vehicle, is most curious, "For," say they, "if we were to do so, nobody would go in our

old ones, and these would be thrown on our hands." Now, if a plea like this were allowed to be valid, there would be no improvement in any thing. I have offered these men, through one of their officers, a plan for a "bus," elegant in appearance, perfectly ventilated, and noiseless; which is moreover safer, easier, and more cheaply constructed, than the old ones; but it is rejected on the above absurd plea.

To those who are in search of a healthy home, I would give a word of advice as to rain-water pipes: Be sure to observe whether the water from these pipes runs into a gutter across the foot pavement of the street; if it does not, you are almost certain to incur the risk of suffering from the ingress of bad air to your house. The Surveyors of Pavements, in some districts, armed with irresponsible power,—a power with which it is proved no man can be safely trusted,—have lately taken it into their heads to direct that rain-water pipes should be continued down to the sewer; consequently, when a drawing-room or a bed-room window is opened, for the purpose of admitting the fresh spring or summer air, the noxious gasses from the sewer pour through the joints of the pipes into the rooms.

Some time ago, a lady, knowing that a large sum of money had been expended, under my direction, upon the house she inhabited, sent for me, to complain of a bad smell frequently discoverable in the drawing-rooms and staircase. After employing some time in an examination of the premises, and in conjecturing the cause of the annoyance, I at last found that a rain-water pipe, the *shoe* of which I had left *above* the pavement, had, by some surveyor or builder, imitating the example of the Surveyor of Pavements, been conducted down, untrapped, to the drain; and thus the air from the sewer was constantly passing into the reception-rooms, which all the perfumes of Arabia could not render sweet. Of course the proper remedy was immediately applied, and the house relieved from the noisome stench. But on my mentioning the matter to the Surveyor of Pavements, that a method of diverting the rain-water from the houses to the sewer, without a trap, was a practice most injurious to the health of the inhabitants, it was quite obvious, from the self-satisfied manner in which he repulsed my remonstrance, that he considered the plan a very clever contrivance, which nothing short of an indignant command or a stringent law would induce him to alter.

Ever since the time, now some six or seven years ago, that the Sewers Commission, established by Henry VIII. was abolished, the subject of drainage has occupied a considerable share of public attention; and as it is a matter of the deepest importance, affecting the health of millions living in the Metropolis and other large towns, it ought to be grappled

with by an immediate legislative enactment, ordaining THAT OUR SEWAGE BE CONSTANTLY RUNNING. At present, the mouths of the sewers are closed for twelve out of the twenty-four hours by the rising of the tides, and if these mouths were lowered, as some persons recommend, the closed period would be lengthened. Hence, for these twelve hours, the sewers become cesspools, in which the sewage, by accumulation, forces out the previously-contained air, through the gully-holes and ventilators into the streets, poisoning the passers by. Now, if the sewers were always running at all times of the tide, which may easily be done, there would never be any bad smell in the streets, for there would rather be a downward draught through the gully-holes and ventilators; and thus one fruitful source of most extensive disease would be annihilated. Moreover, if the sewage were constantly running, there would be no time for decomposition to take place; consequently, manure made from such sewage would be very rich in fertilizing matters. Were the sewers of the Metropolis separated into those of the high, and those of the low-lying districts, all the sewage would run its course in less than an hour's time. In places under the Health of Towns Act, the sewage is seldom more than half that time after leaving the house, before it arrives at the pumping station, as I am informed by some of the engineers employed in carrying out that most beneficial Act.

The causes of the failures of the Sewers Commissions have arisen principally from acting on the notion that because a man had been employed the best part of his life in the construction of railways, he must therefore understand all about sewers! a most extraordinary *non sequiter*. As instances of this error, it may be mentioned, that a Commission of Engineers have recommended that the best plan to purify London, is to bring all the sewage of Brentford, Hammersmith, Kensington, and places adjacent, right through the metropolis, (as if London had not sufficient sewage of its own,) occupying in its passage of some twenty miles time enough for its entire decomposition, and the liberation into the atmosphere of its most noxious gasses. This is actually part of a scheme estimated to cost three millions sterling! I apprehend a Commission of Chemists would have arrived at a very different conclusion. Chemical knowledge would have prevented the recommendation of a plan for the conduction of the sewage in a cast-iron tunnel beneath the Thames; for, had such a thing been done, the salts of the sewage would have converted the iron into plumbago, and the whole thing would have collapsed.

In the country, it is almost incredible to see the nearly universal contiguity of the pump and the cesspool, or of the well and the cesspool. This is a mistake often fatal and always injurious to the health of the

inhabitants of the adjoining houses. Typhus, diarrhœa, and death, are the frequent results of this thoughtless error. While surrounded on all sides by pure air, the sufferers are utterly at a loss to conjecture the cause of such oft-recurring sickness. Wells, cesspools, and drains, are sunk in the same subsoil: for a certain length of time, it may be two, ten, or twenty, years, the liquid contents of the cesspool sinks away by filtration through the fissures of the rock, or chalk, or gravel, or alluvial deposit; but gradually the interstices or the pores choke, and the cesspools fill, until there is a vertical head, producing pressure sufficient to force the foul material, unfiltered, into the well. Mere filtration through alluvium, or gravel, will not purify cesspool refuse; although a properly prepared filter will mechanically and chemically cleanse the foulest river water, and render it wholesome for all purposes. In rivers, wherever there is putrefaction, there is also animal life which destroys this putrefaction; this is proved not only by the microscope, but also by the mass of animalculæ found on the top bed of a filter. Hence I suppose it is that some persons assert that water may be too pure to be wholesome, and that to filter the Thames water, is to deprive the poor of nourishment! But I am digressing from the subject of the cesspool.

Dr. Angus Smith, who knows as much about filters as any man, has analysed the water from scores of wells within and near towns, cesspools, and graveyards, and *never found one specimen of water untainted*. Many waters, regularly used, were found, on evaporation, to leave a residuum, the smell of which was "awful;" and some waters, said by the neighbouring dwellers to be "very good," were "positively poisonous with matter from graves, cesspools, and drains." Both in town and country the cesspool must be peremptorily abolished, and instead thereof, in the latter, stone-ware pipes should be laid from the house, stable, and pigsty, to a distant and perfectly water proof liquid-manure tank, the contents of which should be periodically applied to the land, and thus become the means of producing a more abundant supply of corn, vegetables, and fruit; instead of being the vehicle of sickness, disease and death.

Connected with the subject of water, a circumstance has just occurred which causes me to mention lead cisterns and pipes. These are supposed to be acted on by pure soft water, which thus becomes impregnated with lead, and therefore exceedingly deleterious to health. On this ground the Glasgow Water Works Company have just had their bill thrown out by a Committee of the House of Commons. The promoters of that bill appeared to be ignorant of the fact, or the point did not strike them, that modern Engineers never think now of using lead pipes, but always

iron, even for the small service pipes. And, thus obtaining a safe medium of supply, the purer and the softer the water the better; but this water must be received into stone or slate cisterns, and then we are sure to prevent mischief, for it does not appear to be quite certain whether hard or soft water acts most strongly upon lead. Rain water has no effect upon it. Neither has the pure water with which the city of Bath is supplied. The water delivered to the Bishop of Winchester's Palace, at Farnham, has only one degree of hardness; yet the inmates at that palace are never inconvenienced by the action of the water on the lead pipes or the cisterns. While on the other hand, we are told that the pure water from Bagshot, passing through lead pipes, poisoned Her Majesty's hounds; and similar water delivered at Claremont, through the same medium, nearly poisoned the ex-royal family of France. But we find the same effect produced by the hard water of the Hampstead ponds, which we have in evidence will eat through the bottom of a cistern in two or three years time. Thus the question naturally arises, has the hardness or softness of the water anything to do in the matter? Does it not more probably arise from the presence of carbonic acid gas, always in abundance in the vicinity of large towns, and this acting upon the lead, forms carbonate of lead, one of its most poisonous salts, which once absorbed, does not leave the animal body, but accumulates until death is the result. Here is also a confirmation of the opinion that carbonic acid gas ascends into the atmosphere when combined with caloric, for this gas is found in excess in the hill-water, and scarcely at all in that of the lowlands. When chalk is present, in small quantities, in water, it forms a coating upon the lead, and the metal is preserved from injury. I have seen lead cisterns of the age of Charles the second,—there are many such now in use in London, apparently as sound as when first cast. And it is also a fact, that the lead pipe laid down by Cardinal Wolsey, for the supply of Hampton Court Palace with water from the Colne, still performs that office, perfectly uninjured by the wear and tear of three centuries! I apprehend the reason will be found to be this,—that the river waters about London, do not contain any sensible excess of carbonic acid gas, therefore the chalky coating of the lead remains intact; but where this gas is present in large quantities, it becomes a solvent of the chalk, and the metal being deprived of its coating is speedily corroded. It should be known, that lead, held in suspension in water, may be separated from the water by filtration, and gentlemen connected with water-works, will do well to remember that all the salts of iron, except the sulphate, are tonic and salutary; but that all the salts of lead are deleterious and deadly. From this we may gather that water aerated with atmospheric air only,

does not act upon lead,—and that water aerated with carbonic acid gas does,—that the use of leaden vessels to contain water is at least hazardous, and therefore we may assume that the best method of conducting water from a spring is, to use stone-ware pipes, according to the practice of our great Master, two thousand years ago.

On this subject, I am favoured with the following remarks by Dr. Robinson, the eminent agricultural chymist and lecturer:—

“What you observe with regard to the salts of lead and iron, is perfectly correct. Let me add besides, that the introduction of the salts of lead into the system is so gradual and insidious, that the mischief is done before any harm is perceptible. Men are not as yet aware of the bad consequences that are attendant on the reception of even the smallest portion of lead into the system. In larger portions the evils soon present themselves, as in the case of painter’s colic, (paralysis of the muscular coat of the intestines,) the action is immediate and severe.

The effects of lead so introduced into the system is to paralyze some part or organ, vital or otherwise. Paralysis of the lower extremities is not an unfrequent consequence, no doubt, of the gradual introduction of this pernicious metal. What has banished that splendid wine from our tables, Madeira, I mean, but the fact of its being invariably adulterated with lead. I myself have seen otherwise healthy looking old gentlemen in Bath, drawn about the streets in little wheeled-carriages, and on enquiring into the cause of this paralysis of their limbs, I have been given to understand that they had been in India, and were Madeira drinkers, the sort of wine most relished there.

As leaden cisterns are so generally in use, it would be absurd to think of having them all changed. One *certain* corrective of any bad consequences from lead, would be to have a moveable zinc bottom in every case, where there is a lead cistern, or a wood cistern lined with lead. This bottom should be placed over the leaden one, and taken out every week and cleaned. Depend on it, whatever lead may have been in the water, is sure to find its way to or be precipitated on the zinc. You have seen the leaden tree formed by the suspension of a small piece of zinc in a solution of lead. The action in the other case would be exactly the same, but it would be characterized by a *black* coating, which should be carefully rubbed off, and the clean zinc bottom be returned into the lead cistern.”

A signal example of the efficacy of sanitary provision to prevent the recurrence of epidemic diseases, and greatly to reduce the rate of mortality, is exhibited in the recent alterations in Lambeth-square, in conformity with the measures set forth in the Health of Towns Act.

"Three years ago, Lambeth-square was as unhealthy as the Potteries. The population remained the same; the occupations, mode of life, and habits of the people, remained the same; no change of any kind took place, excepting the introduction of certain sanitary improvements. No history is more instructive.

Lambeth-square is situated in the Waterloo-road district of the parish of Lambeth. It consists of 37 eight-roomed houses, which let at 28*l.* a year, and each is chiefly occupied by the foremen of large establishments, and the more skilled and highly-paid class of artisans. In outward appearance, and in their general aspect within, these houses are very superior to the ordinary abodes of the same class in other parts of the metropolis, and present no obvious cause of peculiar unhealthiness.

According to the last census, this square contains a population of 434 souls. Among this number, on a house-to-house examination, it was found in one year (1851,) there had occurred 80 attacks of zymotic and other diseases, and 24 deaths; that is, nearly one person in every five had been dangerously afflicted with sickness, which had proved fatal in the proportion of 50 and 60 in 1,000.

When built about twenty years ago, these houses had been fitted up with untrapped closets, communicating with flat-bottomed brick drains, then in universal use. A number of the drains passed directly under the houses: they were wholly unprovided with any regular water supply for cleansing: consequently, instead of carrying away the ordure, they retained it within the houses; and the emanations arising from the stagnant mass of putrefying matter, were carried back into the houses, through the open closets, in a proportion increasing with the obstruction in the drains.

At the beginning of 1852, a new system of drainage was applied to the whole square. Water-closets were substituted for cesspools, and stoneware pipes for brick drains, and the closets and houses were provided with an adequate supply of water.

By these improvements the houses were placed in the same sanitary condition essentially as the Society's dwellings. The result on the health of the inhabitants was strikingly similar. On a re-examination of this property in November of the present year (1853,) it was found that the mortality had been reduced from 55 in 1,000 to 13 in 1,000.

Results so extraordinary are beyond hope, and almost beyond belief, but derived from sources thus widely different and independent, they are confirmatory of each other. They have further received decisive confirmation, to a most unexpected extent, from the operation of the Common Lodging Houses Act.

In the town of Wigan, for example, there are twenty-four lodging-houses, through which have passed during the last year, 29,655 lodgers. The superintendent of police reports, 'There has not been a single case of fever in any of those houses since the Act has been in force, in July, 1852; though, before that act had become law, fevers, and deaths from fevers, were scarcely ever absent from these lodging houses.'

The town of Wolverhampton affords a still more striking instance. In this town there are 200 lodging-houses, through which have passed during the year, the incredible number of 511,000 lodgers. The superintendent of police reports, 'There has not been a single case of fever in these houses since the Lodging Houses Act has been in force, July, 1852.'

Moral pestilence has, at the same time, been checked. The intemperate have become sober, and the disorderly well conducted, since taking up their abode in these healthful and, in comparison to what they were previously, peaceful dwellings. No charge of crime, no complaint even of disturbance has been lodged at any police station against a resident in these dwellings since their first occupancy."

Herein is fully shown what an improved system of hygiene has done for modern society. With such results before us shall we not persevere? We know that by the provision of salubrious dwellings for the labouring classes, of fresh air, pure water, and thorough drainage, we save money suffering, virtue, and life; therefore, in the name of all we hold in reverence let us strenuously endeavour to provide them.

It is impossible to over-estimate the practical importance of such results; "They show the extent to which, under circumstances of the utmost difficulty and danger, it may still be possible to save life; they open a prospect of the physical and social improvement of the people, such as before these results were obtained, there was no warrant from experience to anticipate: they indicate that the first step in this progress must be the removal of the degrading influence of the present dwellings of the labouring classes, and they prove the practicability, *without loss to the capitalist, or additional rent to the tenant*, of the universal substitution of houses for hovels. There must be compulsory enforcement of certain sanitary conditions wherever there are human habitations. There must be provision for the supply of better-ordered dwellings for the industrious classes: dwellings accessible to air and light, and no longer producing that malarious depression which resorts for relief to the fatal stimulus of ardent spirits: dwellings compatible with cleanliness, comfort, and those decent observances which are necessary to self-respect, and which must become habits, before there can be respect for the happiness, property, or life of others. Until such dwellings are within the

reach of all these classes, they cannot be raised out of that physical debasement which has lately been so painfully depicted, and which has been shown to be the portion (the unnecessary portion) of large masses of the people. The physical improvement of these masses, it is now admitted, must precede their intellectual and moral elevation. When the house ceases to be a sty, and possesses the conditions which render it capable of being made a healthy home, then, but not till then, may it receive, with some hope of benefit, the schoolmaster and the minister of religion."

Here let us acknowledge our obligations to the modern system of registration, for the great statistical knowledge it has been the means of disseminating,—for the wonderful impulse it has been the means of imparting to sanitary reform,—and for that salutary improvement in public opinion as regards the preservation of health,—and consequently the morals and happiness of the people,—which is one of the truest indications that the heart, the brain, and the sinews of the nation are in as vigorous and elastic a condition as could possibly be desired.

Let us now see from the words of a working man, what it is that the working man requires:—

"The dwellings of the very poor in our metropolis are not only very dear, but they have hitherto been fearfully overlooked. They are generally the fertile nurseries of disease, and the abodes of misery and vice. It is therefore most gratifying to know that the Legislature has stepped forward to abate, at least, some of the evils connected with the 'common lodging-house.' I am not sanguine, however, that the objects sought to be obtained by the recent Act will ever be realized to the full extent, until proper buildings are erected for the purpose, and conducted according to some enlightened system, by which cleanliness, quiet, and good order shall be strictly enforced. But it is not my purpose to speak further on this point at present. I wish rather to consider the case of working men—of the thousands of skilled artisans and mechanics who earn good weekly wages, say from twenty shillings to forty shillings, and who can really afford to pay something more than those poor people who must put up with the mere shelter of a common lodging-house.

Now, if there is anything that can contribute more than another to a working man's welfare—that can add to his enjoyment of life, in addition to the saving influence of good principles and a well-regulated mind, it is the possession of a clean, quiet, and comfortable home, to which he can return after the cares and labours of the day to refresh himself, to rest his weary limbs in peace, and profitably or pleasantly occupy his evening hours. Such a home attracts a man to what is good, and draws him away from what is bad. But place him where the people around

him are noisy and uproarious, dissipated, or profane, where there are squalling children, or other causes of annoyance,—where, in short, there is no order or cleanliness, and no consideration for his comfort,—then he becomes disgusted and irritable. The natural consequence is, that his evenings, instead of being agreeably occupied in retirement and repose, are but too apt to be spent at the public house, or at other places where vicious excitement is to be found.

Next to work itself, a good home is of the greatest importance to a working man, whether we consider character or comfort. It is there he should rest and recruit his strength for the toils of the following day: it is there he must quietly study the principles of his profession, or enrich and store his mind by reading: it is there he must think on his course, on his progress, and his prospects for the future: it is there he must communicate with his absent friends, and attend to other matters of greater or less moment. Not in the hurry or pressure of action is he so likely to form the high resolve, or ask the guidance and the blessing of God on his efforts.

In these days, then, of commercial prosperity, when the working man is fully employed and receiving good wages, what he most requires is a comfortable lodging, yet I believe the experience of every working man who has lived some time in London, or any other large town, will bear me out in saying that nothing is so difficult to obtain. Let a working man go where he may—pay what he may—he must make up his mind to suffer many unnecessary inconveniences and discomforts, whether in the form of filth, bad air, noisy disagreeable neighbours, or the most meagre accommodation, all of which, in nine cases out of ten, are traceable entirely to the ignorance and bad management of those who build houses, and who keep lodgings for working men.”

The eminent Dr. Southwood Smith, who with his colleagues has accomplished so much in the way of sanitary improvement throughout the Empire, says,—

“A clean, fresh, and well-ordered house exercises over its inmates a moral, no less than a physical influence, and has a direct tendency to make the members of the family sober, peaceable, and considerate of the feelings and happiness of each other; nor is it difficult to trace a connection between habitual feelings of this sort and the formation of habits of respect for property, for the laws in general, and even for those higher duties and obligations, the observance of which no laws can enforce. Whereas, a filthy, squalid, unwholesome dwelling, in which none of the decencies common to society—even in the lowest stage of civilization—are *or can be* observed, tends to make every dweller in such a hovel

regardless of the feelings and happiness of each other, selfish, and sensual. And the connection is obvious between the constant indulgence of appetites and passions of this class and the formation of habits of idleness, dishonesty, debauchery, and violence."

Dr. Buchanan in his work, entitled "*Our Great Cities*," considers that it is the duty of the Legislature to interfere in the matter, and certainly assistance is needed from our Legislators. We want the land now cumbered by dilapidated and unhealthy buildings. We have shown the French how to build Healthy Homes, *and they are building them*; while our philanthropists are restrained by our laws of partnership. Set us free from those laws, legalize limited liability partnerships,\* and Healthy Homes, will be rapidly substituted for "London Shadows." Dr. Buchanan, however, goes farther than this, and writes thus—

"Legislation, in our humble judgment, would not go a hair's breadth beyond what the most imperious necessity demands; if in addition to fixing such a proportion between the breadth of streets and the height of houses which line them, as would secure an abundant sufficiency of light and air, it should also insist on various other things, such as that to every tenement designed to accommodate a certain number of families, a washing house should be attached, and a certain open space for drying clothes. In the case of the working classes, both the washing and drying of clothes have, in almost all cases, to be carried on in their own dwellings, thereby aggravating the discomfort and confusion of the small apartments in which they live, and tempting, perhaps, husbands and fathers to prefer the fatal attractions of the tavern to their own fireside. Legislation ought further to provide, by stringent and peremptory rules, for the frequent periodical removal of all those impurities which, as things now stand, it seems to be no one's business in particular to take away. Instead of leaving the obligation to see this done to be bandied from one to another, as it is at the present moment, so that the police know not whom to charge with it; the owner of every tenement to which receptacles for such

\* *Mr. Whitworth, in his report on the New York Industrial Exhibition, says,—*"Great facilities are afforded in many of the States for the formation of manufacturing companies. The liabilities of partners not actively engaged in the management, are limited to the proportion of the capital subscribed by each, and its amount is published in the official statements of the company. In the case of a new invention, or a new manufacture, the principle of limited liability produces the most beneficial results. Persons who from their connexions or occupations are likely to be interested in, or profited by, the new invention readily associate together, and subscribe capital to give the new proposal a fair trial, when they are assured that their risk will not extend beyond the amount which they may choose to contribute. The cost of obtaining an act of incorporation is very trifling; in one case where the capital of the company amounted to \$600,000, (£120,000), the total cost of obtaining the act of incorporation was 50c., (2s. 1d.)"

impurities are attached should be made responsible for his tenants, and recognised as the only party with whom the law has in this matter to deal."

Our energetic and most valuable Home Secretary, Lord Palmerston, in his celebrated letter containing the soundest advice to the Synod of of Edinburgh, says,—

"The Maker of the Universe has established certain laws of nature for the planet in which we live, and the weal or woe of mankind depends upon the observance or neglect of those laws. One of those laws connects health with the absence of those gaseous exhalations which proceed from overcrowded human beings, or from decomposed substances, whether animal or vegetable; and these same laws render sickness the almost inevitable consequence of exposure to those noxious influences. But it has, at the same time, pleased Providence to place it within the power of man to make such arrangements as will prevent or disperse such exhalations, so as to render these harmless; and it is the duty of man to attend to those laws of nature, and to exert the faculties which Providence has thus given to man for his own welfare."

Cleanliness is of the utmost importance in the prevention and cure of epidemic diseases. Purity of persons and things is the great aim of *hygiène*; purity of persons and things was an essential requisite in the religion of the East. Amongst the Greeks, great sanitary reformers received divine honours, for Hercules was the scavenger of *Hygeia*: Mahomet commands his followers to perform their ablutions three times a day. The Levitical law ought to be familiar to us, for it is read periodically in our churches. Its exemplar of to-day—whose practice ought to be followed by every mistress of a family throughout the Empire—the Jewish matron—who in preparing for the feast of the passover, is careful that not only every nook and cranny is swept out, but that a skewer, or a sharp piece of stick is poked into every hole and crevice, so that not a particle of leaven may remain in the house; and it is no doubt owing to these minute precautions, that the Hebrew population, although dwelling generally in the closest and dirtiest parts of cities, uniformly escape epidemic disease.—While the careless Christians are dying by thousands around, Health is in the home of the Jew, and he lives on in comparative comfort to an extreme old age. Thoroughly cleansing,—the diurnal removal of all refuse,—lime-whiting all the areas, vaults, and offices annually, are certainly not the least among the means of making a Healthy Home.

It is the cleaning and scrubbing of the Jewish matron and her hand-maidens that is recommended, rather than the periodical painting and papering of workmen. Those persons who are fond of the frequent

re-papering of rooms, should be particularly careful to see, or expressly stipulate that the paperhanger *does not cover over the old paper with the new, but that he strips the old entirely off*. There are few things more calculated to engender malaria than layer upon layer of size and paste, in a state of decomposition. Rooms in which this is going on, will have a most unpleasant smell, and an atmosphere extremely prejudicial to health, while the cause is often difficult to be conjectured.

It is astonishing what masses of animalculæ are engendered in beds. Beds should, therefore, every seven or ten years be sent to a purifier, who will cleanse the feathers by steam, and return the beds perfectly clean and wholesome. As it is well known that insect life may be destroyed by odours, we have at once the way pointed out by which those domestic nuisances, fleas and bugs, those "terrors by night," may be extirpated. Take the bedsteads to pieces, and brush over the joints with spirits of turpentine, in which a lump of camphor has been dissolved, and you will rid the bedsteads of the nuisance. If these noxious vermin have effected a lodgment in the floors and walls, chloride of lime is the best remedy; and this may be purchased at the oil shops for fourpence a pound. Mix a pound of the chloride in a basin with cold water to a pasty consistence, and pour it into a pail of cold water; brush the floor over with the mixture, using an old hair broom or a hearth brush for the purpose. When the boards and walls are well saturated, which must be done quickly, or the eyes and the lungs of the operator will be affected by the vapour of the chlorine, close the doors and windows of the room, and in a few hours these pests will be annihilated. If, however, any should be suspected to lurk in holes and corners or crevices, repeat the operation in those places in about two or three days, to "make assurance doubly sure." A whole house may be thus cleansed for less than one shilling, besides the labour.

It is scarcely necessary to say that the doors and windows of all rooms in which a close unpleasant smell is perceptible, should be kept almost constantly open. But though advising every one in all cases to open their doors and windows, I would at the same time earnestly recommend those who value their health, to have a system of ventilation entirely independant of doors and windows. Taking into account the injurious effects of foul air on the body, it is scarcely conceivable, even as a matter of taste, that any one, when aware of the importance of the matter, would rest for an instant without endeavouring to obtain, as far as possible, the sweet fresh air:

"That trembling floats from hill to hill,  
From vale to mountain—with incessant change  
Of purest element!"

In ventilating apartments the greatest attention should be paid to that of the bed-rooms. The generally small size and lowness of these rooms render them very insalubrious, unless well ventilated; and the case is rendered worse by the closed shutters of the windows, and by the thick curtains with which the beds are so carefully surrounded, as if to prevent the possibility of the air being renewed. The consequence is that the occupants are breathing vitiated air during the greater part of the night, or in other words, during one-half of their lives. "In such cases," says Sir James Clarke, "the atmosphere in the morning smells more like that of a charnel house, than an apartment for the repose of human beings." But insert a ventilator, like that described in page 65, beneath one of the windows at the bottom of the room, for the admission of fresh air; and one of Arnott's improved ventilators in the chimney breast at the top of the room, for the extraction of the foul air; and then, instead of restlessness and languor, you will have sound and refreshing sleep, almost equal to the result obtainable by a change of air in a country excursion."

Next to the regular admission of air, the furniture of a bed-room deserves some little attention. The free circulation of the air should never be impeded by large sofas, easy chairs, or heavy draperies, composed of absorbent materials, with which we see bed-rooms so often encumbered. Let us rather take the chamber of the illustrious Duke of Wellington as almost a model bed-room, and arrange our own somewhat in the following manner:—an iron bedstead, or one of wood, it matters but little so that it is of a simple form, placed nearly north and south, with the feet set in glass cups—the common thick glass salt-cellars answer the purpose exceedingly well—not nearer to any wall than from twelve to eighteen inches, and not in contact with any chair, table, or any other thing. The curtains should not be of a thick material, gathered up into elaborate festoons and folds, but should rather be thin and loosely hung, so as to be easily removable. Conveniences of every description of course there should be, particularly a large washhand-stand, and plenty of water. Paint the woodwork of a light colour—but warm bird's-eye maple always looks pleasant and clean; it hides spots well. The floor should be covered with a plain drugget—not one of those staring, flowery patterns, but of a plain dark-grey or dark-brown: it will throw out the rest of the room, and give a freshness to it, which is the great charm of a bed-room. Keep the windows well open, and have a sharp eye, as Sam Slick says, for dirt.

In bed-rooms—to those unaccustomed to sleep with a sash down, or with other and better means for the admission of air—in sitting-rooms

occupied by a family, or evening visitors—in clerks' offices, and in all public rooms, one of Dr. Arnott's improved ventilators—those with a silkenly valve glued on to the top of the inside are the best—inserted in the chimney breast, will be productive of the most salubrious effect: the products of combustion and of respiration are carried off; air comes in from other parts to supply the place of that which is borne upward; the fire and the candles are seen to burn brighter; persons are enabled to breathe freer, and instead of that depressing, stifling sensation arising from a close room, the feelings are rather those of exhilaration and comfort.

The sanitary effect of this admirable principle was well illustrated in a large family dwelling-house for nearly 500 persons, at Glasgow. In this house, like all other foul and crowded human dwellings, fevers and such like diseases were constantly preying on the inmates, until permission was obtained from the proprietors of some neighbouring chemical works, in which there was a lofty chimney, to make an opening one foot square into this chimney, for the ventilation of the lodging-house. Tubes from the ceiling of every room, passage, and gallery, were then connected with this opening, and soon, to the surprise and delight of all concerned, the fatal diseases entirely disappeared from the house, and have never since returned.

Plenty of light is another element essential to a healthy home. "Light is a vivifying stimulus to all living beings." Physicians tell us that scrofulous and cutaneous diseases are aggravated by the want of light; that rickets, pallid complexion, consumption, and bodily deformity of children, are the result of want of light. Hence the necessity, in our climate, for large clean glass windows, free from shutters, curtains, and blinds, particularly in bed-rooms, where certainly in the summer most persons might be refreshed by the morning sun for four or five hours, were it not for these impediments. Slowly, but surely, the deprivation of the light of heaven tells on animal life. The "children of the sun" are lively, vigorous, and ardent; those of the shade, melancholy, weak, and listless. All windows should be opened to drink in the sun's rays, as says Armstrong—

"And still at azure noontide may your dome  
At every window drink the liquid sky."

The doors of north rooms should be opened into those rooms or landings having a southern aspect, that the rarefaction and circulation of the air may ventilate and purify every corner.

“The fost’ring sun, whose energy divine  
Dwells not in mortal fire, whose generous heat  
Glows thro’ the man of grosser elements,  
And kindles into life the pond’rous spheres :  
Cheered by thy kind invigorating warmth,  
We court thy beams, great Majesty of Day !  
If not the soul, the regent of this world ;  
First-born of heav’n, and only less than God !”

If, instead of a dangerous-looking frontage of dingy brick suspended in the air upon a brest-summer, the narrow but deep houses in the city were provided with a handsome façade of glass from top to bottom, a beautiful appearance would be presented to the eye, and a fresh field opened for artistic arrangement ; for these frontages would not necessarily be a mere flat surface cut up into squares like a green-house. Glass is now susceptible of a “ thousand forms and colours,” and may be moulded into as many patterns and devices, while the abundance of light thus obtained would cheer and gladden the hearts of the occupants, and an immense extent of superficies would be acquired for the display of goods altogether in a satisfactory and harmonious manner,—although I admit, it is a manner somewhat different to the conceit just exhibited in St. Paul’s Churchyard, of sustaining an enormous superstructure upon slender pillars of glass, to the amazement of gaping beholders.

Among the beneficent provisions of an all-wise Providence, is that harmonious union between animal and vegetable life, whereby the rejected parts of the latter become of *vital* importance to the health of the former, while the rejected parts of animals are equally necessary to ensure luxuriant vegetation. Hence it becomes our *duty* to preserve with jealous care every open spot of ground in our cities, and to fill these spots with trees, shrubs and plants, and thus obtain a mighty chemical apparatus for the supply of vital air. The Limes in St. James’s Park, and the beautiful Platanus in the quondam churchyard in Cheapside, point out such trees as the most suitable for a London atmosphere, while from their abundant foliage is dispensed a stream of health-giving oxygen. Plants, particularly the Hop, should grace every window, balcony, and yard. As we progress, I have no doubt we shall get rid of our ugly, dangerous, and inflammable roofs, and substitute instead thereof, a solid, flat, and incombustible covering, presenting an available surface for the cultivation of plants. It is but lately that even the learned understood that the air we breathe is as much a material substance as the water we drink or the food we eat, and may be mingled with poisons as these may be. A hundred years ago, nobody on earth knew that there was

such a substance in nature as oxygen, now called also vital air, which is one of the elements of our atmosphere, and which constitutes also four-fifths by weight of the whole substance of the ocean, and nearly one-third by weight of the solids forming the crust of the earth. In respiration, the oxygen which enters the lungs takes from the blood there some carbon, and returns as carbonic acid gas, which cannot safely be breathed again, and therefore has to be removed from our houses by ventilation. But as no oxygen is generated in our dwellings, it becomes necessary, if we would obtain a healthy home, to surround it with vegetation for that purpose.

It is most desirable that all our dwellings should be fire-proof,—there is no valid reason that they should not be so. Fox and Barrett have done a great deal towards this, and His Majesty King George the Fourth had flat and fire-proof roofs placed upon Buckingham Palace, showing the practicability and the advantages of the method. Mr. Frost, and others, produced plans and economical means by which this might be accomplished ; but, unfortunately, the twaddle about mediæval architecture—Gothic architecture, the offspring of Popery's palmy state—became prevalent, and, instead of progressing, we were sent back to the principles and practice of the dark ages. What an enchanting sight would our cities present if the tops of the houses were altered in such a manner as to become cultivated gardens ! what perfumes would fill the air, and what health would be in every breeze ! Those wealthy corporations, the Inns of Court, should set the example, and would thus afford at once the means of security and health to their hard-worked, studious tenants, who, in the "battle of life," can rarely find time to act agreeably to the poet's advice—

" . . . . . If the busy town  
Attract thee still to toil for power or gold,  
Sweetly thou may'st thy vacant hours possess  
In Hampstead, courted by the western wind ;  
Or Greenwich, waving o'er the winding flood ;  
Or lose the world amid the sylvan wilds  
Of Dulwich."

In a time of deep architectural darkness, some sixty or seventy years ago, there were some comparatively wide avenues laid out in the environs of "Town," such as Walworth, the Kent, Kennington, Newington, Westminster, Borough, and City roads ; houses were built on each side, with deep gardens planted with trees. Some of those trees had, within the last few years, attained a noble height, and formed a pleasant con-

trast to the heated and close streets. Now, these gardens are fast disappearing, the trees are uprooted, and rows of shops usurp the place, narrowing the avenue to the dimensions of a common street. Moreover, these shops are thrown out as mere feelers, to be rebuilt a few years hence with lofty dwelling-houses over them. Of this cunningly-devised process of encroachment on public space we may see a glaring instance just erected at the N.E. corner of Leicester-square, an instance the more annoying because it happens to occur in an important thoroughfare, lately improved to the great advantage of the public at a great cost of public money. Can the district-surveyors, who are paid to serve the public, be doing their duty in suffering these encroachments? I think they are not.

On seeing the immense multitude of artisans, in their freshly-washed blouses, which assemble on the magnificent *boulevards* of Paris, or in the more magnificent *Champs Elysées*, enjoying the air after toiling all day at their several avocations, one naturally inquires, Where can our poor workmen, in their mud-coloured clothing, hide themselves? Have we no places of recreation for them?—nothing but the tap-room, the penny theatre, or the obscurer haunts of misery and crime? Paris, not one-half the size, or the population of London, has large and beautiful open spaces for the enjoyment, and within the reach, of all her thousands—for the boulevards are a broad belt encircling the city, and separating it from the suburbs; while London has scarcely the minutest open space within half a day's walk from her centre. How, I would ask, with such a state of things, is it possible we can expect to have a healthful and virtuous population? The plantations in our squares might be considerably enlarged by adding to them some of the adjoining dreary expanse of gravel or granite, and those little spaces might be thrown open for the advantage of the neighbouring community. It is the duty of every one interested in promoting the well-being of his fellow creatures to hold up to public indignation every attempt to encroach upon these spaces by buildings. We have seen the attempt successful in Leicester-fields, in spite of the earnest remonstrances of public-spirited individuals, and now an iniquitous project is on foot to do the same thing in the largest of our spaces, Lincoln's-Inn-Fields! Surely it is time for the legislature to interfere and put a stop to such things. Lincoln's-Inn-Fields is a most beautiful garden; but no one uses it—no one, therefore, would be injured if it were given up to the public. It would be an admirable situation for a gymnasium—one of those places to which the ancient Greek was so much indebted for his physical and moral superiority over the inhabitant of a modern city. But on this

point hear Captain Chiosso :—" It will be a great epoch of modern history, when any sovereign or government shall have ordered the erection of gymnasiums (lesser or larger) in every open space of our towns and cities—in our parks and gardens—and on our commons—to which, early and late, a serene, innocent, and happy youth may resort ; when, in every country, a central gymnastic establishment, for the training of masters, will have been established ; when, in fine, a satisfactory testimonial from a gymnasium will be considered as essential as that of any other educational department. Moreover, *the gymnast requires no written testimonial : his is one impressed and marked by a higher authority than that of man—an erect, proud, manly (womanly) posture, a warm and animated look, and a form of body capable of enjoying as well as enduring life.*"

The widening of our great lines of thoroughfare is becoming a matter of urgent necessity. Here our system of short leases might be of advantage, for with such leases we might, in little more than half a century, and, in most cases, within a quarter of a century, obtain the whole of our streets of the desired breadth and regularity, by taking advantage as the leases fall in, or the houses become dilapidated, of pulling down such buildings, and setting back the new ones, continuing the operation as opportunities occurred until the whole street had acquired its convenient width. This has been done by Mr. Shaw, in Newgate-street ; by Mr. Hopper, in one or two instances ; and also by other gentlemen who, in this respect, deserve to be honoured as public benefactors. For thus, instead of a cost to the public of some hundreds of thousands of pounds, the whole thing is quietly done without the cost of one penny.

There are few thoroughfares which require to be widened more than that part of the Strand lying between St. Clement Danes and Somerset House. Were the noble ground landlord aware of the example set by others, his public spirit would, no doubt, direct that the plan should be followed on his property. Yet for months—nay, I believe, for years—there has been a hoarding encroaching on the very narrowest part of the Strand, to the great annoyance and terror of every passer-by. I fear no setting back, or even of keeping the eastern line of houses, is here intended ; yet there is plenty of back space, as there is indeed all the way to Somerset House ; so that under a proper plan the public might obtain a wide street, at little or no cost, within a few years' time. But re-erect these corner houses on their old foundations, and the work of improvement will be deferred another century.

Nor is it less necessary that restrictions should be placed upon those individuals who are building lofty towers, as dwelling-houses, on the

borders of our parks and gardens, to the great injury of those who dwell behind such monstrous erections, as well as the destruction of vegetable life in their vicinity. It may be seen that the elms in Her Majesty's garden have begun to die since the construction of those tall houses in Grosvenor Place, to say nothing of the invasion of the privacy of the gardens. Culpably short-sighted have been the managers of our public works; for instead of permitting such erections to swell the bloated revenue of a nobleman, or to gratify the rapacious enterprise of a builder, it would have been easy to have provided a broad piazza, the width of Eaton Square, the whole way from the Palace Gardens to the Thames at Chelsea—a preserved open ground, of the utmost value to the ventilation, health, and beauty of the metropolis. It is clear from these examples, and from the repeated attempts of a gentleman to enclose Hampstead Heath with houses, that nothing less than legislative interference will prevent these unblushing proceedings for attaining private advantage at the public cost.

The public should purchase, while it can be had on moderate terms, all the open ground between Hampstead Heath and Primrose Hill. The proprietors are those with whom there would be but little trouble, being the Dean and Chapter of Westminster, the Provost and Fellows of Eton, and Sir Thomas Wilson. The inartificial character of the ground need not be altered; roads for carriages and equestrians, paths, with seats, for pedestrians, and a few trees, are all that is wanted. The fine open space of the Regent's Park would thus be extended far into the country.

On holidays I am told there are some hundreds of thousands of persons to be seen enjoying the pure air of the heath. The justly popular rector of the parish knowing this, is anxious to preserve this enjoyment to future generations, and he, in conjunction with other gentlemen, engaged a Surveyor,\* who has ascertained that a noble park, of 300 acres in extent, may be secured to the public for ever, at the comparatively trifling cost of £80,000. Surely the public should be aroused to this, and not allow a second case like that of Battersea, mentioned in page 17. But the whole possibility of obtaining it on any such terms hangs on a thread—the life of the Lord of the Manor—which may be snapt asunder in an instant, when the entail may be cut off, and the land covered with buildings the very next year!

The public should insist that a narrow district, bounded by a line from Crouch Hill to Bean's Green on the north, Stroud Green and Highbury on the west, Bean's Green and Southgate on the east,

\* The accomplished Professor of Architecture to the Royal Academy, I believe.

and Ball's Pond on the south, traversed generally by the New River, should be preserved as open space for ever. In like manner also should be preserved, Old Oak Common, Wormwood Scrubs, and the land lying between Old Oak Lane, the West London Railway, and the Acton Road. The beautiful chain of commons, Wandsworth, Tooting, Clapham, Peckham Rye, and Deptford, should be most religiously preserved from encroachments, and their boundaries enlarged on all possible occasions. Nor would it be too much to demand that a large open space between the Dover Road on the north, Penny Vale on the south, the Ravensbourne on the east, and Lordship Lane on the west, should be kept as fields and market gardens for ever. The railroads now offer such facilities for the conveyance of passengers cheaply and rapidly, that it is far more economical for gentlemen to build their villas ten or twelve miles from London, than to build in the more immediate environs, dependent on omnibus conveyance. The extension of the railways into the heart of the metropolis, according to Mr. Pearson's design, would materially facilitate this object.

A hundred years hence, the metropolitan counties will be studded with houses, all within hail of each other. Where, then, will be our places of recreation?—Where our commons and our forests? Shades of the Fauns and Nymphs preserve them! Reflecting on the greatness of this empire, who can look otherwise than with indignation on the petty attempts, from time to time, made for the inclosure of our commons and forests, and heaths, under the pretence of growing corn. As if we could not grow much better corn in Sicily than we can here. It is not agriculture that has given us dominion over a fifth part of the great globe, and over an eighth part of its inhabitants.

We are a manufacturing and a commercial people, having machinery doing more work for us than could be accomplished by the individual labour of every human being upon the face of the earth. Let us, therefore, have our corn-fields, our olive gardens, and our vineyards in those parts of the globe best adapted for the production of corn and fruit, and preserve our sylvan scenes as places of recreation for our hard-working population, the directors of our gigantic power of machinery, our social system, and our commerce. But we must restrict our observations more immediately to the metropolis.

And here excellent opportunity presents itself for forming urban plantations in the suppressed grave-yards.\* Among the least civilised

\* The imperative necessity for this wise and salutary measure is indisputable; the metropolis had long been groaning for it. Formerly, persons reading Holy Writ literally, imagined that the body was resolved into dust; but now we know that it is resolved into gases, and flies up into the air. In the country, these gases are absorbed by the vegetation

tribes, the burying-places of their ancestors is held sacred; and shall the Anglo-Saxon of the 19th century be put to shame by savages! It was but the other day I heard a calculation as to the value of the sites of the thirty city churches proposed to be removed to the suburbs! Such a thought never entered the minds of our ancestors after the fire of London, much as they then wanted money. Many parishes which, before that event, were distinct, became united, and one church was sufficient for both parishes; but the site of the church not rebuilt was respected, as consecrated ground; and these are the beautiful, open, little spots, we see to our surprise in the City. Thus it must be with those churches which are removed—and which must be removed, for it is our duty to do the most good we can with the means at our disposal.

Having suggested this measure in "Ancient and Modern Temples," published nearly twenty years ago, time has only added to my conviction, that it must sooner or later be carried out. It is, for instance, melancholy to see the splendid eloquence of Dr. Croly expended upon thirty or forty persons, whereas, if his church were placed in the suburbs, he would delight and edify some thousands. While, although but a minor consideration, the Temple he adorns might have its beautiful plan fully developed, which it was impossible to accomplish in the cramped up site it now occupies. How beautiful, too, would the Mansion-house appear if relieved by a garden of trees at the back. Some of the ground now covered by these churches may be given up to widen public thoroughfares, if wanted; because public convenience requires it, and public convenience equally demands—to say nothing of

around; in London, the unfortunate beings whose dwellings encircle the grave-yards, imbibe these gases to their own destruction. The first is amply proved by the proverbial rankness of churchyard grass, and the second, by the mortality of the dwellers in Clement's Lane, and other places on the borders of grave-yards. But if other proofs are wanting, look at those wretched creatures, the London grave-diggers, and see from their cadaverous appearance that, like the vultures of India, they are almost rotten from the effects of their horrid employment. Oh! my Lord Secretary, poor humanity has cause to be grateful for your prompt wisdom in this matter, and thus preventing the continuation of such beings; for there are examples enough in this country to show, that however dreadful the business, there will be found hands enough to do it. Witness the poor men employed in the St. Rollox chemical works at Glasgow, who are obliged to wear glass masks to protect their faces from the fumes of the muriatic acid, and who seldom live more than four years after entering the acid department of those works. Witness also the succession of predestinarians who work in the corning-room of a powder-mill. In fact, as soon as decomposition begins, the dead man is poison, and hence the necessity for the compulsory committal to the earth of every corpse on the fifth day, at the latest, after its decease, or of its removal to a dead house something like those in Germany, that the authorities might take measures for its immediate interment. Mr. Walker, who has examined so many charnel-houses and graveyards in the metropolis, told me one night, as we were coming from a party at the Marquis of Northampton's, that he invariably went into a sudatorium after such examination, or his constitution would have suffered severely from the effects of these investigations. And yet, such is the power of office to blunt the senses, that many years ago, when agitating for the closing of St. Margaret's church-yard, one of the churchwardens told me that the notion of its being unhealthy was quite a mistake, for that he was in the habit of walking round there early in the morning to enjoy the air! and so also *Punch* represents a deputy alderman taking out his children for an airing in Smithfield!

a higher principle—that the site of a sacred building should not be desecrated by a secular structure. Unfortunately, this has been done in two instances in the metropolis—in the one case, to enlarge the Bank of England, a matter of imperious necessity; and, in the other case, to widen an important thoroughfare, when the opportunity was seized to build the Sun Fire-office on the remainder of the consecrated spot. Let us hope that these are examples to be avoided in future rather than followed, and that our associations and feelings will not again be sacrificed at the shrine of mammon. We may keep up the steeples as useful clock-houses, or as ornamental “stones of memorial,” for it is clearly our duty to remove the churches to places where they are wanted, and to enlarge their plan, so that each church may accommodate at least 2,000 worshippers; but the present generation can have no right to misappropriate a site dedicated to God centuries ago. There can be no doubt that legal means should be taken to enable the Church to adapt itself more to the population, so that the edifices, the ministers, and the stipends, may all answer better the purpose for which the piety of our forefathers long ago provided them. These forefathers built and endowed where they were wanted, and endowed them, too, with lands frequently many miles away from the parish. It is no kindness or respect to a founder to refuse to amend his work when ridiculously unfit for its purpose. If we go only so far back as the reign of Queen Anne, we find the population of the city of London four times greater than it is at the present day, for warehouses have taken the place of dwelling-houses, and the inhabitants have been forced into the suburbs. Now, the best disciples are those that complete, and, if possible, improve on the work of the teacher. So there can be no doubt that, if the spirit of the founder can still follow his church, it will rather go with the congregation, the minister, and the life-giving ordinance, than with desolate halls and empty pews. Remove the buildings, but let their sites blossom as a perpetual garden planted thickly with flowers, trees and shrubs, surrounding the old steeple, or a simple cross of memorial. The finest efforts of secular architecture would profane these spots, and be unsightly in comparison with open space. We do not want buildings, but the absence of buildings; and so also in like manner, should be our treatment of the closed graveyards. In these vegetation would be luxuriant enough, and we may thus convert these festering plague-spots into sources of health and delight. How refreshing it would be to the senses of the millions who daily pass by the church of St. Clement’s Danes, if that most conspicuous church-yard were surrounded by a belt of lime and plane trees, with a thick

underwood of box and privet. But to say nothing of those dreadful little pieces of ground drawn into notice by the graphic pen of Charles Dickens, let us think how pleasing would be the contrast if the black desert of St. Giles's, the heaped-up mound of St. James's, the rank earth of Christ Church, and the awful Bunhill-fields, were converted into smiling shrubberies of health-giving plants.

In conformity with the practical advice of Lord Viscount Palmerston to the Synod of Edinburgh, and in order to promote the erection of Healthy Homes for the industrious classes of society, free from the objections to those already built, and combining every requisite for the health and comfort of an industrious man, his wife, and family, on a plan which would be remunerative to the capitalist, and free from the objections of the benevolent lady at whose instance this little work appears, instructions were handed to me by that lady, for the purpose of arranging a design in conformity with her views on the subject.\*

I must confess to some difficulty in arranging a design agreeably to instructions. It may indeed appear very easy, but in reality it is not so ; else, why do we see these miles and miles of dwellings stretching out on all sides of this huge Babylon, and on all sides of our manufacturing towns, mostly erected by clever, shrewd men of business, and men who are supposed to have inherited the fifty-eight centuries of accumulated art-knowledge, yet who go on building habitations for mortals "subject to skyey influences," without taking the slightest sanitary precaution, and consequently most of the builder's productions are stinking, damp, draughty, and smoky.

The choice of the situation of a dwelling is a point of considerable importance. The most essential qualities are those most conducive to health, and the easy access to public roads and conveyances, avoiding the proximity of marshes, boggy ground, and stagnant water. A cheerful situation is above all things to be desired, as it generally has a beneficial influence upon the spirits ; and the position of the house ought to be such that it would have the benefit of the sun every day in the year ; a gravelly soil being, as most people are aware, far preferable to a clayey one, and a chalky sub-stratum better than any other ; but on this point people are more frequently led into error, because the conditions are not so obvious as the other requisites for a healthy home.

To a worthy friend of mine, who had made his fortune in the city, the pure air of Notting-hill presented the most attractive charms. His wife, an excellent manager of a very large family, accordingly set out

\* The result of the instructions being so perfectly satisfactory, I do not think it necessary to print them.—S. A. G.

in search of a residence in that flourishing locality, but thoughtful above many others, this lady inquired of the house-agent the nature of the soil, "Oh! ma'am," said he, waving his hand in a southerly direction, "did you never hear of the Kensington gravel pits?" "Oh! dear yes," said the lady; "to be sure; how stupid I am; I forgot that." The *suggestio falsi* had its effect, the bait took, and the house was taken; nor was the dampness of the ground discovered until after some years' occupation of the house. Now, it is a fact well known to geologists, that in most of the high lands around the metropolis, the London clay crops up, forming what is called the London basin, and such is the case at Notting-hill, Harrow-on-the-hill, Shooter's-hill, and the like. Those persons, therefore, who covet these elevations thinking to be "high and dry," find themselves woefully mistaken in the latter particular. Yet, houses built in these situations are not necessarily damp. The Labourers' Friend Society's model cottages at Shooter's-hill are perfectly dry, although standing on a very retentive clay; no damp rises through the concrete floor, or is seen creeping insidiously up the walls; while, in the adjacent cottages, such is the atmosphere, that the sacking of the bedsteads on the ground-floors speedily becomes rotten.

In all clayey, sandy, boggy, or unsound soils, recourse must be had to those means necessary to make the ground sufficiently solid and compact to bear the weight of the building, and to prevent damp rising by capillary attraction through the foundations. This can only be effectually accomplished by placing the foundations upon a good bed of concrete, which, if properly prepared of sand and gravel, cemented with a due proportion of fresh burnt lime, becomes an artificial rock, resisting damp, and capable of bearing almost any weight that can be placed upon it. Every inequality of settlement and lateral yielding of the supporting material is prevented by taking this precaution; and the fractures which so frequently disfigure different structures, and endanger their stability, are likewise completely obviated. It is also advisable to lay directly above the footings two or three courses of bricks in cement at an equal level throughout all the walls, both external and internal. At Shooter's-hill, we had to avoid every shilling of extra expenditure; and, therefore, there is only a course of slates laid horizontally in mortar; but where expense is no object, a layer of six-pound sheet-lead is also a sure preventive to the rising of damp.

We hear frequently urged by agriculturists the great importance of subsoil drainage; and this, however startling it may at first appear, is also essential to a healthy habitation where there are rooms beneath the general level of the surface; for, however great the precautions

taken in the building, water will occasionally arise in the basement, unless the ground is thoroughly drained.

“Correct the soil, and dry the sources up  
Of wat’ry exhalation; wide and deep  
Conduct your trenches through the quaking bog.”

\* \* \* \* \*

“And wheresoe’er you build,  
Whether on sun-burnt Epsom or the plains  
Washed by the silent Lea, in Chelsea low,  
Or high Blackheath, with wintry winds assailed.

The durability and security of every structure being in a great measure dependent upon the cohesive power of the mortar, a few words on the subject is absolutely necessary. Scarcely anything of the kind can be better than London mortar when prepared for large buildings, under the direction of an architect, by a respectable builder, and scarcely can anything be worse than London mortar when prepared for the dwellings of the poor, by a scampish builder, without the direction of an architect. Mortar, to be durable, should be composed of well-burnt limestone, and sharp, clean, river-sand—one of the former to two of the latter. The Thames sand, taken from above the bridges, is a pure drift-sand, consisting chiefly of hard quartose, flat-faced grains, with short angles, very clear, and suffers but little diminution in its bulk by washing. The limestone that heats the most in slaking is the best, and slakes the quickest when properly watered. No more than is sufficient for one day’s consumption should be slaked at one time, and no more water should be employed than is sufficient to reduce it to powder, when it ought to be immediately covered with sand to prevent the gas escaping, which constitutes its hardening quality. The mortar should be mixed in a pug-mill, or well-beaten, so as thoroughly to incorporate the lime and sand. Care should be taken to have it used soft in warm weather, and rather stiff in cold weather, and to insist upon all the bricks being dipped in a tub of water. With mortar so made with pure water, free from salts or clayey particles, and with good stocks so treated, you will have a homogeneous mass, solid as a rock, which will increase in strength every year, and be found stronger at the end of 2,000 years than it was in the first year of its existence. But if, on the contrary, you form your mortar with lime which has been kept till it is almost reduced to a state of chalk, and with unwashed road-drift or pit-sand mixed with water containing saline or earthy matters, and apply it to place, or half-burnt bricks, hot and dry, the result will be a friable compound that will tumble to pieces with the least cause of displacement. Let it

be remembered that dead lime, water containing more than a certain per-centage of salts and sand containing clay or mould, cannot be formed into durable mortar. This also points out the ill effects which must result from using the scrapings of roads, old mortar, or other rubbish, which consist, for the most part, of soft, muddy, and extremely comminuted particles, instead of clean river-sand, which is a strong substance not in the least degree friable.

Dr. Hutton proved all this in his experiments in the latter end of the last century, and the *rationalé* of the matter appears to be as follows :—When a drop of water is exposed to the air, the calcareous matter contained in it begins to separate from the water, and, after passing through the process of crystallisation, becomes, in fact, limestone. The perfection of mortar must, therefore, depend entirely upon the perfection of the crystals; and if the matter interposed between the crystals of the lime, such as clay, mould, or other friable matters, the material must necessarily be of a weak and imperfect nature. But, on the contrary, when the particles are hard, angular, and very difficult to be broken, such as Thames sand, the mortar invariably assumes a compact and solid form. That the crystallisation may be the more perfect, a large quantity of water should be used, the ingredients thoroughly mixed together, and the drying be as slow as possible. This process has the effect of dissolving a large quantity of the lime, and of rendering the mortar equally hard with that used in the construction of the walls of the ancients. Dr. Hutton's mode of slaking lime was by immersing it by sievfuls in a tub of water, and afterwards using this lime-water for saturating the bricks.

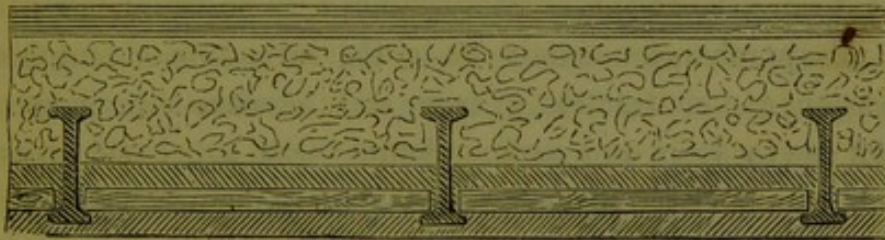
The best means of preserving an edifice from the ravages of fire, is a subject which ought to occupy the most serious attention and study of every architect in preparing a design for palace, mansion, or cottage. A well-built house would suffer but little from accidental carelessness, and it would defy the attempts of the most malicious incendiary if reasonable precautions are adopted in its erection. There are several ways of effecting this, the most obvious of which is, preventing the communication of fire from floor to floor. This is very effectually done by Messrs. Fox and Barrett's patent method of flooring, as well as by the usual practice of Parisian architects; and there are other ways of obtaining the same most desirable result. As I am directed to specify for Messrs. Fox and Barrett's flooring, I must, in a few words, describe their method of producing fire-proof floors, and afterwards mention two or three other means by which the same object may be accomplished.

Messrs. Fox and Barrett's principle of construction was devised to

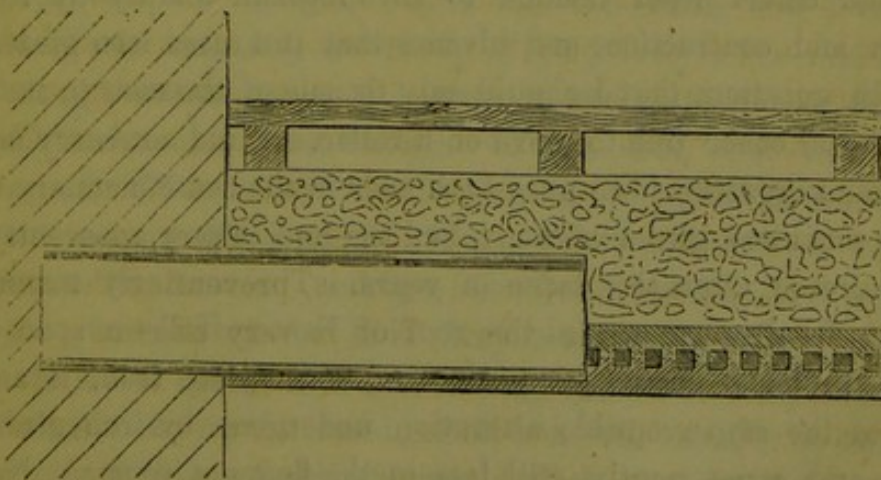
obviate the danger of fire from timber floors on the one hand, and the expense of large iron girders and brick arches on the other; for it has been but seldom that these latter could be used in domestic buildings, partly on account of the expense, and partly from the arrangements necessary to resist the thrust of the arches upon the walls: but such is the economy of the patent method, that it has become little more than a matter of choice whether a building shall be fire-proof or not.

The general principle adopted in carrying out the fire-proof arrangement in this improved system of construction, is the substitution of joists, either of wrought or rolled iron, for those of timber, and the employment of successive layers of incombustible materials, principally concrete, in which these joists are imbedded; the whole forming a solid fire-proof foundation, adapted to receive a finished surface of floor or roof of any kind; the combination of the various materials, and their perfect consolidation into a compact mass, leading to the development of great strength and firmness.

The following sketches illustrate the construction of the floors and



*Fig. 1.*



*Fig. 2.*

roofs, and show the principle as applied in its most simple form. Figure 1 is a section across the course of the joists, with a cement or other

similar surface; and Figure 2 is a section between, and in the direction of the joists, with a boarded surface, the joist being broken off to show the construction of the floor.

The surface of the floors may be finished either with the ordinary boarding, or with cement, tile, slate, stone, or other material; and that of the roofs, with asphalte, metallic lava, or perforated tiles, &c. The roofs are formed nearly flat, the slope being only sufficient to allow a fall for the rain, *and the ordinary timber and slate roof is entirely superseded.* The ceilings are applied in the ordinary way, except that the usual ceiling laths are rendered unnecessary.

The following statement affords a close approximation to the comparative cost of the floor for a room of average size in a dwelling house constructed with timber, and on the fire-proof principle:—

Room, 18 feet long, 16 feet wide:—

TIMBER FLOOR, of the <i>commonest</i> description	£15	5	7	or	£5	6	0	per square.
Ditto of a superior description .....	20	9	1	„	7	2	0	„
FIRE-PROOF FLOOR, with Cement surface ...	17	3	0	„	5	19	0	„
Ditto, with 1-inch boarded surface	20	9	3	„	7	2	0	„
Ditto, with 1½-inch, ditto .....	21	9	5	„	7	9	0	„

Much misapprehension exists as to the variations of length due to the expansion and contraction of iron, and therefore a prejudice exists against its use in floors and roofs. Some years ago I had occasion to put a roof of a peculiar construction upon a picture gallery, and I proposed to do so with cast-iron girders. The proprietor begged of me first of all to consult an eminent engineer on the subject. On meeting this latter-mentioned gentleman he observed, that he could make a railway bar travel from London to Birmingham simply by its own expansion and contraction, and advised that if I used iron girders for the roof in question, that I should only fix one of the ends in the wall, and leave the other free to move on a roller. I did not carry out the gentleman's suggestion, but fixed both ends in the same manner as if it had been a trussed girder of wood, and the roof is now apparently perfectly unaltered after this lapse of years. The masterly manner in which Mr. Daukes has carried the roof of Exeter Hall—a span of no less than 75 feet—on arched girders of boiler-plate iron, is another instance of the imperceptible alteration undergone by iron girders in the roofs, and, consequently, still less in the floors of rooms. No one, therefore, need hesitate in the free use of iron in such situations. In fact, the expansion of iron from the freezing—32 deg. Fahrenheit—to the boiling point of water, 212 deg., is only about  $\frac{1}{1000}$ th of its length; and as an ordinary room rarely varies more than 20 deg. from the mean tem-

perature, the expansion will not exceed  $\cdot 03$  inch. in a length of 20 feet, even if the iron is freely exposed to the heat of the room—which, however, is not the case, as it is generally covered with some non-conducting material. In short, the effect of expansion and contraction may practically be disregarded in this climate.

Where, however, the objections to the use of iron are insuperable, there are other methods of making buildings fire-proof, which are, moreover, so simple, easy, and inexpensive in their application, that it is most surprising the architects of those elegant buildings which line the sides of New Cannon Street have not caused such superior specimens of street architecture to be constructed fire-proof, which might then have existed uninjured, as monuments of honour to the age in which we live. At the same time, we must acknowledge that these buildings, the Sun, and various other insurance offices, the Geological Museum, the *chef-d'œuvre* of Pennethorne (who, however, indeed, does every thing well), banks, both in London and in provincial towns, the palatial club-houses, and numerous minor edifices, exhibit the immense progress we have made in architectural design—despite the cunningly-devised Gothic mania—since the time in which our grandest avenue, Regent Street, was accomplished; for in this latter there are but six pieces of architecture worth notice—the County Fire Office; the two chapels, St. Philip's and Hanover; the front of the porch of Archbishop Tennison's chapel; the Polytechnic; and the Langham Bazaar.

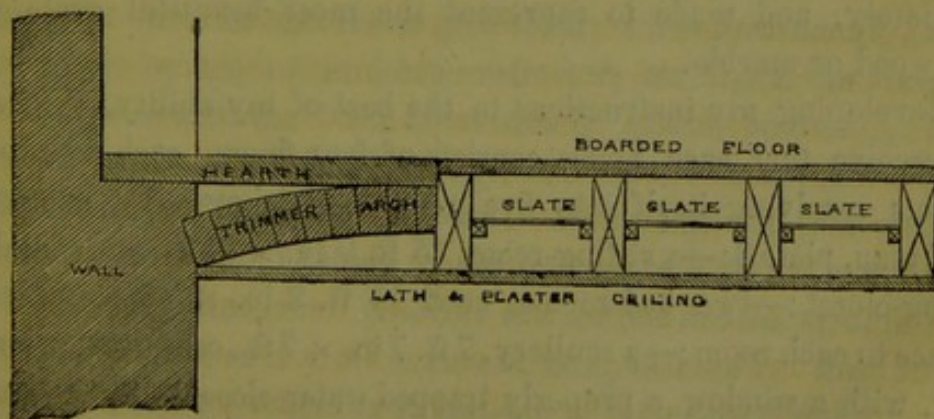
About the year 1770, Mr. David Hartley, M. P. for Hull, obtained a thirty-one years' patent, for his invention for preserving buildings from fire. This invention consists in interposing sheet-iron, or copper, or tin, between the flooring boards and the joists, and *preventing a draught of air ascending vertically*, consequently a fire made thereon cannot long continue burning, because it can obtain no air from below to feed it. The idea was thought so beautiful, that the House of Commons, in 1774, voted Mr. H. the sum of £2,500 to enable him to carry out his experiments. In 1776, a house was built on Wimbledon Common on the fire-plate principle, filled with combustibles, and set fire to in the presence of the Lord Mayor and Corporation of the city. The combustible matter died out, leaving the fabric uninjured, with the exception of charring the boards. This trial was thought so satisfactory, that an obelisk was erected, which is still standing, on the spot, to commemorate the event; the freedom of the city voted to Mr. Hartley; and an order made to the city lands committee, to direct that *in all future building leases the said fire-plates be ordered as part of the plan*. Yet, notwithstanding all this, not one house in a thousand has been

made fire-proof by this plan, although the expense would not exceed three per cent. above the cost of a combustible building. For, as I was told by one of the Hartley family, the insurance companies set their faces against it! Here is another instance of the unscrupulous character of mammon. Eight hundred fires occur annually on the average in this metropolis, with a corresponding loss of life, most of which would be preventible by the adoption of fire-proof houses; but victims must be offered up, that the coffers of insurance offices may be replenished. Notwithstanding that it has been one of the most interesting objects of attention to the legislature from the time of Richard Cœur-de-Lion, for in his reign the first *Building Act* was passed, directing that the lower story of all houses in the City of London should be built with stone, and the roofs covered with tiles or slates, to prevent the destruction of houses, and the consequent loss of life by fire. Surely it would not be asking too much to request that this be followed up in the forthcoming building act, by an enactment enforcing the fire-proofing of all hotels, lodging-houses, and places of entertainment. The Lord Great Chamberlain compels the erection of fire-proof theatres so far as walls, and corridors, and staircases can accomplish that object. Many regulations have been made for the establishment of fire-engines, and firemen and fire-escapes; and many subordinate clauses have been introduced into acts of parliament respecting chimneys and party walls, and hearths, and other details which might render each particular house less liable to communicate its conflagration to another. But no reigning principle has ever been adopted by parliament to strike at the root of the evil, by establishing general security upon the certain basis of individual and personal safety.

The preventive operation of the fire-plates being a negative, eludes positive demonstration; but, to the eye of reason, it will amount to demonstration, that if the fire-plates can resist the power of fire when faggots and combustibles have given ascendancy to its fury, they will be much more capable of resisting it in its infant and commencing state. The fire-plates being incombustible, and being laid under the floor, will prevent any fire from dropping through chinks or crevices in the boards to the timbers of the house, and lurking there until it forms a great body of heat, and bursts out all at once. From the way in which common houses are built, with quarter partitions, and staircases, forming so many bundles of fire-wood, a floor on fire, is a house on fire; but in a house secured by the fire-plates, the floor will not take fire to make a body of heat, and transmit that heat to other floors, so that a house secured on this principle cannot be burnt.

Moreover, the expense is very trifling in comparison with the object of the preservation of life. The ingenious and philanthropic inventor has long since gone to his rest, so that there is no royalty to pay, or the inordinate enriching of the patentee to fear—nothing but the cost of labour and materials. Thus a house of 20 feet frontage may be fire-proofed for £50 or £60; a house of 30 feet for about £70 or £80; and so on, while the saving of the insurance will be more than sufficient to pay the interest of the additional expense of securing the house from fire. Suppose a house 25 feet in front and 50 feet deep, valued with its furniture and contents at £3,600, the insurance at 3s., together with a tax of 1s. 6d. upon each £100, would amount to £8 2s. per annum. This sum is the interest of £162 at 5 per cent., whereas a house of the above dimensions may be secured from fire for about £100;—thus not only effecting a saving in point of expense, *but the security of life is thrown into the bargain.* But the comparative expense is always proportionably less, according to the greater value of any house, with its furniture and its contents. There are many shops and warehouses which contain 10, or 20, or £30,000 worth of valuable goods within a small compass. The expense per cent. is in such cases reduced to a mere nothing. And after all, who can give AN ADEQUATE ESTIMATE OF THE VALUE OF LIFE ITSELF, ADDED TO SECURITY WITHOUT RISK, AND SLEEP WITHOUT FEAR.

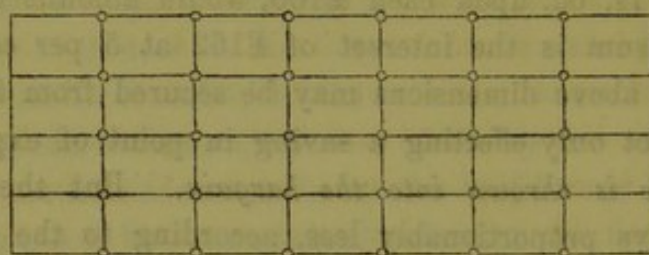
In order to prevent the transmission of sound from floor to floor, a process called pugging—a layer of coarse mortar on thin slips of wood midway in the depth of the joists—is usually carried out in building good houses at the present day. This result may also be obtained by the use of slates laid, as indicated in the following cut, with John's liquid cement,



or with putty, forming a close joint—and, at the same time, all upward currents of air will be prevented. But place the fillets and this layer of slates immediately beneath the boarded floor, and jointed in the same

manner, and you will have a perfectly fire-proof building on the same principle as that of Mr. Hartley's fire-plates. I had some thoughts of taking out a patent for this plan, but, unfortunately, like other patentees, I have discovered that the cost of letters-patent is the least part of the expense, most patents requiring a fortune to work them; and the House of Commons of to-day is not so ready to vote rewards to inventors as the House of Commons of 1770 appears to have been.

By the use of slates instead of lath and plaster, a fire-proof quarter partition may also be formed. The slates may be fixed to the quarters by screws, as shown in the cut—one screw taking one corner of four



slates; and the whole may be covered with paper in the usual way—or ornamental styles may be run in cement, or metal, or leather, and, for very splendid rooms, the slates may be enamelled in the Japanese manner.

In all fire-proof constructions it is necessary that the skirtings should be run in cement. Skirtings worked in good cement have a great advantage over those of wood; they are more durable, do not shrink from the floors, are not so susceptible to damp, and are more easily repaired. Neither are they so liable to harbour vermin, from the resistance they offer to their attacks, and from there being no hollow spaces in their construction. Moreover, it can be painted over almost immediately, and made to represent the most beautiful graining of either wood or marble.

In developing my instructions to the best of my ability, the reader will perceive that each house consists of four floors, each floor or set of rooms resolving itself into five general divisions, set forth on the ground plan, plate 3:—a sitting-room, 15 ft. 9 in.  $\times$  11 ft., and containing a drying-closet;—two bed-rooms, each 11 ft. 2 in.  $\times$  9 ft., and with a fire-place to each room;—a scullery, 7 ft. 7 in.  $\times$  7 ft., containing a sink, a pantry, with a window, a properly trapped water-closet, with a window, a dust-shaft, a coal-bin, and a slate cistern;—and, fifthly, a stone staircase, ventilated from bottom to top. The rooms are 9 ft. high throughout all the floors, except those of the upper floor, which are 11 ft. 6 in. The floorings and ceilings are formed with rolled iron joists, filled in

with concrete upon battens, by Fox and Barrett's patent method, being perfectly fire and water-proof, and are finished with deal flooring boards in the usual manner. Yet, we conceive that such a set of rooms may be let at little more than the same rental as that now paid for one room in such houses as the one delineated in page 17.

It will be seen that a drying-closet to each set of rooms is a feature particularly insisted on as of essential importance in the lady's estimation, to a healthy home. To accomplish this, I have resorted to an expedient for introducing warm air, which I many years ago thought of patenting. It is the same principle which Mr. Cundy has made use of in his moveable stove, being decidedly the very best mode of introducing warm air into a house economically. A four or six-inch stone-ware pipe is led from the outside of the house to a chamber behind the fire-grate. The back of the grate should be composed of fire-clay rather than of iron. A second pipe conducts the heated air from the chamber to the drying-closet, through which it passes and finds its exit by a pipe at the top of the closet, which leads it again to the open air at the top of the house. When the closet is not in use as a drying-closet, here is at once the effectual means of warming and ventilating the room. A constant supply of fresh, warm air is incessantly pouring in and displacing the vitiated air which is forced out at the exit pipe. This is, in fact, the natural system of ventilation; and the room of an invalid purified on this principle, would become a paradise, which, in the absence of organic disease, would speedily restore him to convalescence. All other principles of ventilation are mere trifling toys, fit only for the laboratory or the lecture-room, and certain to be ineffective in practice. Our unfortunate legislators, for example, are something like mice under the bell of an air-pump, and can only receive just as much, or just as little air as the operator chooses to give them; while occasionally, either by accident, or by way of punishing refractory members, the House of Commons has sometimes been hermetically closed, so that for some hours not a breath of air could struggle into it, but that which escaped from the leakage of the tubes or flues! How long will our senators submit to such a state of things, and how long will it be before they return to the true principle. Whether carried out according to my own suggestions, or those of any other person, time will show. Say "there is nothing in a name:"—here is an instance of men submitting for years to a daily martyrdom against their own common sense, for the mere *prestige* of a name!

And now another scheme is to be tried, that of admitting *air from the roof*; but which will also fail, because it is contrary to the great laws

of nature, and because it is already in operation in the corridors of the house, where every one complains of being stifled—a sensation arising from the compulsory inhalation of the same air over and over again.

The natural ventilation of persons is produced by the warmth of their bodies, their breath, and the wind. The poisonous hot breath being lighter than the surrounding air, is buoyed up, and the wind carries it away. Walls and roofs of houses, however, by preventing these natural movements, soon made men aware of the necessity of ventilation; therefore, even of old, when crowds had to meet, they did so in the open air. Smaller numbers found that they could meet under cover, and yet breathe comfortably for awhile, if they had open doors and windows. Then appeared more spacious houses, and particularly with large space above, as in the mediæval cathedral, and, lastly, openings for air were formed in buildings above and below. It was by such openings that the great Sir Christopher Wren ventilated the House of Commons of his day; but Dr. Reid attempted to reverse the natural laws by which air is moved, by exhibiting a gigantic air-moving mechanism—equal to the demands, for single rooms, certainly, but which has signally failed when applied to a whole edifice consisting of numerous apartments. While at the same time the most enormous expenditure has been incurred—and such expenditure must ever be incurred in all attempts to reverse the natural laws by which air, fire, or water are governed—the capacity of the building very much lessened, the acoustic properties of the “Houses” destroyed, and the health of various persons considerably injured. And all this has been occasioned by degrading a grand national edifice into a mere theatre for trifling experiments;—such experiments being founded primarily on the notion of withdrawing foul air from the bottom of buildings, on the supposition that, as carbonate acid gas is heavier than common air, it must necessarily fall to the lowest portion of the interior. But plausible as this notion seems in theory, in practice it is found altogether erroneous, as the laws of air, we here and there just hint at, abundantly prove.

By the very clever contrivance of the scientific Dr. Arnott,—a ventilator in the chimney-breast,—the foul air of rooms is certainly drawn off, but an additional draught through the crevices of floors, and doors, and windows, is felt to supply the place of that ascended, or else the air remaining in the apartment becomes attenuated, and the fire burns sluggishly. Now, apply one of the pipes I have mentioned, provided with an opening beneath the fire-grate for the supply of air necessary for combustion, and an opening from the air-chamber for the admission of warm air to the room, and you will be breathing a pure, warm air, at *plenum*, by which a feather-balance may be maintained at any door or

window—with this additional advantage, that no smoke, or smells from drains, can enter into a place so supplied with air.

The great difficulty in London is to make any invention generally known. A fortune must be spent to obtain publicity. Even the discovery of that most useful substance, gutta-percha, would probably have sunk into oblivion had not a capitalist been found sufficiently enterprising to spend forty thousand pounds in making known its valuable qualities. The pages of that wonderful organ, the "Times," are now so numerous, that the most interesting subject often escapes notice, except from those who can spend half a day in the study of that journal.

Our *brochure* is, I am told, to be published at such a price as must ensure an extensive circulation. I trust, therefore, the idea mentioned above will obtain a corresponding celebrity. Were the public aware of its immense importance, not a house, either old or new, would be exempted from its application, as being one of the simplest and most economical methods of obtaining a copious supply of warm fresh air. For it is not enough that we get rid of that which is vitiated, but we must likewise provide a supply of fresh air to occupy its place, particularly in rooms where a large party is assembled, and numerous lights are burning. Here the air soon becomes vitiated, and the room close and unwholesome. But foul air, though mostly in its nature heavier than that which is pure, yet, being more heated, becomes thereby lighter, and rises to the ceiling, where, if no means are provided for its escape, it accumulates, and, descending, fills all the upper part of the room down to the level of the chimney-opening, where it is drawn off. So that, in reality, in a room so filled with foul air, the only place where one can breathe freely, is by sitting on a low stool, that one's head may be level with the chimney opening.

The numerous plans for admitting fresh air through apertures in the window-sashes, either by perforated panes of glass, or by glass louvres—both of which methods invariably cause draughts which may be felt, and both being contrary to the laws which govern the salubrious motion of air—cannot be recommended except in cases where the application of a better system is impracticable.

When, however, the introduction of pipes, and fixing new backs to grates, is thought too troublesome or expensive, rooms may be efficiently ventilated by taking advantage of the natural laws in constant action, and, on the principle of these laws, inserting one of Arnott's improved ventilators at the upper part of the room in the chimney-breast, or in a pipe provided expressly for the purpose, for the extraction of foul air. Then take out two courses of bricks to a length of two

feet, at the bottom of the room beneath a window, as the most convenient place, and insert therein a zinc, iron, or wooden box, the size of the opening, fitted on the outside with a plate of perforated zinc, another plate, with still smaller perforations, being placed about two inches behind this ; at another two-inch distance, place a thickness of coarse hair-cloth ; next, at a third two-inch distance, place a layer of fine hair-cloth ; lastly, cut a hole of the same dimensions as that in the wall in the skirting-board, and fit it with a flap or door, and you have the means of admitting fresh air into a room in a manner almost imperceptible to the sense of feeling, because of the exceedingly minute divisions into which the air is broken,—which we may easily comprehend when we recollect that many rooms, where in cold and windy weather we complain of draughts in the day-time, are perfectly comfortable in the evening, when the shutters are shut or the blinds let down, and the curtains drawn. The quantity of air introduced is not less, but it is more broken and divided.

In the summer time, when there are no fires to cause a movement or upward draught in the chimney flue, and when a large party is assembled either in dining or drawing-room, open the valve in the skirting, and a supply of fresh air will flow in without any perceptible draught ; and now, having provided an aperture with a small gas-pipe inside, near the top of the room, light the gas—a very small jet will answer—and you effect a constant change in the air of the apartment, so that, however protracted the entertainment may be, the salubrity of the atmosphere will be unimpaired. Two friends of mine who are in the habit of giving large dinner parties in not very large dining-rooms, have adopted this plan to the great comfort of themselves and of their guests. But one gentleman admits the air beneath the carpet of the room, the other through apertures in the skirting.

Many improved modes of construction, and kinds of fittings, will be found directed in the specification, which yet are not of sufficient importance to be separately described, with perhaps one or two exceptions. The first is, Dr. Arnott's improvements on Cutler's smoke-consuming grates, whereby, at a moderate expense, *ordinary fire-places can be made to consume much of their own smoke*, while the amount of fuel requisite to maintain an agreeable temperature, is about one-half that required by the present most wasteful method,—an important consideration both for the poor man and for the public, for with half the quantity of coals it is obvious we can have but half the quantity of smoke, while, in this grate, the coals being supplied to the bottom of the fire instead of to the top, the gasses pass into the body of the incandescent cinders, and are

there consumed, so that, after the fire is lighted, very little smoke appears at all. Nearly the same effect may be obtained by the use of the old-fashioned deep grate, and by those introduced by Count Rumford, if we proceed as follows:—Poke out all the cinders and fill the grate with coals, pressing them down very hard, that the interstices may be filled up with small coals; now place on the top the paper for lighting, and the wood, and over these the cinders from yesterday's fire; on being set alight, the fire will gradually burn downwards without smoke, and will last for six or eight hours without any attention whatever; but it has this inconvenience, that it gives but little heat in the morning, when it is most required, and an immoderate heat in the afternoon, when, perhaps, it is not so much wanted; and this, I apprehend, must also be the case with Cutler's grate. Where, however, quiet is desirable, and the intrusion of a servant disagreeable, this mode of lighting a fire will be found very advantageous in many respects, as well as that of being perfectly free from smoke.

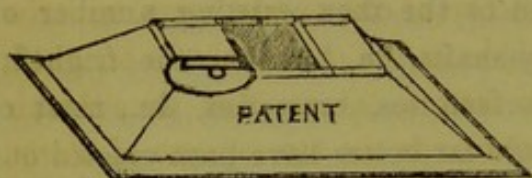
Since 1845, there has been added to the then existing number of engine furnaces and their chimney-shafts, in London, the frightful increase of more than 800, for manufactories, breweries, &c., most of which, it is not too much to say, would far better have been erected out of the metropolis, than in causing this additional impurity to our London atmosphere. Thanks, however, to the inventions of Juckes, Hazeldine, and others, none of these factory chimneys will vomit forth opaque smoke any more, the prevention to this being nearly on the principle just mentioned for obtaining a domestic fire free from smoke, namely, a continuous supply of fuel from below, and at the front of the fire, by means of moving-bars carrying the coal forward in a manner so as to effect almost perfect combustion, with a very great saving in the expense of fuel. The legislative enactment may now, therefore, be carried out to the advantage of everybody; and were a similar measure enforced for our domestic chimneys, we should then have a fair chance of cleansing our murky atmosphere.

I may add, that the grates of the ingenious Mr. Leslie effect a very great saving in fuel, being close to the hearth, and thereby radiating the heat most advantageously; and that, by the moveable stoves of Mr. Cundy, a stream of pure warm air is constantly flowing into the room in which these are placed—a fact of the utmost importance to congregations of persons in churches or other public buildings.

There is scarcely anything about grates so unphilosophical as black sides and back, and those generally of iron. Iron is, perhaps, the very worst material for such a purpose, being certainly a good conductor,

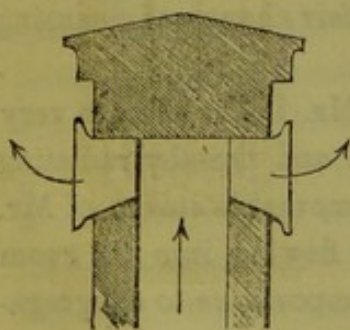
but, unless highly polished, a bad reflector, therefore by no means economical, as the object is to obtain a material that conducts slowly and reflects quickly. Bricks will answer the first condition, and, if whitened, the second, to a certain extent. But we may here take a lesson from our neighbours, the Dutch, who have long found that the best material for this purpose is glazed tiles. We are not now confined to the quaint patterns of the Hollander, for we have many manufacturers of very beautiful things of the kind, which would be highly ornamental to the most sumptuous apartment. Glazed linings of pottery ware are the best reflectors of heat and the slowest conductors, two qualities which render them especially useful for heating rooms with great economy of fuel.

Of all the methods—and their name is legion—for preventing nuisances from chimney-flues, those of Mr. Moon (an architect) are perhaps the cheapest, the surest, and the best; his chimney-contractor



and register is made of iron, and serves also as a chimney-bar. The register acts horizontally, and, when the chimney is not in use, admits of being perfectly closed. It is of easy action, and

cannot get out of order; is also cleanly, inasmuch as there is no space for the deposition of soot. By its use we may get rid of our dismal looking black grates, and, instead thereof, exhibit a highly ornamental recess, lined with Copeland's or Minton's beautiful tiles, which may be occupied in the summer by some work of art, and in winter by a moveable grate. By another of Mr. Moon's inventions, the unsightly chimney-pots and zinc tubes, which so disfigure the sky-line of our houses, are entirely superseded, as he covers the top of the flue, which

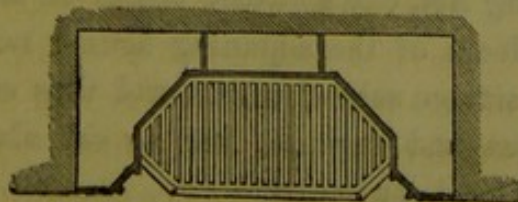
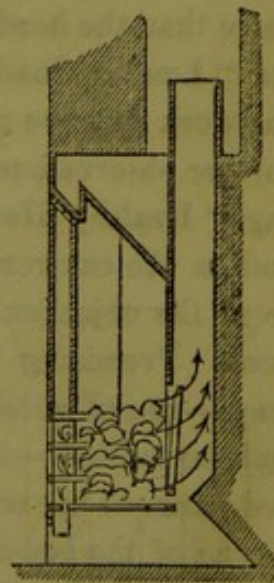
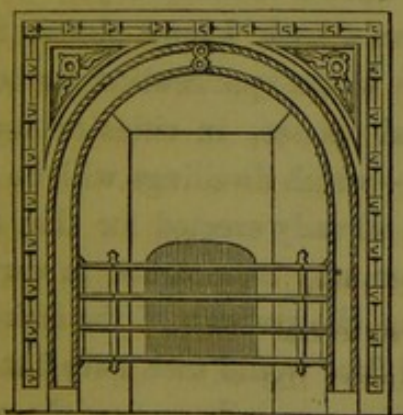


is thus kept dry, and the stoves below are preserved from injury. The smoke escapes through horizontal mouth-pieces, which stand out before the external surface, and are formed so as to divert the wind, and prevent downward draughts.

By the application and use of these contrivances, we may certainly obtain a more perfect combustion of coals, and thereby prevent the generation of one-half of the smoke from our domestic fires, as well as save a considerable quantity of fuel; but I have now to announce that which must be considered one of the most valuable and

important inventions of the age, simple, effective, scientific, and beautiful—a method just patented by Mr. Quarm, the talented clerk of the works, for the last ten years, of the Houses of Parliament—*by which nine-tenths of the smoke is consumed, and a saving of fifty per cent. in the cost of fuel is effected.* It is said that five-sixths of the heat generated by our common fires goes up the chimney; but by this plan all the heat is thrown out into the apartment, except that which is requisite for the combustion of the smoke. Smoky houses will now be of the past, and the thick mantle of impenetrable smoke, which has so long enveloped us, will no more be suspended over our metropolis, to the destruction of our health, and the vegetation of our parks and gardens, nor deface our buildings, and our works of art. Nor will our public edifices, or our houses, be any longer disfigured by hideous pots and cowls on lofty chimneys; for as, by this most happy idea, perfect draught and perfect combustion are ensured, no perceptible smoke issues from the chimney-top, and the shortest chimney-shaft is as equally efficacious as the longest. Our legislators may, therefore, at the expiration of one or two years, with the strictest justice, cause every householder in the metropolis to be fined, from whose chimney opaque smoke is seen to issue. And thus the air of London will become as free from smoke as the atmosphere of Paris.

As a climax to the recommendation in this little book, of means for obtaining healthy homes, I am extremely fortunate in being the first to publish an account of this admirable invention, and I shall be happy,



as far as I am able, to direct its application to the houses of those occupiers requiring it, as I am authorised by the patentee so to do.

It has been ascertained that, in London, on account of its smoke-loaded atmosphere, the cost of washing the linen and dresses of the inhabitants exceeds by £150,000 sterling a-year that expended by the same number of population in the country. Flowering trees and shrubs can scarcely exist in London air; and persons with diseased lungs find respiration extremely difficult. How incalculable, then, is the benefit conferred on society by any invention that will diminish this nuisance, and prevent the present wasteful consumption of fuel. Moreover, soot is known to contain a vast quantity of ammonia; yet, probably, few persons are aware that we send off from our fires in London into the atmosphere, annually, the enormous amount of 12,000 tons of ammonia—worth, if it could be obtained, £600,000! I have shewn elsewhere how we might obtain £500,000 a-year from the sewers—I leave it to the chemists to show how to obtain the ammonia from the smoke. In these two things alone, the smoke and the sewers, we have a million sterling a-year worse than wasted; for the products of the two would be far pleasanter if taken into our stomachs in the form of fruit, vegetables, and cereals, than into our lungs in the form of poison.

After these rapid, very hastily written, and therefore, I fear, somewhat disjointed remarks upon a few only of the details which the subject involves—and those necessarily, from the form of our work, scarcely more than the heads of such details—as it is imperative that a remedy for “London Shadows” should be made known immediately, and that the work must be more of a pamphlet than a book, I must abstain from further observations, and proceed at once to the specification for building “Healthy Homes” for the industrial classes, in cities or towns, and in the environs of cities and towns,—which dwellings will be free from the objections urged against those already erected for that purpose. Premising that the plan here given may be modified in various ways—one of which would be in reversing the position of the staircase and the scullery—in that case the ground floor would then have but one bed-room, as the scullery of that floor must necessarily occupy the place of one of the bed-rooms. In places beyond the cramping influence of the London Building Act, one staircase might be made to give access to the rooms and floors of the adjoining house; two staircases would therefore serve for sixteen sets of rooms, and thus effect a considerable saving both of room and expense, and so on, always adapting the general principle to local conditions.

The best way to arrange these buildings would be in the manner pursued by the Romans in the arrangement of their camps, a manner which we see to this day exemplified in our Cheapside and its adjacent streets, whose houses still stand on the foundations of 2,000 years. On each side of a commercial street, lateral streets of at least forty feet wide of healthy homes should branch out, the end houses to form shops; and it would be better that these streets should not be thoroughfares, for many reasons—one of which is, that a safe play-ground would be provided for the poor children, under the eye of the mothers. The backs of the houses would be at least forty feet apart, and in the centre of this space should be planted a row of trees. As this space is solely for the supply of wholesome air, it may either be laid down in grass, or let to a gardener for the purpose of raising vegetables or flowers.

The best way to arrange these buildings would be in the manner proposed by the Romans in the arrangement of their camps, a manner which is still followed in the arrangement of the barracks in the army. The houses should be arranged in rows of three or four, with a central street or passage between them, and a row of trees or shrubs on each side of the central street. The houses should be built of brick or stone, and should have a gabled roof. The windows should be small and high, and the doors should be small and low. The houses should be built on a slight rise of ground, and should be surrounded by a low wall or fence. The central street or passage should be paved, and should be flanked by a row of trees or shrubs. The houses should be built in a regular and symmetrical manner, and should be arranged in a grid-like pattern. The houses should be built on a slight rise of ground, and should be surrounded by a low wall or fence. The central street or passage should be paved, and should be flanked by a row of trees or shrubs. The houses should be built in a regular and symmetrical manner, and should be arranged in a grid-like pattern.

REMARKS.

The plan of the proposed buildings is based on the principles of health and comfort. The houses are arranged in a regular and symmetrical manner, and are surrounded by a low wall or fence. The central street or passage is paved, and is flanked by a row of trees or shrubs. The houses are built of brick or stone, and have a gabled roof. The windows are small and high, and the doors are small and low. The houses are built on a slight rise of ground, and are surrounded by a low wall or fence. The central street or passage is paved, and is flanked by a row of trees or shrubs. The houses are built in a regular and symmetrical manner, and are arranged in a grid-like pattern. The houses are built on a slight rise of ground, and are surrounded by a low wall or fence. The central street or passage is paved, and is flanked by a row of trees or shrubs. The houses are built in a regular and symmetrical manner, and are arranged in a grid-like pattern.

*SPECIFICATION of the Artificers' Work to be done in the erection of a Pair of Dwelling Houses, of the Third Rate, or Class of Building, under the London Building Act of 7th and 8th Victoria, cap. 84; and in completing the same with Appurtenances thereto, fit for Use, or Occupation; upon a certain plot of ground, situate in*  
*for* *under the direction of his*  
*Surveyor, and in strict accordance with the accompanying Drawings.*

#### BRICKLAYER.

NOTICE TO  
DISTRICT  
SURVEYOR,  
&c.

To give to the District Surveyor, to the Surveyors and Commissioners of Pavements and Sewers, and to all the other public officers, the requisite notices, to obtain all requisite official licences; and to pay to the District Surveyor and to all the other public officers concerned in the building and works, their proper and legal fees and charges.

GROUND  
WORK.

To excavate the ground to the proper levels, and as may be found necessary for the construction of foundations, drains, areas, and all other works, for which the ground will require to be excavated; to beat down to a hard consistence the ground forming the beds of the trenches for the reception of the concrete and brickwork; to fill in again and level about the foundations and other works after the same are constructed, the ground so dug out; to perform the whole groundplot, upon part of which the dwellings are to be erected, such other ground-work as may be requisite, in order to level the said ground-plot according to the sectional ground lines shown on the working-drawings.

CARTAGE OF  
RUBBISH, &c.

To remove and cart away from the whole of the ground-plot, building, and premises, all the earth, soil, and rubbish, which will be found superfluous after the ground-plot and soil of the premises are made up to the proper levels and surfaces; and to leave finally the whole of the house, ground, and premises, entirely free from superfluous ground, earth, rubbish, and useless materials.

CONCRETE  
AND  
PIPE DRAINS.

To fill in the trenches with concrete, 1 foot thick, of the several widths shown in drawings, and to form a bed of concrete 4 inches deep, and 8 inches wide, laid with a regular fall for bedding the pipe drains thereon; the pipe drains to be jointed with fine quick Roman cement, and bedded half their depth in concrete. The concrete to be composed of Thames stone-ballast unscreened and blue lias limestone, in the proportion of one part lime to eight parts of ballast, thoroughly mixed with each other in small quantities at a time. To place a layer of concrete, 12 inches deep, beneath floor of sculleries, and beneath the jambs and hearth-stones, in basement.

GENERAL  
BRICKWORK.

To execute in the very best and in the most careful and workmanlike manner, all brickwork requisite in order to erect and complete the dwellings and appertenances thereof, according to the drawings, and which may be also requisite to render the whole complete and finished in every respect. The bricks to be laid in old English bond, the joints to be well-flushed up with mortar, but the joints are not to be struck except in the walls of the staircase, the lobby in basement, and in all the sculleries.

ARCHES.

The arches are all to consist of two rings of 4-inch work closely set, over all openings the thickness of the walls.

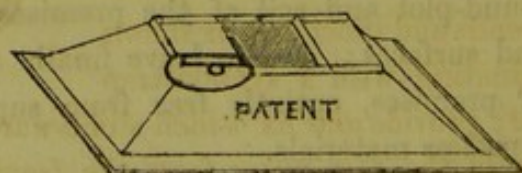
CORNICE.

To form a cornice with core of 2-inch York set on brick-on-edge, as dentils to tail into wall 14 inches, and to project 10 inches; covered with one course of bricks in cement, and weathered up 6 inches, with a covering of flat tiles in cement; to corbel out around rooms, three courses of bricks, the lower course to project 2 inches, the upper courses 4 inches, for the double purpose of forming a cornice and supporting the concrete floor. To corbel out for the support of cisterns above coal-hole.

CHIMNEYS  
IN MORTAR.

To properly build all the chimney-flues with circular bricks, to finish the chimney-shafts with salient courses 6 inches high, cut to form the proper angle of 45 degrees, to put over each chimney with, 4-inch brickwork forming a semicircle, all to be set in the best new quick Roman cement and clean Thames sand, mixed together in equal measures.

To put to each bed-room fire-place one of Moon's Patent Contractors and Registers, at ment of the flue. sitting-rooms, a chimney - bar, 3 turned up and down at the ends thereof.



the commence-  
To put to the  
wrought - iron  
inches by  $\frac{1}{2}$ -inch,

**TILE CRESTINGS AND FILLETS.** To finish the party walls with brick-on-edge and double plain crestings, both set in and jointed with the best new quick Roman cement and clean Thames sand gauged half and half. To run a fillet beneath tile crestings and around chimney-stacks, securely with the same kind of cement and sand.

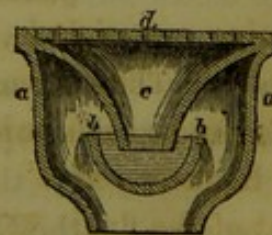
**BONDING AND BEDDING.** To lay three courses of bricks in cement, (that is two layers of cement,) immediately above the footings of the walls throughout; and two courses in cement, (one layer of cement) within which is to be placed three rows of iron hoop properly turned and fastened at each junction of the walls throughout all the walls every five feet in height. The cement is to be new and quick, and gauged half and half with clean sand, and the bricks to be dipped previously into a tub of water.

To bed in mortar all the plates, lintels, wood-bricks, iron girders, templates, stone-work, and other work intended to be set in the brickwork, and so requiring; to bed in and point round with lime and hair mortar, all the door-frames and window frames; to back up and fill in with solid brickwork to all stone-work, or slate, or iron, or wood-work intended to be set in the brickwork.

**FOX AND BARRET'S PATENT FLOORING.** To provide and fix to the ground, first, and second floors, Fox and Barrett's Patent Flooring with 1-inch boarded surface, of the value of seven pounds two shillings per square.

**BASEMENT FLOOR.** To put for the support of the sleepers of the ground flooring, 4-inch brickwork on a 9-inch footing, in lines 3 feet apart, with the exception of the sculleries and lobbies. To put an iron-brick grating for the admission of air beneath floor of sitting-rooms and bed-rooms, and an iron air-brick immediately beneath the ceiling of each water-closet.

**DRAINAGE.** To provide and fix four-inch stone-ware half-socket drain-pipes with proper bends and junctions, as shown on plan for receiving the back rain-water, and its conveyance to main-drain; a trap of the value of two and sixpence, of galvanized iron, Jennings' patent. To provide and fix from water-closet to main sewer, 6-inch stone-ware half-socket pipes, with proper bends and junctions, as shown on plan, and terminating with a syphon-trap of the same material; provide and fix 4-inch stone-ware half-socket pipes for the conveyance of the rain-water from the front of the house to



main-drain, as shown on plan; and to fix one of Jennings' patent traps of the value of two and six-pence, in front area. All the pipes to be very carefully laid with the greatest fall it is possible to obtain, and set with quick Roman cement, gauged half and half with clean sand, and filleted over the top part of joint.

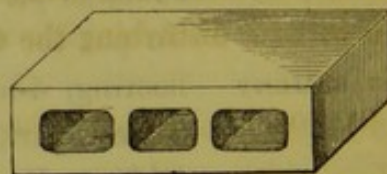
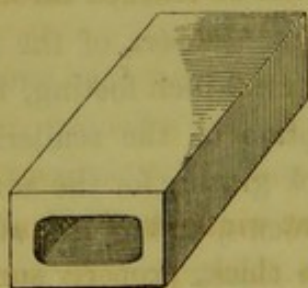
**AIR-PIPES.** To provide and fix 4-inch stone-ware tubular pipes from outside of front wall of house to space behind chimney-backs, as dotted on section, with a 4-inch pipe from chimney-back to drying-closet; the same to branch into two mouths, if a party-wall is insisted on by the Official Referees.

**PIERS.** To erect for the support of each sink, two piers of brick-work, each 2 feet 8 inches high, 18 inches wide, and 9 inches thick. To build in 9-inch work, the necessary walls for the support of area steps and the retaining wall of area, the latter to be set sloping towards the street. To turn a 9-inch brick arch, closely set, to each doorway, for the support of steps to ground-floor from street.

**BRICKS.** The bricks for the flues are to be the moulded circular bricks, with perfect gatherings to bond in with the general brickwork, so that no cutting and no pargetting is required. To be had of Mr. Pocock, Battersea. The bricks for the second floor are to be hollow, made by Norton and Borie's Patent.—

Common size Hollow Stretcher Brick.

Common size Hollow Header Brick.



All the other bricks are to be of the very best new approved, hard-burnt, square, grey-stock bricks, free from breakage and all admixture of soft bricks, place-bricks, or other inferior bricks.

**MORTAR.** The whole of the mortar to be used is to be compounded in the proportion of one-third, by measure, of the very best well-burnt stone-lime, and two thirds of clean sharp Thames sand taken from above Westminster Bridge, well beaten and worked up together.

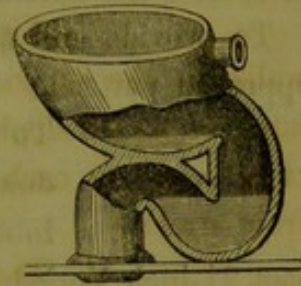
**SLATE PARTITION.** As these dwellings will be fire-proof, it is probable that the Official Referees will permit the partition of drying closets with slabs of slate; if not, a party-wall must be built with the same conditions as the other party-wall;

the expense in either case will be nearly the same; in the former, then provide 1-inch thick slate-slabs from top to bottom of house, divided and jointed with rolled galvanized iron bars of the form of the letter **H**.

**GRATES.** To provide and fix one of Quarm and Olding's patent grates of the value of thirty shillings, with a back of the

hardest and best prepared fire-clay, well burnt, in each of the sitting-rooms. And a small grate very low down on the hearth, of the value of ten shillings, in each of the bed-rooms. To provide and firmly fix to the sides and back of chimney opening, between the chimney hopper and top of grate, the largest white tiles 1½-inch or 2 inches thick, set and jointed with a very close joint.

**WATER-CLOSET PAN.** To provide and fix in each water-closet, a brown stone-ware white-inside closet pan and trap of Jennings' patent, the construction of which is shewn in the accompanying figure.



This simple water-closet has many advantages. Being free from all machinery, and imperishable in its material, it cannot get out of repair.

It displaces no impure air, it is noiseless in action, and saves the expensive lead trap.

The basin has a large water surface, and is so formed that it cannot be soiled. Anything improper thrown into the basin can be immediately removed; and the trap being above the floor can be reached through the basin without disturbing the closet seat.

## MASON.

**WINDOW SILLS.** To put to all the exterior front windows, Portland stone sills 9 inches wide, 3¼ inches thick, properly sunk and weathered; to put to all the back windows, sills of Yorkshire stone, 9 inches wide, tooled all over, and laid sloping; all the window sills to be properly throated.

**STEPS AND LANDINGS.** To put to the areas, Yorkshire stone, solid tooled steps, properly back-jointed and set on brickwork according to plan. To put to ground floor doorways from street,

Yorkshire stone, solid tooled steps, properly back-jointed, and properly morticed at the ends, to receive the horizontal ends of upright iron balusters. All these steps to be laid with a slope. To put to the area doorways a Yorkshire stone, solid, tooled sill, 18 inches wide, 4 feet 4 inches long, and 6 inches thick. To put to the two ground-floor

doorways Yorkshire stone, solid, tooled steps, 4 feet 4 inches long, 9 inches wide, and 8 inches thick.

To put a Yorkshire stone, solid, tooled landing to the ground floor, the first and second floors; to extend in the two former from partition wall to bottom step of stairs, and in the latter from partition wall to party wall; to be 4 feet wide in the clear, and to tail into partition wall 9 inches, and into front wall  $4\frac{1}{2}$  inches, and to be 6 inches thick. To provide and fix Yorkshire stone, solid, tooled steps for stairs, properly back-jointed and cut to pattern shown on plan; to be 3 feet long in the clear, to tail through the 9-inch walls, and halfway into the 14-inch walls, each step to be at least 8 inches thick, with the ends properly morticed to receive the horizontal end of iron balluster.

To provide and fix to each external doorway, a cast-iron scraper of approved pattern.

PAVING. To provide, work through on the edges thereof, and lay down in regular courses in the sculleries, basement, lobbies, and areas,      feet superficial, of the best compact  $2\frac{1}{2}$ -inch Yorkshire stone paving.

AREA CURBS. To put to front area a curb of Portland stone, scantling, 6 inches by 6 inches, rubbed fair all over except the bed thereof, plugged, and run with lead at all the joints thereof, and with holes cut out to receive the iron palisading or other work.

CHIMNEY  
PIECES. To put to the sitting room fire places, box chimney pieces of  $1\frac{1}{2}$  inch Bath stone, 7 inches wide; and to the bedroom fire places; jambs, mantles, and shelves, of  $1\frac{1}{4}$  inch Bath stone, 5 inches wide.

HEARTHES. To put to the sitting room fire-places, a hearth slab of  $2\frac{1}{2}$  inches rubbed Yorkshire stone, 2 feet wide; and to the bed rooms a hearth slab of  $2\frac{1}{2}$  inches rubbed Yorkshire stone 18 inches wide, and all to be 14 inches longer than the chimney opening.

BLOCKS. To put to the ground floor entrance doorways, four blocks of Yorkshire stone, 14 inches by 9 inches, and 6 inches thick, tooled to faces of wall, and morticed for the reception of gate bars.

SLATE SINKS  
AND CISTERNS. To provide and fix in each scullery a slate sink of the sizes shewn on drawings, and a slate cistern over coal-hole, 3 feet by 2 feet, and 2 feet deep. To cut out to receive the different pipes, boxes, and gratings thereto.\*

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\* As the Act of Parliament compelling the several water companies to give a constant supply will be in force in a few months' time, it is probable this item will not be necessary.

**HOLES, &c.** To cut in the masons' work such holes, rabates, mortices, sunk-work, and grooves, as may be requisite for the  
**AND FINISHING.** thorough completion thereof; and to clean off and finish properly the whole of the work, immediately prior to the completion of all the other works of the dwellings and premises. All the mortar used in the work is to be of stone lime, of the quality described for the brickwork.

**BATH STONE  
FOR NUMBER.**

To provide and fix a stone, 6 inches square, and 9 inches deep, on one side of each of the arched entrances, and cut thereon the number of the house.

### CARPENTER AND JOINER.

**NEW  
MATERIALS.** To provide sufficient new materials for, and frame, fix, and complete all carpenter's work, and joiners work, which will be requisite for carrying out, and for finishing in every respect the dwellings, fittings, and appurtenances thereof, according to the drawings; and to provide and furnish to the carpenter's and joiner's work, all proper nails, screws, and other needful ironmongery, of the best quality.

**TIMBER AND  
DEAL.** All the oak timber is to be of the best English growth; all the other timber is to be either Dantzic, Riga, or Memel yellow fir; all the joiner's work, flooring boards and other woodwork, are to be of the best yellow Christiana deal, all to be cut out perfectly square, and free from sap-wood, shakes, large knots, wany edges, and all other defects: none of the joists, ceiling-joists, and rafters, are to be respectively more than 12 inches apart.

**SUNDRIES.** To provide and fix all requisite centering, turning-pieces, beads, stops, fillets, tilting-fillets, backings, blocks, linings, casings, furrings, and bearers. To perform such rabating, grooving, tonguing, beading, scribing, chamfering, housing, jointing, morticing, framing, dove-tailing, planing, and other work and labour, as may be found requisite for the perfect performance of, and the thorough completion of the dwellings.

**HOARDING.** To provide and fix all requisite temporary hoarding for inclosing the ground plot, while the several works thereon are being performed.

**LINTELS AND  
WOOD-BRICKS.** To put such lintels and filling-in-lintels as may be necessary to carry the filling in beneath arches over openings, 3 inches thick, 4 inches longer than the opening, and of the width of the brick-work. To put all wood-bricks

requisite for fixing the framing, lining and other finishing to works so requiring.

**BASEMENT  
FLOORING.**

To construct the flooring of basement of  $1\frac{1}{4}$  inch yellow deal, listed free from sap-wood, wrought and halved together upon fir joists, 4 inches by 2 inches, and with oak sleepers under the joists, 4 inches by 2 inches, 3 feet apart.

**OTHER  
FLOORING.**

To fix the woodwork of the other floors provided under Messrs. Fox & Barrett's patent.

**ROOF.**

To construct the roof with fir timbers and woodwork, of the following scantlings and sizes:—

Wall plates, 4 inches by 2 inches. Two purlins, 8 inches by 5 inches.

Rafters and ceiling joists, 4 inches by 2 inches. Ridge 8 inches by 1 inch.

Tile-battens, 2 inches by 1 inch.

1-inch yellow deal gutter-bottom, laid on bearers to a current of  $1\frac{1}{2}$  inch to a 10 feet run, with cesspool 6 inches square.

**DEAL FRAMED  
PARTITIONS  
AND  
INCLOSURES.**

To separate the pantries from the sculleries, and the water-closets from the lobbies, in the basement. The coal-bin, water-closet, and the pantry, from the sculleries on the other floors, and the drying closets on all the floors from the sitting-rooms, by framed partitions three panels high, with rail styles and muntins of  $1\frac{1}{2}$  inch deal, and panels of  $\frac{3}{4}$ -inch deal planks not glued, and not more than  $10\frac{1}{2}$  inches wide.\* To enclose the coal and dust bins in basement with  $\frac{3}{4}$ -inch ledged deal inclosure. To form hoppers with covers of  $\frac{3}{4}$ -inch deal, to the dust shafts of each floor.

**WINDOWS.**

To fit up all the windows with  $1\frac{1}{2}$ -inch ovalo sashes, double hung with iron weights, iron axle pulleys, the best large patent lines, and patent spring fastenings, in deal cased frames, with oak sunk sills, and to put  $\frac{3}{4}$ -inch linings with neat mouldings, and 1-inch seat-board, to all the outer windows of the ground, first, and second floors, and to the back windows of the basement. The front windows in basement are to have 1-inch sunk beaded boxings, with mouldings laid round the same to form architrave, and  $\frac{3}{4}$ -inch return linings at the sides of the boxings,  $1\frac{1}{4}$ -inch shutters, two

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\* If the Official Referees refuse to sanction the division of slate and insist upon a wall, the drying closets must then be brought out seven inches into each room.

panels high, moulded in front, and hung with hinges, complete in two heights, and 30-inch spring shutter-bars.

To put to the windows of sculleries in basement, a 3-inch square beaded frame; to put to the other internal windows,  $1\frac{1}{2}$ -inch linings to serve as frames; and to all the internal windows, 1-inch square moulded casements, hung with butt-hinges, and fastened with brass buttons.

DOORS. To put to the entrance door of each set of rooms, an  $1\frac{1}{2}$ -inch deal moulded and bead-butt six panel door, hung with a pair of 4-inch butt-hinges, two 10-inch barrel-bolts, a good 9-inch draw-back, iron rimmed lock, with strong brass furniture and a small knocker of approved pattern.

All the doors to rooms to be of  $1\frac{1}{2}$ -inch, and the doors to closets to be of  $1\frac{1}{4}$ -inch deal, square framed, with  $\frac{3}{4}$ -inch panels, hung with 3-inch butt-hinges, and good 7-inch iron rimmed locks, with plain brass furniture to rooms, and with brass button and inside bolt to closet doors; to put to all the doorways, mouldings to resemble architraves, and all requisite beaded stops.

DOOR-CASES, AND LININGS. To put to the doorways in walls of basement, fir proper door-cases, with oak sills, 4 inches by 4 inches, with  $\frac{3}{4}$ -inch beaded linings, the remaining thickness of the wall; and to all the doorways in the upper portion of the dwellings,  $1\frac{1}{4}$ -inch deal single-rabated linings, with 2 inches wide moulding around, to form stop for plaster.

DWARF CLOSETS AND DRYING CLOSETS. To put on one side of the fire-place in the sitting-rooms, a dwarf closet, with 1-inch Honduras mahogany top, fixed with the requisite bearers,  $1\frac{1}{4}$ -inch deal front,  $1\frac{1}{4}$ -inch deal square-framed folding doors, hung with 3-inch butts, 5-inch brass flush-bolt, and 4-inch good closet-lock; and to put in each closet a shelf of 1-inch deal, as wide as the closet will admit.

To put on the other side of the fire-place in the sitting-rooms,  $1\frac{1}{4}$ -inch deal-fronted closet, with  $1\frac{1}{4}$ -inch deal square-framed folding-doors, hung with 3-inch butts in two heights, and to the doors of each closet a 30-inch spring shutter-bar.

To put a square  $\frac{3}{4}$ -inch deal trunk from the top of lower drying-closets to the opening in chimney-stack above roof, and branch trunks into the same from the tops of the other drying-closets.

SHELVES. To put in each of the pantries three tiers of 1-inch deal shelves, the lower shelf to be 18 inches wide, and the upper ones 12 inches, and 9 inches, on proper strong bearers.

**WATER  
CLOSETS.**

To fit up the water-closets with 1-inch clean deal seats and risers, and clamped flaps and frames; to provide all requisite bearers and other fittings; to attend upon the plumbers while fixing the pipes and other apparatus; and to cut all requisite pipe-holes.

To provide and fix neat  $\frac{3}{4}$ -inch deal casings for the pipes of the water-closets.

**FLY WIRE.** To fill in the casements of pantries with fly-wire.

If cisterns are not required, the top of the water-closets in basement is to be covered with  $\frac{3}{4}$ -inch deal, with filleted joints, and on two bearers 5 inches by 2 inches.

The doors of water-closets in basement are to be 6 inches shorter than the openings.

**PLASTERER.**

**OUTSIDE.** To dash the outside of the dwellings, back and front, with a mixture of hot lime-wash and clean gravel and sand, so as entirely to hide the brickwork.

To compo the blocking on both sides and top, the weathering, and face of cornice, with Roman cement gauged half-and-half, and finish the same with colour, as well as the chimney-tops.

To compo the sills of the internal windows.

**SKIRTINGS.** To run in compo, moulded skirtings 9 inches high, blocked out with tiles to 2 inches thick, around the walls of sitting and of bed-rooms.

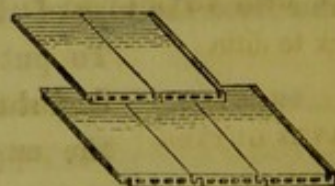
**L. P. F. S. and W.** To lath, plaster, float, set, and whiten, the ceilings of the upper story.

To plaster, float, set, and whiten, the walls of upper story, and the ceilings and walls of the other stories in the sitting and bed-rooms only.

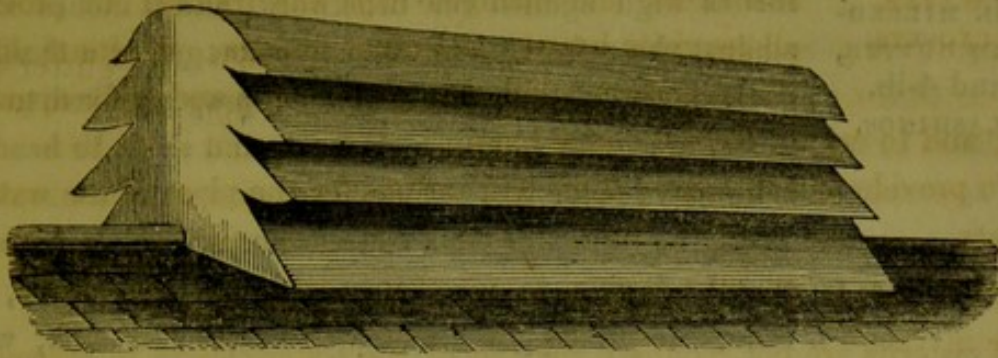
To colour with hot lime and sulphate of iron, the walls of staircases, and walls of porches and sculleries.

**TILER.**

**TILES.** To cover the roof with Norton & Borie's patent roofing tiles, nailed with extra long galvanized iron nails, and cover the ridge with roll top-ridge-tiles, very carefully jointed and filleted in cement, but set in mortar. The covering tiles need nothing but a good nail.



To fix over each staircase, upon the roof, a zinc ventilator of the pattern



shown here, and to set the same with tilting pieces all round, and 4-lb. milled-lead flashing, 5 inches wide.

PLUMBER.

RAIN-WATER  
PIPES.

To put a stack of cast iron rain-water pipes, 3 inches bore, from back and front gutters to ground, each pipe to be securely fixed, with head and shoe complete.

WATER-CLOSET  
and SINKS.

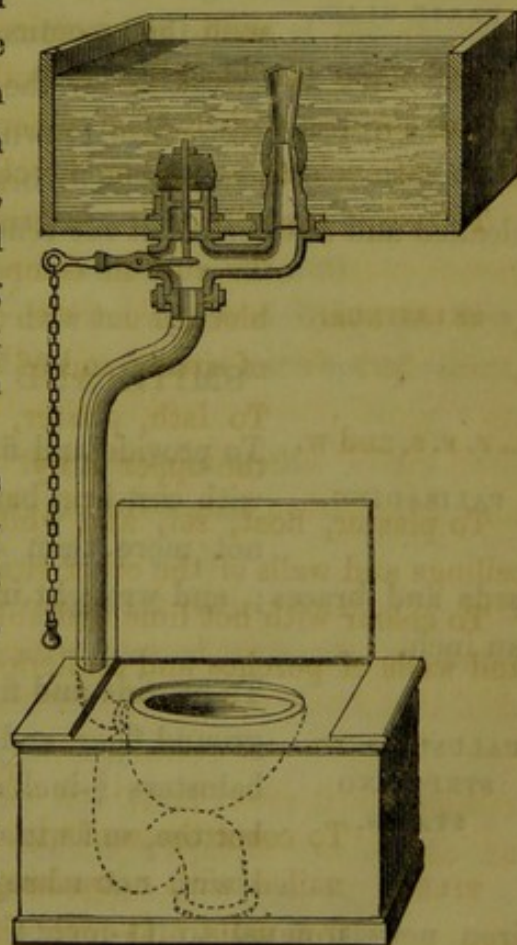
To provide and fix an 8-lb. lead funnel-pipe  $4\frac{1}{2}$ -inches bore, from uppermost water-closet to drain, with proper tusks, branches, and junctions, to each of the other water-closets, and branches and junctions of 2-inch strong waste-pipe to sinks; and to each sink one of Jennings's patent bell-traps with brass grates.

To fit up the cisterns for water-closet supply with Jennings's patent cistern valve and pipe to pan, as annexed cut.

*Note.* If the constant supply is in operation, this item will not be required; but instead thereof, provide and fix an inch branch-pipe from service-pipe to pan, with brass cock to ditto.

EAVES GUTTER.

To put to the eaves cast iron 4-inch trough square gutter, put together with white lead, and securely fixed on strong wrought-iron brackets.



6-lb. MILLED-  
LEAD GUTTER,  
and 4-lb.  
FLASHINGS.

To lay the gutter with 6-lb. milled-lead, turned up 5 inches high against the brickwork, and 9 inches wide against the rafters; and to put to the gutter a flashing of 4-lb. milled-lead, 5 inches wide, properly fixed to the blocking; with a proper cesspool, and shoot to head of rain-water pipe.

WATER SUPPLY.

To lay on the water from street-main with  $\frac{3}{4}$ -inch strong cast lead pipe to uppermost cistern, if required, or otherwise to uppermost water-closet and sink, with branches to all the other cisterns, if required, or otherwise to all the other water-closets and sinks; to put, in the first case, to cisterns, a brass cock and ball; in the latter, a brass cock to each of the cisterns, complete; and to pay all official fees and charges consequent upon the laying on the water.

### GLAZIER.

PLATE GLASS.

To glaze the casements of sculleries and water-closets with thick common rough plate glass.

SECONDS GLASS.

To glaze all the exterior windows with good second Newcastle crown glass. All the glazing is to be properly bedded, bradded, and back-puttied, and is to be cleaned and left perfect at the rendering up of the premises as complete.

### SMITH AND IRON-FOUNDER.

PALISADING.

To provide and fix to the area curb an iron palisading, with cast-iron bars, 1 inch diameter, with spear heads, not more than 4 inches apart; 2-inch iron standards and braces; and wrought iron top-rail, 3 inches by five-eighths of an inch.

BALUSTERS TO  
STEPS AND  
STAIRS.

To provide and fix to each side of the entrance steps to ground floor, and to one side of the stairs, wrought iron balusters  $\frac{3}{4}$ -inch square, turned to a right angle at the bottom, so as to enter the vertical ends of the steps and stairs, not more than 4 inches apart, turned wrought iron newels, equal to  $1\frac{1}{2}$ -inches diameter, and rounded hand-rail, of wrought iron,  $1\frac{1}{2}$  inches by  $\frac{1}{2}$  an inch. The balusters and newel rivetted at top into the hand-rail, and all the ends of palisades, balusters, newels, and bars, let into the stone-work, and run thereinto with lead.

## PAINTER.

To knot, stop, pumice, and smooth in every part, prepare properly, and paint four times with good and proper oil-colour, the whole of the wood-work, iron-work, compo skirtings, and other works usually painted, of the whole of the dwellings in such common colours as the surveyor may direct.

## PAPER-HANGER.

To prepare properly and hang all the walls of the sitting and bedrooms of the dwellings with figured paper of the value of one penny per yard, of approved patterns.

WILLIAM BARDWELL, ARCHITECT.

MAY, 1854.

4, GREAT QUEEN STREET, ST. JAMES'S PARK.

The arrangement being unique, it is proposed that such masses of buildings should not be called streets, or lanes, or courts; but Gardens; and to name a district of such buildings after the names of the eminent statesmen of the day, as for example, Aberdeen, Russell, Palmerston, Gladstone, Shaftesbury, &c., Gardens.

There are but few places in London designated Gardens, as for instance, the Hop Garden, and Bolton Garden.

The estimated cost of a pair of these buildings is £1,000.

It is supposed that ground may be obtained at five shillings per foot, frontage, of forty feet, which will be £1. 5s. a year on each set of rooms, as follows:—

2 Basement floors, at 4s. 6d. per week each.

2 Ground-floors, at 5s. 6d. per week each.

2 First-floors, at 5s. 6d. per week each.

2 Second-floors, at 4s. 6d. per week each.

Which will produce a gross rental of £104 0s. a year.

Deduct Ground-rent, £10; House-tax, £1. 10s.;

Water-rate, £4; Lighting and paving, £3;

Property-tax, £3; Sewer-rate, £1. 10s.;

Poor and Police, £5; Annual Repairs, £5;

Collecting, £5. 1s. - - - - - 38. 1s.

Leaving the sum of £65. 19s., or,

nearly six-and-a-half per cent. for interest on £1,000.

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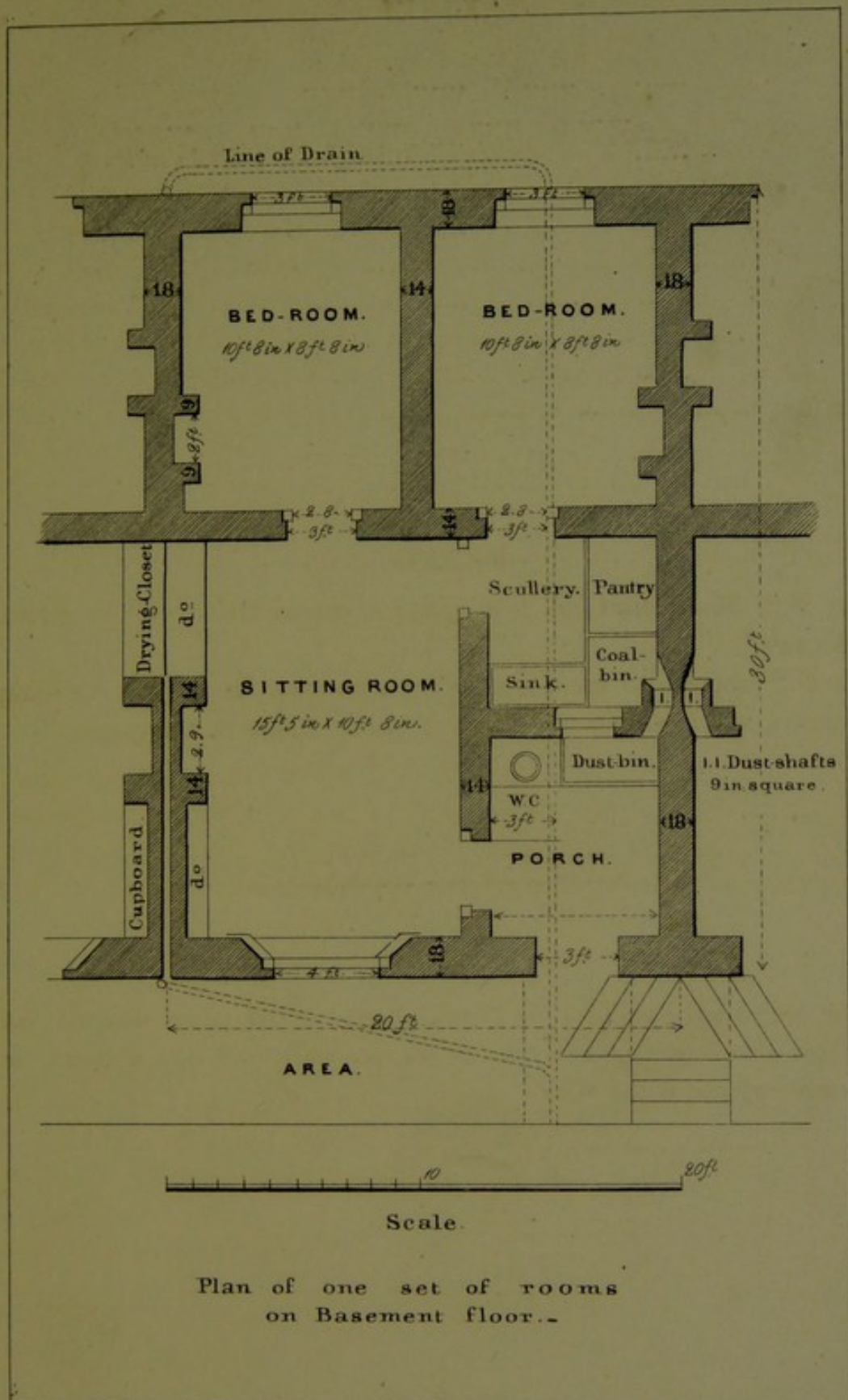
### ERRATA.

In page 30, *instead of* “proposes a consolidation of the eleven companies,”

*read* “proposes to erect one or more stations for the gas distilling apparatus, and to supply the works of the existing Gas Companies.”

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The designs and description for Healthy Homes for the almost destitute, and for those classes earning from 10s. to 15s. per week, will form a second, or supplementary part to this Work.



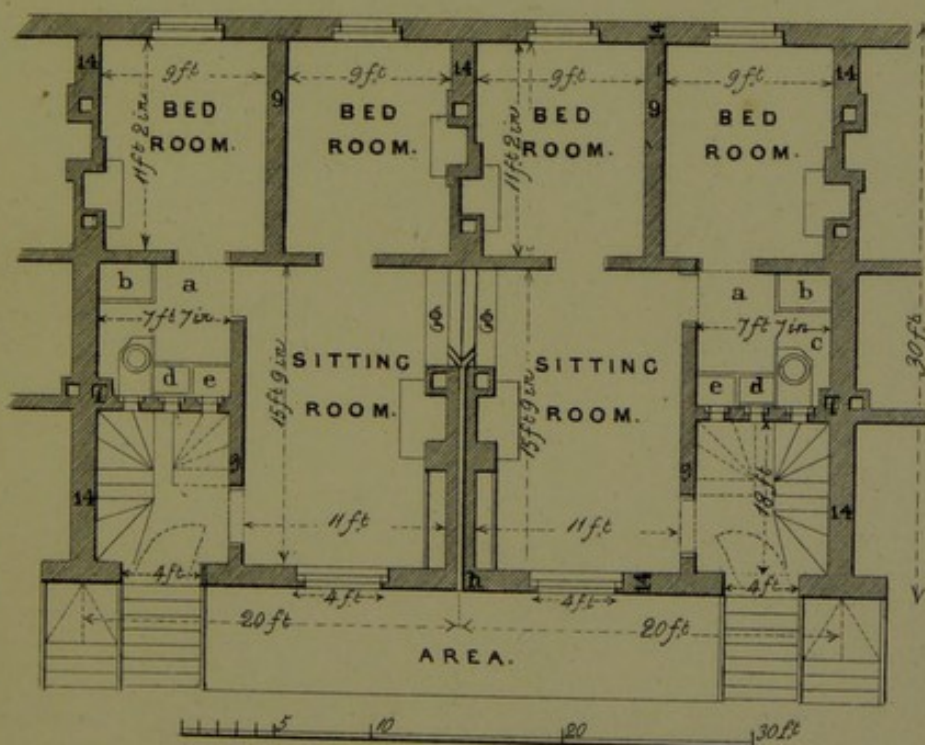
W. Bardwell, Architect

Dean & Son, Lith. 35, Threadneedle St.





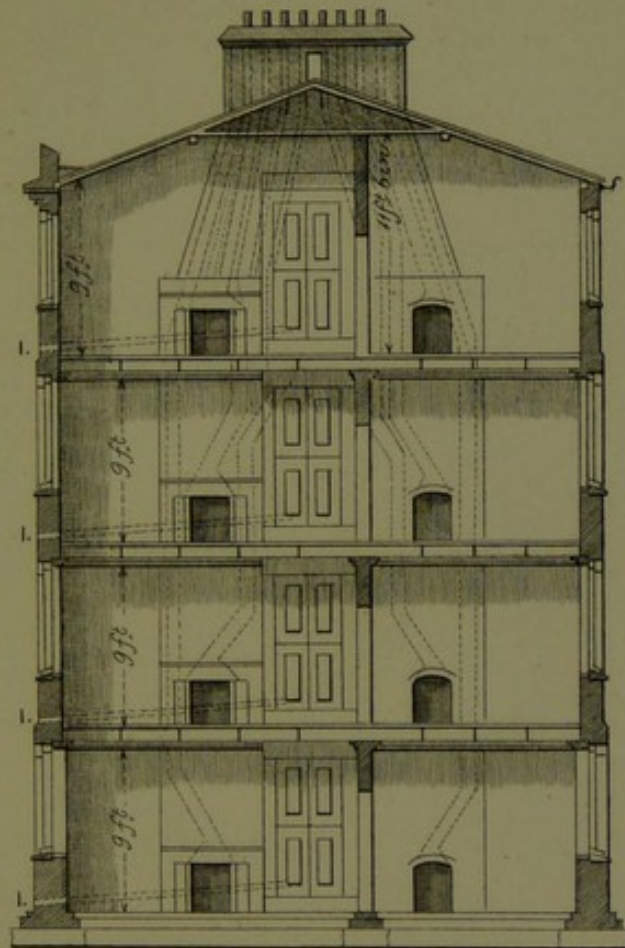
FRONT ELEVATION



PLAN OF GROUND FLOOR.

a a. Scullery b b. Coals. c c. Water closet. d d. Sink. e e. Pantry.  
f f. Dust-shaft g g. Drying-closet. h. Pipe for air to d<sup>o</sup>  
passing behind backs of fire-places. k k. Dwarf-closet.



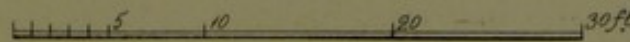


SITTING ROOM. DRYING CLOSET. BED ROOM.  
 . . . . . Air-pipes 4 in. dia.

SECTION.

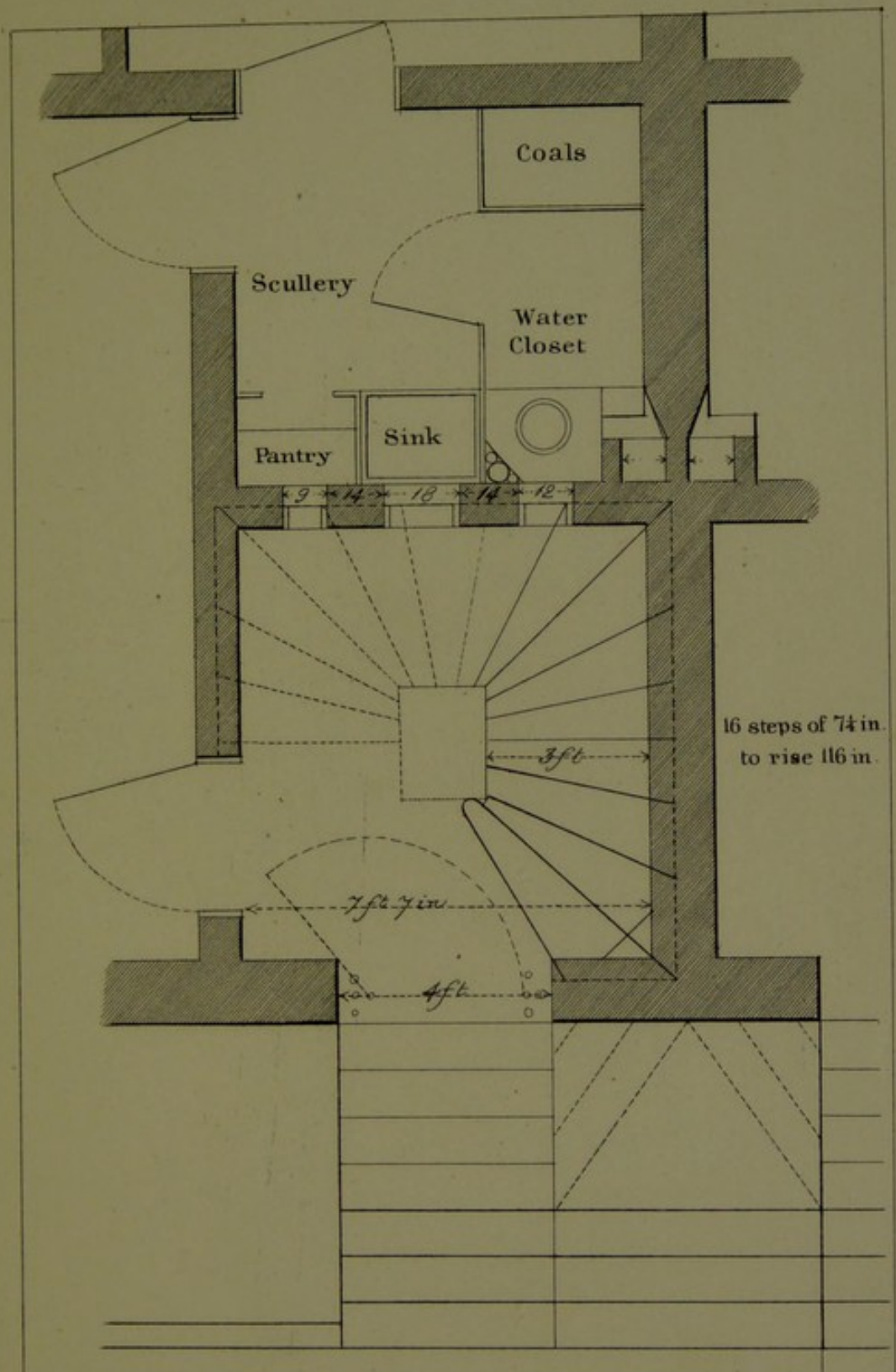
W. Bardwell, Architect

Dean & Son, Lith.



Scale





PLAN OF ENTRANCE & OFFICES to a 1/4 in Scale

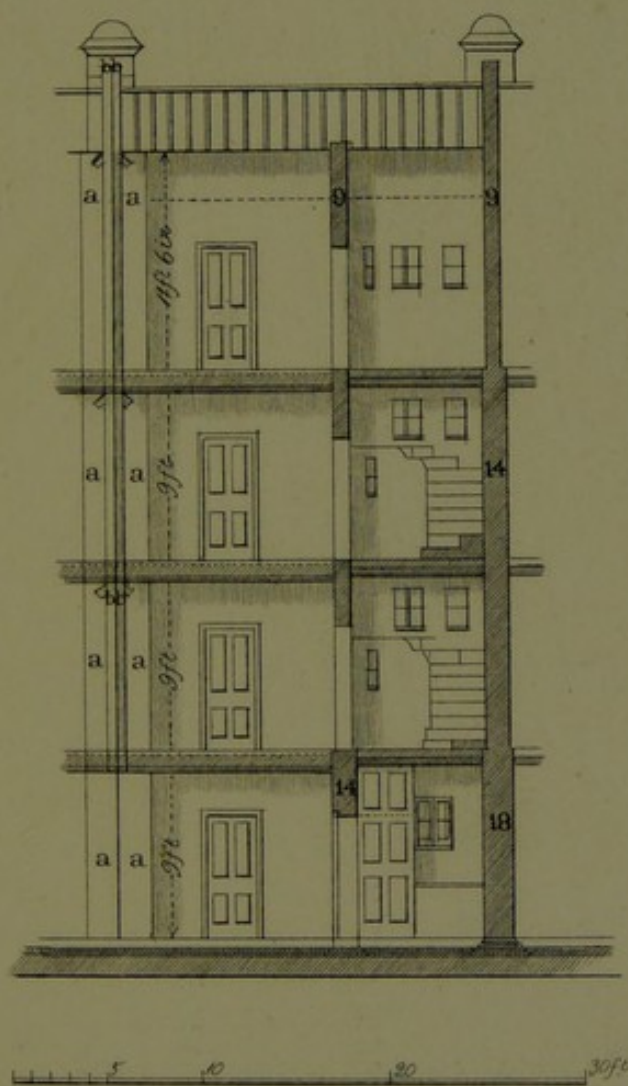
W. Hardwell Archt.

15

10 ft Dean & Son, lith.

Scale





a.a. Drying closet. b.b. Ventilating shaft to do

# SECTION.



29.1.29  
H.C.



