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SALUS POPULI SUPREMA EST LEX

WILLIAM BARDWELL'S

WHAT A HOUSE SHOULD BE

VERSUS

DEATH IN THE HOUSE

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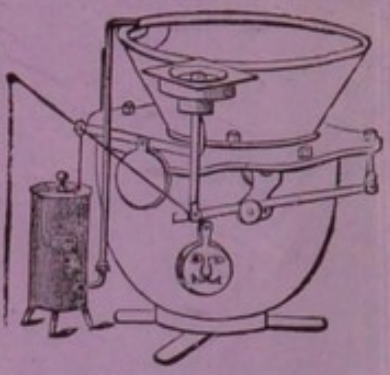

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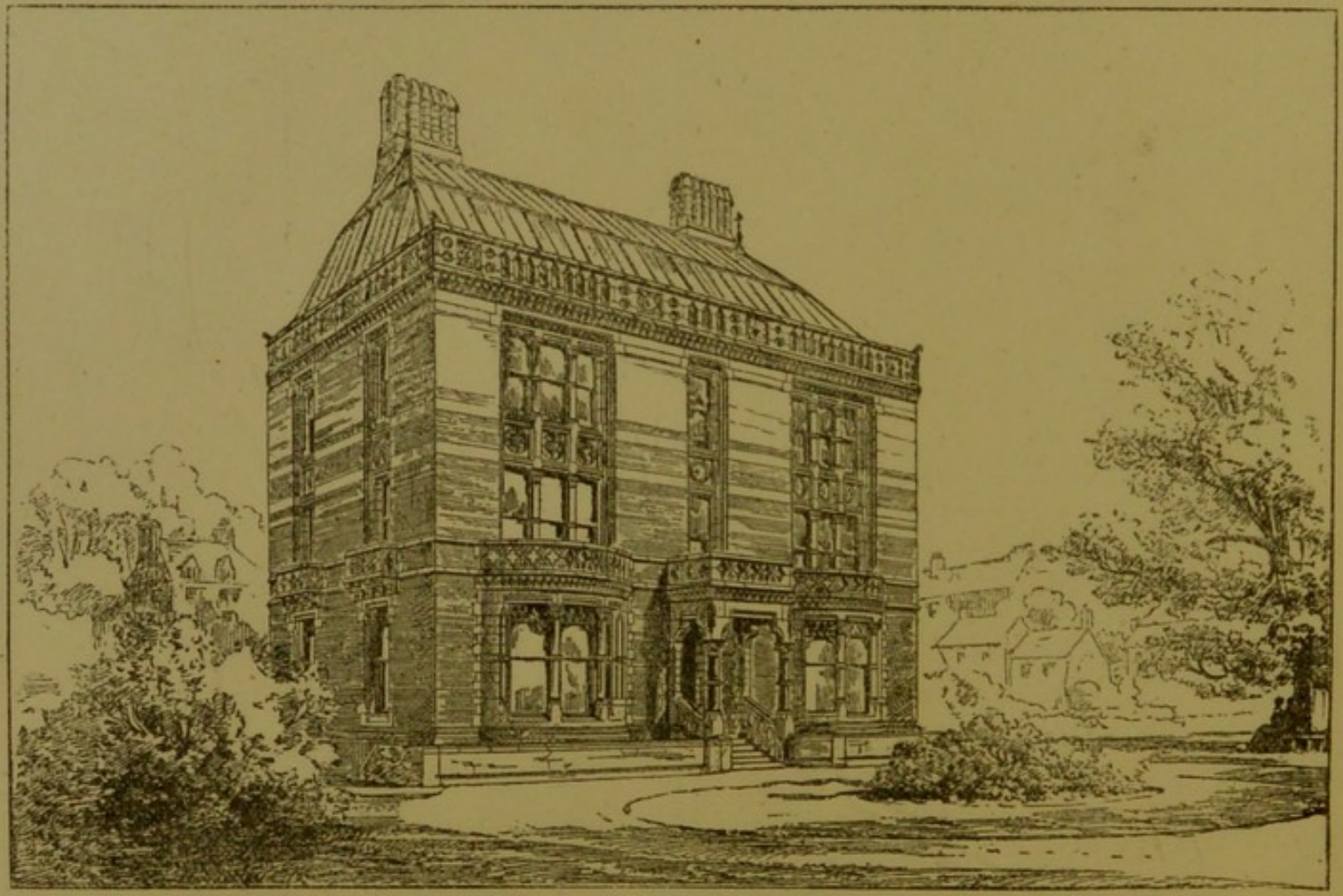


WHAT A HOUSE SHOULD BE. J. Seddon, Architect.

What a House Should Be,

VERSUS

DEATH IN THE HOUSE.

A COMPANION BOOK TO

"HEALTHY HOMES,

AND

HOW TO MAKE THEM."

Illustrated with Sanitary Dwellings and Sanitary Appliances.

By WILLIAM BARDWELL,

ARCHITECT, AND SANITARY ENGINEER.

AUTHOR OF

"Ancient and Modern Temples," "Ancient and Modern Westminster," "Villas and Labourer's Cottages," "Essays on Sewage," &c.

SALUS POPULI SUPREMA EST LEX.

LONDON: PUBLISHED FOR THE AUTHOR, BY DEAN & SON.

"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."

THE TREATISE ON

"HEALTHY HOMES, AND HOW TO MAKE THEM,"

Was Dedicated to the late

LORD PALMERSTON,

WHOSE

WISEST MEASURE WAS THE SUPPRESSION OF INTRAMURAL INTERMENTS.

IN THE HOPE OF SAVING MANY LIVES,

AND OF

ALLEVIATING MUCH SUFFERING AND SORROW,

THIS,

WHAT A HOUSE SHOULD BE,

VERSUS

DEATH IN THE HOUSE,

IS DEDICATED WITH PROFOUND RESPECT

TO THE UPPER

"TEN THOUSAND,"

BY THEIR OBEDIENT, HUMBLE SERVANT

WILLIAM BARDWELL,

Great Queen Street, St. James's Park.

INTRODUCTORY.

THE first edition of "Healthy Homes" was devoted mainly to the great necessity of providing improved dwellings for the manual-labour class, and the result has been success in a most extraordinary degree. Several works on the same subject have been published under a similar title. Patents have been taken out for the matters therein recommended. Government *employés* have carried out the sanitary measures suggested, without the slightest acknowledgment of the sources from whence they derived their information. The Government has not been inactive, for it has reformed the law of partnership, which prevented the full accomplishment of my object, as I therein stated. Limited liability has been legalized. The public attention has been aroused to the subject, and numerous philanthropic friends have come forward to carry out the principles enunciated therein.

2. This—"What a House should be"—is intended to promote the welfare of the higher classes, who are dwelling in habitations without knowing that DEATH IS IN THE HOUSE! My purpose is to unveil the skeleton, and to nullify his attacks. To me it is dreadful to see excellent people passing away, whose valuable lives might have been spared to their family and friends, if they had lived in WHAT A HOUSE SHOULD BE.

3. This will be evident, if we just glance at the effects of bad air upon the human frame. In about two minutes and a half, all the blood contained in our bodies traverses the respiratory surface. Every one, then, who breathes an impure atmosphere two minutes and a half, has every particle of his blood acted on by foul air. Every particle has become less vital, less capable of repairing structures, or of carrying on functions; and the longer such air is respired, the more impure it becomes, and the more corrupt grows the blood. After breathing for two minutes and a half an atmosphere incapable of properly oxygenating the fluids which are traversing the lungs, every drop of blood in the human being is more or less poisoned; and in two minutes and a half more, the entire minutest part of

all man's fine-wrought organs has been visited and acted upon by this poisonous fluid—the tender, the delicate, the wakeful, and the sensitive nerves; the heart, the brain, together with the skin, the muscles, the bones throughout the structure—in short, the entire being.

4. There are various places which have been selected as the chosen abode of the great and wealthy, as salubrious situations, but which are far from being so. It certainly is not generally suspected that under those great mansions inhabited by the wealthiest subjects of the wealthiest empire in the world, the pabulum of disease lies festering in unremoved heaps. Now, it is proved beyond a doubt, that typhus, cholera, and other frightful diseases, have an "elective affinity" for filth of all kinds, and that, consequently, where there is filth there will be disease; or, in other words, DIRT and DEATH are commutable terms, and, in hot weather, the one is the inevitable concomitant of the other; and thus untimely deaths are produced, and the term of natural life frightfully shortened. But untimely death is a great national calamity: the strong man is suddenly cut down, and his children must be supported by the industry of others, and hence our poor rates are increased, to say nothing of the bitterness of witnessing the premature death of a wife, a child, a father. What dashes to the earth so many hopes, breaks so many sweet alliances, blasts so many auspicious enterprises, as untimely death? The poets have always sung that, in the happier ages of the world, this source of tears shall be dried up. Common sense, energy, and science, have this grand work before them, and it is one now comparatively easy. Look at this one simple fact disclosed by the last census: "*The mean lifetime in Liverpool is but twenty-five years, while the mean lifetime in Surrey is forty-five years!*" That is, the people die twenty years, on an average, before their time in Liverpool, as tried even by the result of a confessed defective state of things in Surrey.

5. The sanitary condition of villages, farms, and detached houses in the country is often extremely bad, and in no case what it should be; for there are gathered about them more or less of removable sources of disease, telling in some way or other upon the health of the inhabitants. Counteracted, it is true, by the beneficent influences of country air and pursuits, their bad effects are much diminished from what they would otherwise become; and hence country places, as compared with towns, obtain a reputation for salubrity which tends to make their inhabitants think that no sanitary measures are required; but it is not so. Often there is much disease, much weak health, and much aptitude to receive disease, which is directly caused by circumstances surrounding the dwelling—circumstances which may be removed, or obviated, or avoided, by common care and attention.

6. Indeed, it has been satisfactorily ascertained that all epidemics are, to a certain extent, preventable. Thus, small-pox is prevented by vaccination, and cholera by free ventilation, and the perfect cleanliness of person and habitation; consumption by the use of oil, and extreme care of the general health; influenza and bronchitis by warm clothing and warm habitations, with fresh honey as a medicine; measles, scarlatina, and hooping-cough by avoiding contagion: typhus fever ought never to rage anywhere; it is entirely preventable by breathing a pure atmosphere, and avoiding the ordinary sources of impurity—as bad drainage, accumulations of filth and putrescence, and by a generous but temperate diet; for, as we have before hinted, of all parts of the living body the blood is the most apt to be acted upon by substances in a state of decomposition.

7. HUMAN PHYSIOLOGY being the basis of sanitary and social science, it becomes imperative that in a work of this kind physiological and architectural precepts should be combined. Air being our vital essence, I must dilate somewhat upon it, seeing that the death of the children of the lower classes *treble* in number those of the upper classes. The poor children, it is true, get fresh air in the streets in the daytime, but they are poisoned at night by the vitiated air in the rooms in which they are huddled together to sleep:

8. Health reigns throughout nature; and man was intended to be healthy, every provision being made to that effect; but inasmuch as he was also gifted with the power of choosing the good from the evil, to a certain extent, his well-being is placed in his own hands, and thus his destiny is left, more or less, under his own control. Although created an independent being, having free action, his social relations as a member of a community expose him to constant danger arising from the carelessness or ignorance of his fellow-men, which, individually, he cannot avoid. It is indisputable that pure air and pure water are essential to health; yet both are polluted by man, and all suffer in consequence.

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!

WHAT A HOUSE SHOULD BE;

VERSUS

Death in the House.

CHAPTER I.

THE PRESENT AND THE PAST.

"Full many a fiend did haunt this dwelling-place,
And made of passive wights an easy prey."

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 person, 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.

2. 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.

3. 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, prematurely wrinkled, tell too faithfully to what they owe the ghastly look and haggard gait.

4. Contrast the dwellers in closed-up houses with the butcher in his unglazed shop, or the cabman in his open-air home, and observe how these men luxuriate in their superabundant animal vitality. They know no pain, though constantly inflicting it.

> He knows no laws by ÆSCULAPIUS given,
> He studies none; yet him nor midnight fogs
> Infest, nor those envenom'd shafts that fly
> When rapid Sirius fires the autumnal noon.
> Serene he bears the peevish eastern blast
> And uninfected breathes the mortal south.

5. Look again how 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 soil-pipe, the water-closet, the sink and rotting boards, and tainted wall-papers, the dust-bin, filled with decomposing vegetable and animal matters, or defective and untrapped drains; all or any of which send up deadly emanations to poison the air in the house, while the hotter the internal air the more rapidly is the poison sucked up into the rooms. Thus it is no uncommon thing to observe even in grand houses, when a large party is given, a fetid smell permeating the place, in spite of all the perfume with which well-to-do persons *unknowingly* protect themselves.

6. The air in inhabited houses has very little ozone, and is therefore depressing, unless well ventilated. The air in the Alps—for reasons mentioned further on—contains an abundance, and is therefore exhilarating and vivifying.

7. Be it remembered, that no less than 400 cubic inches of air are required by each individual per minute; yet actual observation proves that in the majority of modern houses the quantity of fresh air admitted does not amount to more than one-fourth of the minimum required.

8. 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.

9. 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, by the appointment of persons to look into these matters to whom the subject was comparatively new; while the appointment by vestries of most ignorant men as sanitary inspectors, at three pounds a year, is simply laughable. Educated architects stand by supinely, and allow mushroom so-called engineers, to usurp their functions, and filch away their brains and bread.

10. Science has presented much, and propounded more, but still there is mischief afloat. We have progressed some little since 1828, when my first essays on Health were published, and public attention has been directed to the subject; but still one-half of the children born in London, and other large towns, die before they are three years old; while at a parish in Norfolk, where the principles here set forth are rigidly enforced by the excellent rector, a child is never known to die.

11. Let me therefore direct attention to what seems 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.

12. To show 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 speci-

mens, which graduate from one to the other by almost imperceptible degrees.

13. In "Healthy Homes, and How to Make them," a view of one of these BEST was given, and a view of the WORST.

14. The first, situated in a street in Westminster, is of a house of eight rooms, each a *separate tenement* of small dimensions; therefore 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 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. Then, also, the ignorant but filthy practice prevails of washing the floor with the warm water in which the clothes have been washed, or with "good stuff," as it is called, but which is very deleterious indeed to the air of the place.

For further description of a workman's dwelling in detail, see "Healthy Homes."

15. 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 thousands 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.

For some of the lowest dwellings of the poor, see "Healthy Homes," and

> To be the worst,
> The lowest, most dejected thing of fortune,
> Stands still in esperance.

16. In the first edition of "Healthy Homes" many other instances were adduced, and in addition, also, the wretched state of the agricultural labourers' cottages. Moved by this state of things, some gentlemen determined to erect a model cottage. They advertised for plans, and from those sent in, mine was selected and carried out. (See details further on.) After this a benevolent lady, wishing to benefit other classes, requested me to publish my notions of a Healthy Home, and to give her a design for such buildings in towns. This I did, and she paid me for doing so. (See "Healthy Homes.")

17. This lady had 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.

18. Hence it became 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 amount of interest as will induce the capitalist to embark his money in the erection of these dwellings.

19. It is considered by parties who have had great experience in the matter, that most of the designs for the habitations of the labouring population 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 so windy and draughty as to be almost uninhabitable.

20. It is satisfactory to know that the publication of "Healthy Homes," and the erection of 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—most of whose buildings, from admiration of mediæval architecture, are irregular in plan and irregular in outline, from an idea of being picturesque; and hence the chimneys are outside, involving loss of heat, the roof all hips and valleys, and dormer-windows requiring constant repairs, and exhibiting an utter ignorance of the very first principles of a Healthy Home.

21. But there are other errors, besides the mania for grotesque architecture: for instance, a surveyor finding some cottages on a clay soil in Essex very damp, ordered the ground-floors to be covered with asphalte. The result was, that the inhabitants were crippled with rheumatism! Why? Because asphalte is a non-conductor of moisture, therefore the body's insensible perspiration was condensed upon the person; thus, by standing on one of these floors, the trousers or petticoats became dangerously damp. The asphalte had, therefore, to be covered with boards, and these being a conductor, the rheumatism disappeared. Yet we hear of some men paving stables with asphalte. Oh! the poor horses!

22. Nevertheless we rejoice that the subject has attracted so

much public attention. The necessity of Healthy Homes for all classes is now a conceded question. Mr. Peabody left a large sum for the purpose of building workmen's dwellings, and several societies have also been formed for the like purpose, most of them having their own surveyor, who, of course, had to learn the subject, and hence my friend thinks their buildings might have been better; that such dwellings ought to have been fire-proof, and ought to have superseded ancient rookeries, instead of doing positive mischief by filling up every open space that could be attainable; "and," says DR. HARDWICKE, "the *familistère* at Guise is far superior to anything hitherto erected here." Others, again, are said to be too costly. The numerous chimneys might have been omitted, by making the flues descending, and so carrying the smoke to the under side of a clean coke fire, formed at the bottom of the central shaft; and thus, instead of the 300 or 400 vomitaries of smoke, there would be none, for all would be consumed in passing through the coke fire. This was done by MR. FLEMING, of Glasgow, in ventilating a pile of dwelling-houses known by the name of the *Barracks*.

23. MR. LOUDON says that chimneys should be placed in 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.

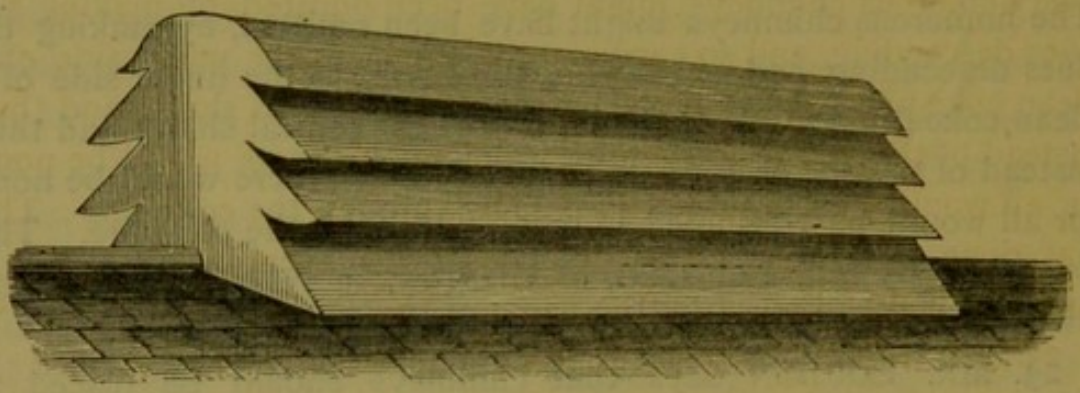
24. But the poor are not the only sufferers, as we shall presently see. There are other places besides Spitalfields, in which the besom of the Home Secretary is most urgently required; for thus writes a correspondent of the *Builder*:—

"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."

25. Then followed a description of a model cottage for agricultural labourers, part of which will be found further on; and the present and the past of the agricultural labourer contrasted, as to his condition, now, and what it was in the time of "Good Queen Bess." For, by the 7th of the 31st Eliz., we find it ordained that no cottage should be built for residence without *four acres* of

land at least being attached to it, for the sole use of the occupants of such cottage.

26. Both in the present and the past, houses have been built like bundles of firewood, to burn, to the great delectation of Insurance Offices. I purpose to show that incombustible houses may be constructed in future at a less cost than at present. A house should be indestructible by fire to become "What a House should be."



VENTILATOR FOR SCHOOLS AND STAIRCASES.

CHAPTER II.

THE BANE.

"Hoc fonte deriuata clades
In patriam populumque fluxit."
—*Hor.*

THE use of water in cabinets, in disobedience to God's command to bury excreta in the earth, is unquestionably the cause of those alarming *modern diseases*—the "something in the air" with which the whole country is afflicted.

2. The command was once strictly enforced by the law of England, and England's people were then a stalwart, healthy race. But in the present century, ignoring the injunction, we commenced wasting in water that which was primarily intended for the land, and, by adding blunder to blunder, the development has been enormous cost, poisoned air, filthy water, sterile earth, depressed health, and predisposition to contagion; while reckless or ignorant persons, working like gnomes in a mine, disseminate the germs of the fearful maladies now so rife among us: for what is gastric, enteric, typhoid fever, or ulcerated stomach, but blood-poisoning with mephitic air? and of these people are daily dying. What is a germ? A thing infinitesimally small, beyond our comprehension (see SOUTHWOOD SMITH'S atomic theory); a grain of musk will continue to throw off a perfume for fifty years—that perfume is composed of germs. What wonder, then, that we are smitten without knowing when, why, or where! What wonder that the corroded soil-pipe in the house, and the sewage irrigation in the field, are destroying their victims by thousands!

3. The first we hear of water-closets is from JUDGE HARDINGE,

who, on his visit to the DUKE OF KENT at Castlebar Hill, was delighted and astonished at the luxury of a cabinet, through which a stream of water was constantly running, near his bedroom. How different this to the modern Bramah * which has cut off thousands of children in early life, and nearly caused the death of the Heir-Apparent!

4. The water-system was presumed to be cleanly, and water was eulogized as a cheap carrier, but its chemical effects on certain matters were not understood, or were superciliously pooh-poohed; for now we painfully know that no house can be sanitary with the common half-way arrangements. There is scarcely a house around St. James's Park, or in Belgravia, or any house with two fronts, that is healthy; for wherever there are hopper-pan closets there is malaria, and DEATH IN THE HOUSE.

Owing to the perverseness of Surveyors, it is rare to find a room in the majority of houses free from sewer-gases; and these gases are only not fatal at all times, because, from the adaptability of humanity, the inhabitants become acclimatised, in common with the sewer-workmen.

5. The hopper-pan closet is that which has a moveable copper basin or hopper—a noisy thing with cranks and wires; a most deadly machine—for every time the handle is pulled and the basin emptied of its water, a communication is opened with the sewer, from whence the foul gases instantly rush.

6. The clergy, the nobility,—royalty itself,—have been stricken; and from the lamented Prince Consort to the Prince of Wales, 500,000 persons have died from preventable disease.

7. On visiting at several good houses, I have been horrified to find the principal water-closet beneath the stairs, without any external ventilation whatever. The air being rarefied by the heat of the house, whenever *the hopper is pulled, a rush of foul air from the sewer instantaneously occurs,* in addition to that which is constantly bubbling up through the two inches of water in the trap. How can people living in such places ever expect to keep their health! and indeed we see that the doctor is a daily visitor at those houses. Neither is the case much bettered by having such things opening into a bedroom, as the "glaring" instance at LORD LONDESBOROUGH'S sufficiently proves. If this is the accommodation for

* The name of the inventor.

the masters, we may expect that for the servants below will be worse, if possible, and that foul air must pervade the whole house. Remedies will be found further on; for surely in such cases there must be DEATH IN THE HOUSE.

8. In making alterations to a house, a chase is frequently cut down the walls—even of those of the drawing-room—for the reception of a lead soil-pipe; the chase merely covered with canvas, and papered over. Now, this soil-pipe is of lead, soldered with soft solder throughout its whole length, and sure to be corroded sooner or later by its contents, which, being sometimes acid and sometimes alkaline, chemistry cannot remedy. Through these corrosions putrid gases must flow into the heated rooms.

9. Moreover, these soil-pipes are seldom hermetically fastened into the drain; therefore the sewer-gases issue upwards between the pipe and its *casing*, whether this is of wood or brick, and thus in these cases also there is DEATH IN THE HOUSE.

10. A gentleman came to me one day, begging me to come and look at a large house he had recently taken in John Street, in which they found a very bad smell, which affected all the family; and the children were ill and dying. On examination, I found that the soil-pipe, which passed downwards by the side of several rooms, was in the basement corroded into holes, through which the poisoned air passed into the house. This shows the danger imminent in every house where a leaden soil-pipe is used. Defects may gradually arise, producing only enfeebled health to the inhabitants, but DEATH to new-comers. And thus it is that the residents in London become, as it were, acclimatised, while people from the country, coming to Town on business or pleasure, get their death-blow, unsuspectingly, from poisonous and invisible germs, emanating from drains and closets in a lodging-house or hotel, and return home to die.

11. The corrosion of lead soil-pipes proceeds from the interior, and is caused by the sewer-gas. When these pipes are unventilated, holes will occur in them in from eight to twenty years. When ventilated by an air-pipe running from them into the open air, they may remain whole from eighteen to thirty years.

12. Here, then, is the true cause of the sudden irruptions of disease, of which we are continually hearing, and must hear of more and more.

13. Every soil-pipe which has been fixed from eight to twenty

years is certain to be perforated; for not one in a hundred is ventilated. Sickness and death occur, the house is an uproar, the family remove; the builder is called in, who takes up the drains, and advises a thorough cleansing, painting, and papering, which is done—never once suspecting the true cause, which therefore remains unheeded. The family return, only to be further annoyed, and at last part with an otherwise suitable house at a great loss. There is DEATH IN THE HOUSE.

14. We have never heard of the Government Inspectors even hinting at this,—simply, I suppose, because the previous occupations of these men gave them no knowledge of the subject. But now that the great cause of danger is disclosed, this in cases of sickness will be the first thing to suggest itself, and thousands of pipes will from henceforth be renewed; so that, although I abjure plumber's work in one thing, yet in this he must of necessity be employed, unless a better material than lead can be used.

15. As to soil-pipes, MR. FRANK BUCKLAND says, "The builders of suburban terraces generally carry the overflow pipe from the cistern into the closet soil-pipe, thus forming a flue up which the foul gases from the whole system of drainage rush into the cistern; and thus, when a bath is fixed beneath the upper and above the lower cistern, the discharge-pipe from it being united to that from the lower cistern, the result is, that when the water runs from the bath, the pressure forces it up the short piece of the open pipe to the lower level of the cistern below, into which more or less of the dirty water finds its way. It would surprise English mothers to know that they "wet" the matutinal tea with a liquor, some of which has done duty at children's vesper ablution, or husband's morning dip!

16. After the publication of these pages, I have no doubt improved soil-pipes will be devised, and patents taken out for them. I have never published anything but other persons have taken the matter up, and very largely profited thereby—Churches, Westminster, Mechanics' Homes, Sewage, Reclamation, etc. JOHN BULL seldom rewards those who would improve his social position. He gapes, and superciliously asks, "Who's he?" After MR. WINSER had actually lighted Pall Mall with gas, SIR HUMPHREY DAVY reported the thing to be impossible; and so JOHN shook his head, stuck to his oil lamps in Berkeley Square for forty years afterwards,

and allowed MR. WINSER to die in poverty, while thousands of persons are at this day clearing their thousands a year by gas; for this brilliant light is now burned to the tune of sixteen millions of pounds a year! Here's a chance for a wise Chancellor of the Exchequer. A tax on gas of two shillings per thousand feet would produce eight millions a year, and still leave it the cheapest light that can be obtained, enabling the Chancellor to take off all the taxes on the necessaries of life, and make himself the most popular of ministers. From the sublime to the ridiculous is but a step, so perhaps he would rather stick to his matches.

17. The sink in the butler's pantry, and the newly-introduced lavatories, in lieu of the usual basin and ewer, often prove inlets of foul air by no means to be disregarded; for be it remembered that one part of sulphuretted hydrogen in 260 parts of common air will kill a horse; and for the potency of carbonic-acid gas, I need only instance the Grotto del Cano.

18. As before hinted, the principal causes of the insalubrity of London houses, and those in other large towns, are the soil-pipe, the cesspool, the badly-trapped water-closet and sink, and the badly-constructed drains. 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 making holes beneath floors for the reception of stagnant water, and the admission of dangerously unhealthy gases.

19. 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.

20. 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. It is said that by tutoring the olfactory nerve, it is capable of perceiving matter in the atmosphere of the most subtile nature; not only that which is pleasant, but also such as is unhealthful. If an unpleasant odour is a warning to seek a purer air, surely it is worth while to cultivate that power which enables us to act up to that warning, for the general benefit

of health. For there cannot be a doubt that the epidemic diseases which have ravaged countries, and much of the broken and permanently imperfect health which we meet with everywhere, are consequent upon impurities allowed to be kept and accumulate in the parts of the atmosphere in which men are living.

21. It has been observed, "It cannot be so bad as you say." No? I see people dying in this house and that house from the causes just mentioned, unsuspected by themselves. The PRINCE OF WALES went on a visit to the splendid mansion of a nobleman, and was brought to death's door through an unventilated hopper-pan closet. There was DEATH IN THE HOUSE. The *"Antick"* is there still, as well as elsewhere; for the mere separation of the drains, as shown to be necessary in one of my works twenty years before, did not drive it out.

22. All these are the dire consequences of putting that into the WATER which we were commanded to BURY in the EARTH—*not to spread upon the surface, as the so-called irrigationists are doing.* The cities of the Tigris, the Euphrates, and the Tiber became all depopulated from the same cause. We take no warning, and the misery is daily increasing. What the punishment will be for burning, or sending into the sea, that which should have been used to fructify an exhausted soil, remains to be seen; for the refuse of our cities and towns is the very gold and silver of agriculture. Its loss is very inadequately supplied by the three millions' worth of foreign manures per annum, which our farmers are obliged to import in order to prevent the exhaustion of the soil of Great Britain.

23. The air from altered and disused drains, unless these drains have been previously disinfected, often produces fatal results. This was the case when DEAN BUCKLAND meddled with Westminster Abbey drains. All the inhabitants were more or less injured, except those who could get away. The Dean was attacked with a fatal malady, and one of the minor canons and the porter died.

24. Thus was DEATH IN THE ABBEY, and it must soon be in the Church, while the Dean, in spite of Lord Palmerston's law, permits interments therein. Ages ago, a Dean, probably wishing to check the practice, said that the floor of the church was so filled with corpses that he could only grant a space eighteen inches square for the body of "rare Ben Jonson;" so "rare Ben" had to be buried in an upright posture. Thank heaven, the Church is not so filled.

Formerly, persons, reading Holy Scripture literally, imagined that the body was resolved into *dust.* St. Margaret's churchyard, and the vaults of St. Martin's and St. Anne's, in 1848, proved that it is resolved into gases, so powerful as to burst the leaden coffins and fly up into the *air.* In the country these gases are absorbed by vegetation, but in churches the effluvium would seriously injure any one near at the time of its escape.

25. How long is this revolting, pernicious, and anti-christian practice to be continued—turning a glorious temple erected for the worship of the Almighty into a charnel-house? The Jews, and other thinking persons, look on with disgust and amazement, astonished that a wicked, maudlin sentimentalism should be tolerated by the guardians of the fabric, and thus produce DEATH IN THE CHURCH.

26. I will here relate a curious story, without vouching for its truth. A wealthy person altered and fitted up most luxuriously a bed-room for a guest-chamber. Everybody admired it, but it was found that one after another of the visitors were taken ill and died. This caused great consternation; the splendid fittings and the sumptuous bed were removed, and the walls again stripped, when a small orifice was discovered in the brick-work, which further examination showed to be connected with an old drain, and this drain ran through a disused churchyard at some distance off. Here was the mystery solved: the poisonous gases occasionally rushed through this small aperture, and killed as certainly as a bullet from a gun. Obvious to all that here was DEATH IN THE HOUSE.

27. Let us now turn to the more pleasing part of our subject, and consider the ANTIDOTE.

CHAPTER III.

THE ANTIDOTE.

"Viam qui nescit, qua debeniat ad mare,
Eum oportet amnem quærere comitem sibi."

THE Creator's wealth given to us consists in sunshine, which is the source of all vegetable and animal life; air, which is the great reservoir of the material of life; water, the chief element of life; and earth, which is the basis of life. Every man must have his proper share of these and their products, or he cannot have the necessaries and comforts of life. We must therefore consider the Antidote under the following heads:—Remedies, Earth, Water, Fire, Air, Ventilation. The sitting-room, the bedroom, the hall and staircase, the cabinet, the sudatorium, and the gymnasium.

2. *Remedies.* It is impossible to over-estimate the practical importance of an improved system of Hygiene, which may effect wonders under circumstances of the utmost difficulty and danger, opening a prospect of the physical and social improvement of the people, instead of the let-alone system, which has produced such fearful results.

3. We know that by the provision of salubrious dwellings for all 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.

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

4. 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, 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 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.

5. "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 among the poor 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."

6. 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 encumbered by dilapidated and unhealthy buildings. We have shown the French how to build Healthy Homes, *and they are building them.*

7. Cleanliness is of the utmost importance in the prevention and cure of epidemic diseases. Purity of persons and things is the great aim of Hygiene; 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—

> A light, busy foot astir
> In her small housewifery; the blithest bee
> That ever wrought in hive,

whose practice ought to be followed by every mistress of a family

throughout the Empire—the Jewish matron—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 or 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.

8. Housekeepers and the heads of families should strictly enjoin that refuse of every kind, particularly the great mass of vegetable refuse—the pea-shells, the cabbage and lettuce leaves, turnip and potato parings, etc.—should invariably be burnt upon the kitchen or copper fire; for were this universally done, it would tend more than many would imagine to preserve the purity of the air.

9. LORD PALMERSTON'S reproof to the Synod of Edinburgh will be remembered, therefore it is not repeated here.

10. Little did that nobleman then suspect how noxious was the air in his own princely house on Carlton Terrace, in which, on coming from the pure air of Ireland, his lady was seized with cholera, caused, as I discovered, from *an imperfect drain running through the housekeeper's room.*

11. It is the cleaning and scrubbing of the Jewish matron and her handmaidens 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 paper-hanger *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.

12. Many instances of very serious illnesses have been known to arise from this cause, and also by the use of a green paper, the

colour of which has been obtained from arsenic. To remedy these evils, and at the same time obtain the best covering for a damp wall, it is now proposed to use hangings made of metal for walls; this new invention is French. The metal employed is tin-foil in sheets, painted, dried at high temperatures, and then decorated with different patterns. Tin-foil is naturally tough, and the coats laid upon it in preparing it increase its toughness. The hanging of these metallic sheets is similar to paper-hanging, except that the wall is varnished with a weak kind of varnish, and the sheet applied. Thus a room or house may be newly painted, without any smell of paint to annoy or harm the inmates. Moreover, the tin-foil keeps out damp, and as the varnish is a damp resister, the protection of the room is complete.

13. 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 bedroom window is opened, for the purpose of admitting the fresh spring or summer air, the noxious gases from the sewer pour through the joints of the pipes into the rooms.

14. 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

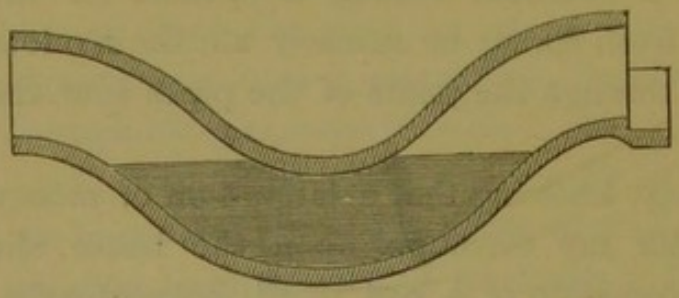
Surveyor of Pavements, that a method of diverting the rain-water from the house to the sewer, without a trap, was a practice most injurious to the health of the inhabitants, it was quite obvious, from the self-satisfied manner in which he repulsed my remonstrance, that he considered the plan a very clever contrivance, which nothing short of an indignant command, or the rule of ST. MAURE and ST. BENNE'T, would induce him to alter. The practice was introduced by a whimsical man in St. James's parish, and followed by other surveyors, except those of the City.

15. Let us now proceed to consider some of the details necessary to MAKE A HOUSE WHAT IT SHOULD BE; first in general terms, and afterwards recapitulate the more important items.

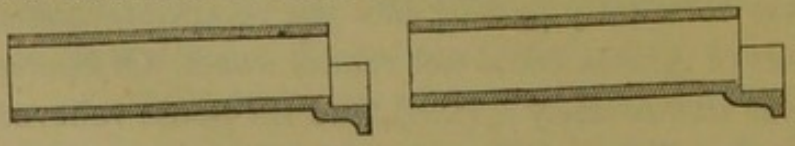
16. In most old houses the drains are of brick, and very large, thereby producing damp, and great contamination of the air.

17. The remedy for this evil is now cheap and simple, by the use of that admirable invention, the glazed stoneware 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 have I been to see unwholesome houses transformed into Healthy Homes.

18. 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.* The cost will be but a very few pounds, the interest of which is but a 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.



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

20. 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 well-rammed ground, or 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, and thickly planted round with trees and shrubs.

21. The drain-tubes used should, in all cases, be hard-burnt, well-glazed stoneware, 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, is 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 22½ degrees. I directed a syphon-trap (as shown above) 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.

22. To prevent unhealthy and noxious gases from ascending to the interior of houses from the drains, it is absolutely essential that all drains should be carefully trapped at their inlet and outlet. There are many forms of stench-traps now before the public, most of which are efficient. It must also be remembered that in laying drains, of whatever kind, it is necessary to make the joints water-tight; the escape of liquid only serves to hasten

the blocking of drains, by facilitating the accumulation of solid matters.

23. The danger of corroded soil-pipes has been pointed out at No. 10 in "*The Bane.*" It thus appears that any house, no matter how carefully or well built, will become unhealthy from these perforated pipes. Therefore, when cases of typhoid fever, diphtheria, scarletina, diarrhœa, etc., occur, the first thing to be done is to uncover and thoroughly inspect these fatal pipes throughout the whole length, and at the junction with the drain, and if found defective, instantly to have new ones put up. Be careful to have the casing secured by screws only, so as to be easily removable, for the periodical examination of the pipe.

24. Sewer-gas acts very little on pure lead. Chemical action takes place on the mixture of tin and lead called solder. *It is on the joinings of the soil-pipe that the corrosion occurs.* If these pipes could be drawn like smaller pipes, there would then be no vertical soldering, but soldering only where one length of pipe was added to another. So, Mr. Builder, or Mr. Engineer, if you should be called in, instead of an Architect, or a Plumber, you will now know where to look, in order to find DEATH IN THE HOUSE.

25. In order to lengthen the duration of soil-pipes from eight to thirty years, it would be the cheapest plan to carry them straight up above the roof, and leave them quite open to the air. A pipe will thus be securely ventilated, and its safe efficiency prolonged. If a syphon trap and flap is placed at the junction of the drain and sewer, as elsewhere recommended, little or no smell will be perceptible at its opening into the air.

ΑΡΙΣΤΟΝ ΜΕΝ ΥΔΩΡ.

THE *sewer*.—After the house drainage, comes the public drain, or sewer.

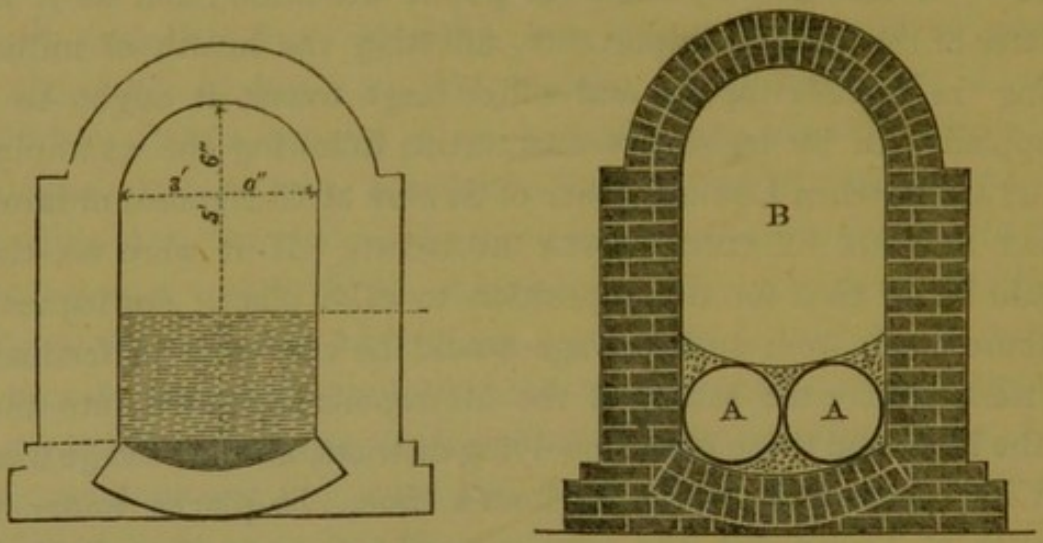
2. Ever since the time, now some thirty years ago, that the Sewers Commission, established by HENRY VIII., was abolished, the subject of drainage has occupied a considerable share of public attention; and as it is a matter of the deepest importance, affecting the health of millions living in the Metropolis and other large towns, it ought to be grappled with by legislative enactment, following the example of PLUTARCH, when Commissioner of Sewers at Chersonea, ordaining THAT SEWAGE BE CONSTANTLY RUNNING. If it were so, 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 outfall.

3. One glaring instance of error is the bringing 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 gases. This is actually part of a scheme now being carried out at a cost of six millions, and entailing an enormous annual expense for pumping up that which ought to have gone by gravitation; for that system of drainage must be a bad one, which only receives the filth to return its pestilential products upon us, to the destruction of our health. 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 conducting 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.

4. This will unquestionably be the case with the tube which carries the Fleet sewer, and that which carries the Kings-scholars' pond-sewer over the underground railway; when the unfortunate travellers will be overwhelmed with the filthiest of floods.

5. The future of sewers will probably be the separate system. That is, the separation of the house from the surface drainage. I submitted the following plan to the Commissioners, for adapting the existing Westminster sewers to that system, and it was published by the Metropolitan Board of Works, in their Second Report.



THE WESTMINSTER SEWER.—THE SAME ADAPTED FOR THE SEPARATE SYSTEM.
A.A. Pipes for House Drainage. B. Sewer for Surface Drainage.

6. By this it will be seen that the house drainage is received into pipes at the bottom of the sewer, from whence no smell could arise, as the contents could not be oxygenated. The surface drainage would flow over these tubes at once into the river, without any nuisance, while the other might be made into an excellent manure.

7. On this matter there was a deputation to LORD PALMERSTON, urging the great superiority over other methods of treating the sewage, at or near the sewer's mouth—not necessarily at every mouth, but arranging these in groups. His fatal answer was, "Well,

gentlemen, this I can tell you: there shall be no local tinkering!"* Yet, now, this is the very plan the Thames Commissioners are contemplating, and so at last, *vincit veritas.*

8. It begins to be clearly apparent that six millions of money have been wasted on a false system—a system most erronously forced upon the Board by two members named WRIGHT and CARPMAEL; the engineer had only to carry out their instructions, assisted by the numerous plans for the drainage of the Metropolis, previously laid before the Board. No thought whatever of utilizing the sewage, but only how to get rid of it, at any cost, instead of considering how it might be made to pay its way, as has been fully shown, and even to make it remunerative.

9. To make it so, such precipitants must be used as shall be either practically of equal value with the manure contained in it, or as shall be worth more as manure, in combination with each other and the sewage, than separately.

10. In towns where the separate system is carried out, my treatment of sewage on this principle would pay better than any other plan yet adopted. There is no doubt that the standard value of the manufactured article would be arrived at in the same way as any other artificial manure, proving that the utilization of sewage is profitable, if treated as above; for the manure contained in and combined with sewage, consists of the valuable ingredients which enter the sewers.

11. But this Board of Works, instead of encouraging, insolently snub and crush those persons who strive to remedy the errors the Board have committed. This, among others, they have just done to the so-called A B C Company. Whatever might be the merits or demerits of that Company's scheme—and they might have improved it—they certainly arrested the filth; and clear water only went into the river, without any cost to the rate-payers.

12. *Sewer-gas.*—To palliate the nuisance and danger of sewer-gas, I, some time ago, raised subscriptions for trapping all the gully-holes in my neighbourhood; and this was done, to the great satisfaction of the inhabitants of the streets around. But this good was soon negatived by the sewers-people, who came and opened *air-holes* in almost every street, and some of these, most perversely,

* He had been earwigged. He didn't even know the term *sewers*, but called them *shores*.

in the crossings, so as to give pedestrians the full benefit of sewer-emanations. One of these holes being made opposite a builder's house, the stench was so deadly, that the builder's daughter was taken ill, and died. He had sufficient interest to have this air-hole stopped up, and another made higher up the street, to the detriment of other people. This is one instance of death from sewer-gas, but there are many others.

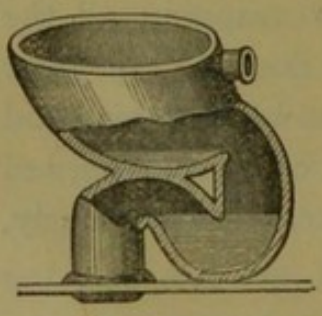
13. Several kinds of traps are made to intercept this most dangerous and offensive gas; the best of which appears to be that invented by Mr. Jacomb, of Barrow-in-Furness, by which the sewer is ventilated, and the sewer-gas disinfected. The contrivance appears to possess simplicity, cheapness, and facility for quickly changing the deodorizing material. Cost, from £2 10*s.* to £5 5*s.*

14. *Water.*—Our motto, by DR. JOHNSON, calls water the first of the Elements. As such, it is of the utmost importance to life and to our domestic requirements, to which we again revert.

15. Great as were the evils connected with the old cesspool system, they were small compared with our water-closet and sewage system. We then had closets *outside* the house, and but rarely *inside.* The smells passed into the open air, and not into the living rooms. The closet was at some little distance in the yard of a large house, and some attention paid to it, though, as we have seen, in fatal proximity to a small house, where its effects were utterly neglected.

16. But if we must have cabinets with water, it is best to have those which are sanitary; and as secondary changes in the contents of drains seldom occur under two or three days, most houses may be made comparatively healthy very easily.

17. In the first place, we must do away with all hopper-pan closets, and substitute those without a dangerous apparatus, and which are simple and safe in their action—the syphon-trapped pans, as shown below.



18. Provide, and fix in each water-closet, a brown stoneware, white-inside closet pan and trap, the construction of which is shown in the accompanying figure.

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

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

21. 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. (See further on.)

22. Or those of J. TYLOR AND SONS, which cost six shillings each, or, if blue and white, eight shillings each; or those of DOULTON, or STIFF, or BAILEY, of Fulham.

23. But if from either of these firms, you must order the basin to be made with two holes—one for the insertion of the service-pipe, and another for the waste or overflow-pipe; in order that the overflow *may discharge into the basin*, and thus effect flushing without any trouble, and prevent the waste-pipe continuing to be an outlet of foul gases; as well as avoiding the regurgitation of dirty water mentioned by FRANK BUCKLAND.

24. Or, to make assurance doubly sure, a waste-pipe in the form of a syphon may be placed in the cistern; and as with a good ball-cock this is very seldom used, it will be necessary to bore a small hole in the pipe just beneath the surface of the water when the cistern is full, so as occasionally to renew the water in the syphon.

25. No water-closet should ever be in the basement of a house, or *under the stairs*, or opening upon the stairs, or in a room, or opening into a room, but should always be in the back-yard, or at the top of a two-storied house.

26. Carpenters, not being physiologists, make the seats as high or higher than a chair. This is a perpetuated error; no seat in these places—for reasons not to be described here—should be more than fourteen inches from the floor.

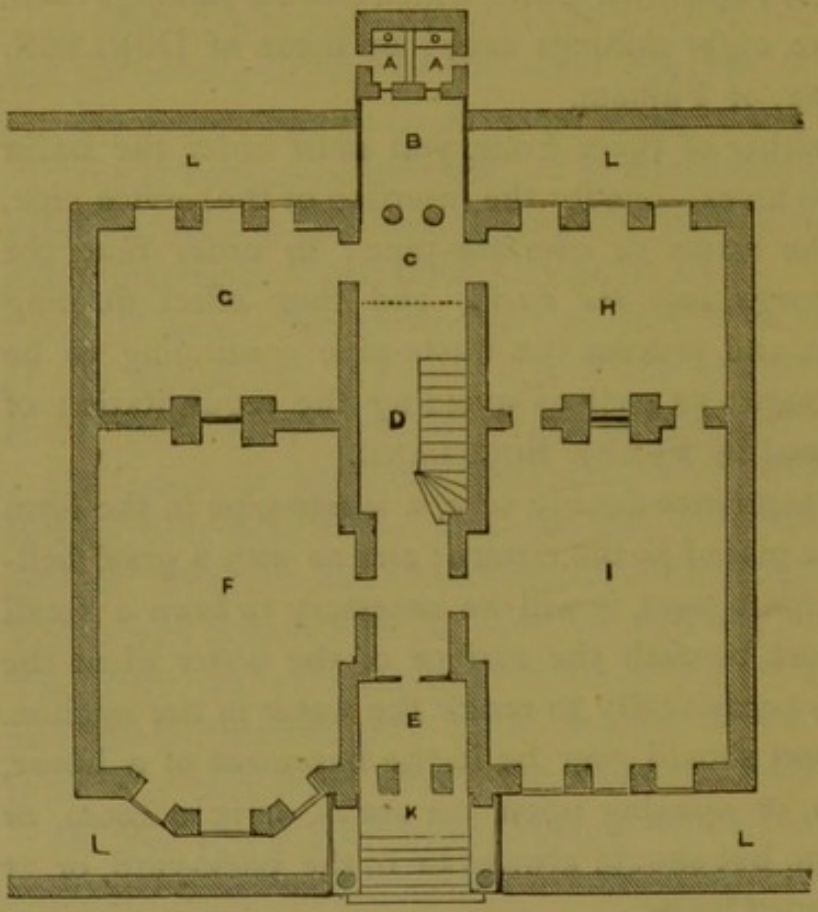
27. All water-closets, wherever, to have external light and air, and be approached through an ante-closet, or lobby; or, still better, through a greenhouse filled with plants.

28. Where the ante-closet is small, that, as well as the closet, should have, just beneath the ceiling, a couple of air-bricks on each side—iron outside, and perforated zinc inside; and thus obtain continuous ventilation without any trouble.

29. Let me again reiterate that lead soil-pipes should never be inside a house—boxed up; because the joint between the pipe and

the drain cannot be good, and so the foul air is drawn up this air-shaft, and gets beneath floors, etc., into the warm rooms.

30. In large houses the closet should be detached from the house, and be approached through a greenhouse, filled with odoriferous plants,—you then have salubrity instead of insalubrity ; or through an ante-closet, with a window, as shown below.



AA. Water-closets.
B. Conservatory.
C. Back lobby.
D. Hall.
E. Front lobby.
F. Dining-room.
G. Library.
H. Music-room.
I. Drawing-room.
K. Portico.
LL. Area.

THE AUTHOR'S IDEA OF WHAT A HOUSE SHOULD BE.

Scale, $\frac{1}{20}$th of an inch to a foot.

31. On entering the prothyrum, or front lobby, the lightsome appearance of the distant conservatory will remind the classic visitor (in a humble degree) of a Pompeian house, seen through the vista of the atrium, tablinum, and œcus, or peristyle; all of which features may be enlarged. Houses on this plan may be built singly, in pairs, or in rows.

32. In such cabinets as those mentioned in page 12, the hopper-basin should be removed, and a syphon, with at least three-and-a-half inches of water, substituted. An inch air-pipe should be

inserted *below* each trap, and carried above the roof. A deal tube, four by two inches, having a brattice in the centre, should proceed from the ceiling to above the roof. This will ensure a constant circulation of air; the cool air descending on one side of the tube, and the foul air ascending by the other.

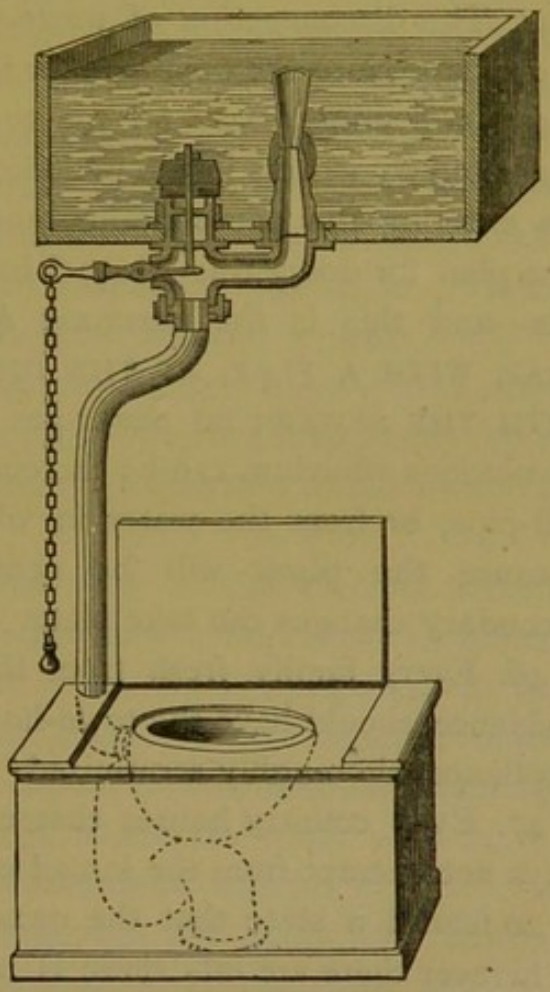
33. Before these suggested alterations can be made, it will be advisable to procure a small flower-pot half filled with earth, saturate the earth with carbolic acid, and keep it in the closet. This will destroy all noxious germs; and, in short, almost stop the plague itself.

34. All rain-water pipes to empty into the street or area, and not into a drain.

35. All staircases to have a ventilator at the top.

36. Disinfect before opening drains.

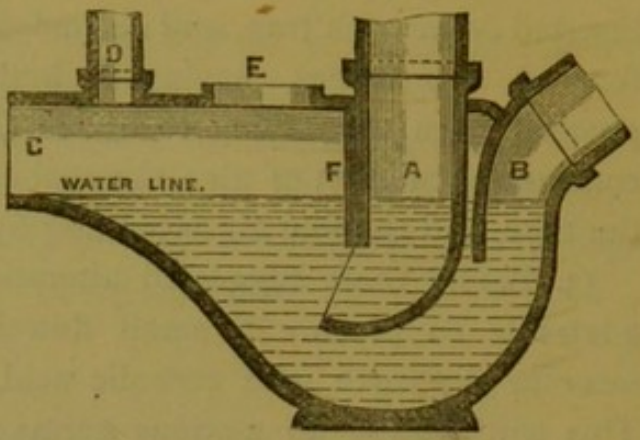
37. Provide and fix an 8-lb. lead funnel pipe, 4½ inches bore, from uppermost water-closet to drain, with proper tusks, branches, and junctions, to each of the other water-closets.



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

39. This is a sanitary water-closet. I have recommended and used it for more than twenty years, particularly in the Healthy Homes, in St. James's, and have never found the least defect, trouble, or nuisance to arise therefrom.

40. Twenty years ago this was the perfection of a water-closet, but many improvements have been made since that time, among which is the one represented here, and more minutely described in sanitary appliances. Its



superiority consists in its having a pipe for the exit of water from waste-pipe, sinks, etc., and thus flushing out the trap, in having a socket for a pipe for ventilation, and also in having a capped orifice for the removal of obstructions.

41. All soil-pipes to have an inch lead pipe inserted beneath every trap, and carried up above the roof for ventilation, according to the practice now many years in use.

42. Ventilation of a drain, or of a soil-pipe, below the trap, by an air-pipe to rise above the roof, costs about £3 each.

43. To insert a syphon-trap in a drain costs about £2 10*s*.

44. The disconnection of waste-water pipes, and causing these to discharge into the open pan, or into a sink, about £3 each.

45. It is unnecessary for me to notice the various expedients suggested by writers in the periodical papers for preventing sewer-gas entering the house drains, and permeating the whole house. The plan for doing this which I have practised for many years, is this—and this is the *summum bonum*—TO INSERT A SYPHON-TRAP, WITH A FLAP, AT THE JUNCTION OF THE HOUSE-DRAIN WITH THE SEWER; no sewer-gas can then enter the house, and no noxious effluvium can be therein,—except that from a corroded soil-pipe, or from the water in which greens have been boiled; because the pipes will be continually emptying, so that no secondary changes can take place.

46. Every family fresh from the country, before coming into residence, should have the town-house disinfected, and its necessary appliances thoroughly scrutinized.

47. Even country houses that used to be salubrious, are now-a-days not exempt from the inroad of sewer-gases: some, indeed, are in so fearful a state that the owners don't care to live in them! Wherever there are rats there is malaria. Almost every mansion requires to be disinfected, and to have its several conveniences systematically examined and set right, so that epidemics may not find us unprepared.

48. In the country, it is almost incredible to see the nearly

universal contiguity of the pump and the cesspool, the dung-heap and the well—mistakes often fatal, and always injurious to the health of the inhabitants of the adjoining houses. 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 sink 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. Even this is not the worst: some reckless fellows have dug sumpts beneath the sources of heretofore pure springs of water, for the reception of sewage, and boast of it as an expedient to be admired; heedless of the warning given by the well in Great Marlborough Street, into which an ancient plague-pit drained. The water from this pump was clear and sparkling, and therefore praised, until sudden destruction came upon those persons that drank it, and swept them off wholesale. So it will be to those who drink from tainted springs: they will perish by hundreds, without suspecting the cause. Tainted water produces cholera, and sewer-gas produces typhus.

49. In rivers, wherever there is putrefaction, there is also animal life destroying 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.

50. Most marvellous it is to see that as the Thames becomes more and more polluted, and sewage filth is deposited higher and higher up the river, the worms follow the decomposing matter; although it is pretended that this is carried out to sea. Formerly the worms were only seen at Westminster; now they have extended themselves up as far as Isleworth, where the water used to be as clear as crystal; now it is little better than sewage.

51. Dr. Angus Smith has analyzed the water from scores of wells within and near towns, cesspools, and graveyards, and *never found one specimen of water untainted.* Therefore stoneware pipes should be laid from house, stable, and pigsty, to a distant waterproof 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. These tanks should be thickly planted around with evergreen shrubs.

52. Lead cisterns are acted on by some waters, and are therefore exceedingly deleterious to health.

53. 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 of 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. 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!

54. It appears that water aërated with atmospheric air only, does not act upon lead, and that water aërated 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 stoneware pipes, according to the practice of our great master, VITRUVIUS, in whose

time the water from the aqueducts was carried to the houses of Rome by 13,500 earthenware pipes one inch in diameter.

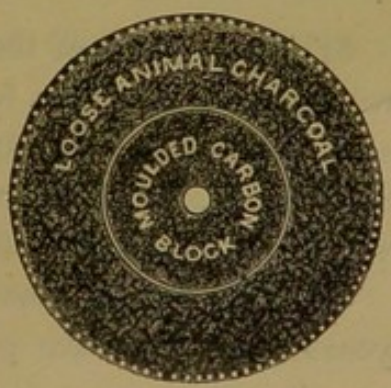
55. The effect of lead introduced into the system is to paralyse some part or organ. Dropped hands, and paralysis of the lower extremities are consequences of the gradual introduction of this pernicious metal. What has banished that splendid wine from our tables—Madeira—but the fact of its being adulterated with lead? I have seen otherwise healthy-looking old gentlemen in Bath, drawn about the streets in little wheeled-carriages; and on inquiring 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.

56. One *certain* corrective of any bad consequences from lead, would be to have a moveable zinc bottom where there is a lead cistern, or a wood cistern lined with lead. This bottom should be taken out every week and cleaned. 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 the same, but it would be characterized by a *black* coating, which should be carefully rubbed off, and the clean zinc bottom returned into the cistern.

57. We have now tinned-lead pipes, or rather leaden-cased block-tin pipes, which are not acted on by any water—therefore safer than lead, and more manageable than iron. These are made by Messrs. Walker, Campbell, and Co., of Liverpool, and are sold at the same price as the common lead pipe, strength for strength—from 8½*d*. per yard to 3*s*.; being a real sanitary water-pipe.

58. It is best to get rid of lead cisterns altogether, and substitute those of brick, lined with good cement; or York stone cisterns; or, still better, those of slate, or of galvanized iron.

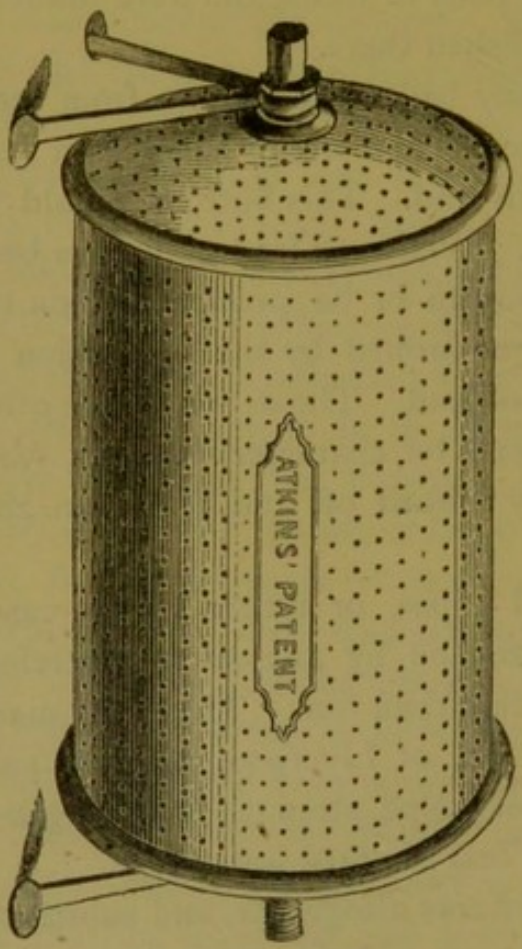
Slate cisterns to contain 100 gallons and upwards of water cost from 1*s*. 4*d*. to 2*s*. per foot superficial. Those of galvanized iron nearly the same price.



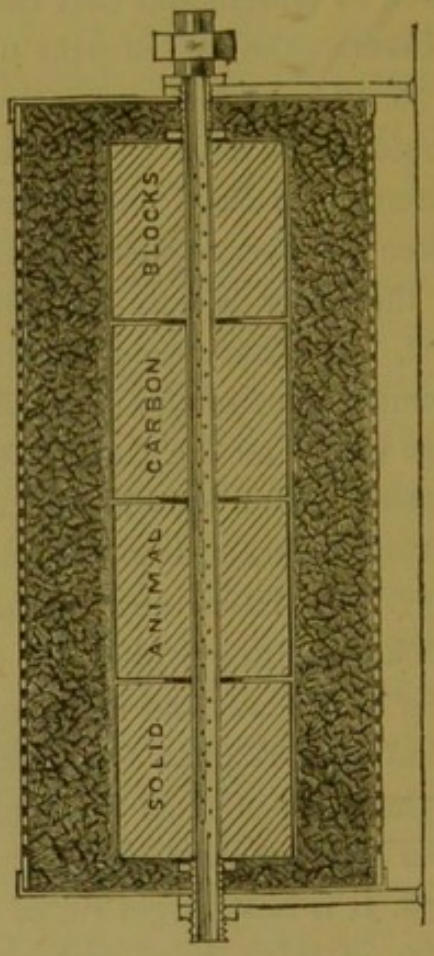
59. As in London we are drinking mere diluted sewage, and must continue to do so while the sewage-irrigation schemes are allowed; and as it will be

many years before the pure waters of Bala Lake, or those of the Severn, are brought to us, a filter within the kitchen cistern, if you would avoid a muddy complexion, becomes an absolute necessity. Until you procure a filter it is advisable never to drink water unless it has first been boiled; and even after boiling there will be a deposit from the best Thames water.

60. Filters are made by DEANE, LIPSCOMBE, SPENCER, and others. Atkins's tank and filter, as supplied to Government, costs, according to size, from £5 to £25.



PORTABLE CISTERN FILTER.



HOUSE CISTERN AND FILTER.

61. The filters of the London Water Purifying Company are really *pro bono publico*, for these filters are not only sold at prices to suit all classes of society, but are also lent on hire like gas-meters, for from 25*s*. to 35*s*. a year, thus putting one of the means of health within the reach of all persons.

62. Although the matter was assumed to be settled some fifty years ago, there are yet persons again agitating for a constant

instead of a periodical supply of water, totally ignorant what this involves. We get rid of the cisterns, the waste-pipes, and "the troublesome plumber, always wanting the fire for his messes." We should then drink the impurities from the pipes which used to be deposited in the cistern. Or suppose the cistern retained, and the ball-cock out of order—in Westminster we only had a pressure of twenty feet, now we have one of ninety—the new cocks necessary to resist this pressure are often set fast for want of a little oil. This may occur in the night, and the overflow rush like a cataract down the stairs; or the servants may come down in the morning, and find the basement flooded. We invite a dinner-party, and on the very day an accident occurs to the main, and there is no water for the cook to make the soup, or boil the fish. The dinner must be postponed, and the company go away enraged at the *contretemps*. Or suppose a hard frost in the winter: the pipes full are sure to burst, and before a plumber can be obtained, the water has flooded every floor, destroyed the ceilings, and turned the basement into a lake! No plumber is to be had, the turn-cock is in another part of the district, and so the flood goes on to the neighbouring houses; and in the terror of actions for damages we curse the plausible agitators for their success in obtaining a constant supply. This is supposed to occur in good houses; but in poor districts, where there is only one cistern for the supply of several houses, the taps are at present continually wrenched off and sold for a few pence. If the like should be done with a constant supply, an immense quantity of water would be lost, and great mischief occasioned before assistance could be had. Moreover, I am told that in some parts of "Town" there will be a pressure of 400 feet, so that no easily worked tap could resist that amount of force.

63. All stuff! Is it? Well then, what do you say to the expense? The apparatus required by the water companies, in order to prevent waste, costs £10 for a small house, and £60 for a large one; involving a cost to the house-owners of London, of eleven millions sterling!

THE BATH WATERS.

Thus drinke, thus lave, nor evermore lament ;
  Our sprynges but flow pale anguishe to befriende :
How fayre the meed that followeth content !
  How blest to lyve, and fynde such anguishe mend !
How blest to die when sufferynge faith makes sure,
  At lyfe's high founte, an everlasting cure !

64. *The Bath Waters.*—For the cure of lead-poisoning mentioned in previous pages, and for sciatica, neuralgia, gout, rheumatism, skin diseases, and general debility, these waters have long been celebrated. They are supposed to be heated by the fires of Etna or Vesuvius, and to flow beneath the land and sea by Portugal ; for when the earthquake took place at Lisbon, the waters of Bath turned black. They force their way through the coal measures, beneath the superincumbent red sandstones, marl, and lias, and arise at Bath, near the junction of the lias with the upper oolite, wonderfully flowing for thousands of years, at the rate of a million tons a year, and at the maximum temperature of 120°, still preserving their uninterrupted flow, and that mysterious healing power which no chemistry can explain and no mere artificial formation produce.

65. The principal salts found in them are sulphate of lime, chloride of sodium, chloride of magnesium, carbonate of soda, silica, and protocarbonate of iron ; while the gas evolved, apparently in abundance, is about 97 per cent. of nitrogen to 3 per cent. of oxygen, with a small and varying quantity of carbonic-acid.

66. The King's Bath has the repute of being the most ancient, and was used by Prince Bladud, 800 years before Christ. It measures 59 feet by 40 feet, and when filled to a depth of 4 feet 7 inches, contains 364 tons and 2 hogsheads of water. It may be seen bubbling up from the spring, through holes in the pavement,

at a temperature of 116°. In Bladud's time it was not built around, so that the Prince and his swine wallowed in the mud, saturated with the minerals; "For," said the Prince, "if it cures my pigs, it will also cure me;" and all were therefore more quickly cured than can be done at present.

67. The Hot Bath derives its name from the fact that it supplies water of the highest temperature, *viz.*, 120°. "This," says LELAND, "is caulled the Hote Bathe, for at cumming into it, men think that it would scald the flesch at first, but after the flesch ys warmied it is more tolerable and pleasaunt." This is the bath for dropped hands, gout, and rheumatism.

68. Then there are the Royal Baths, the Cross Bath, 96°, where Queen Eleanor was cured, and several other baths, at prices from twopence to half-a-crown.

69. The Romans built magnificent edifices at Bath, and delighted with these springs, called them the WATERS OF THE SUN.

70. But you must drink as well as bathe. Drink at the Hetling Rooms, or if you wish to get well, put pride in your pocket, and drink at the Free Pump. Jolly MRS. BISHOP will pump it up for you as hot as possible. "Drink it off at a draught, Sir, or you'll lose all the gases." At the Grand Pump Room, in order to display the waters as a fountain, and so *ad captandum vulgus*, they are so messed about that the gases have escaped and the value is lost.

71. In concluding this division of the subject, let me say,—If ills arise from *what a house should not be*, "Go to Bath," see the beautiful children, call on DR. TUNSTALL, and get cured; have your house made sanitary according to the advice herein given—return, and find WHAT A HOUSE SHOULD BE.

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

TERRA OMNIUM MATER.

1. *The Earth.*—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.

2. In most of the high lands around the Metropolis, the London clay crops up, as 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 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.

3. In all 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 is 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 dif-

ferent 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 asphalte over the whole surface of the ground inside, *beneath* the floor, is a sure preventive to the rising of damp.

4. Another good plan, which I perceive many builders very judiciously carry out, is to insert two or three iron bricks in the front and back walls of a house, below the lowest floor, thus securing ventilation between the earth and the floor, preventing the dry-rot, and any dampness arising from the earth through the floor. Some also carry out a similar arrangement in each floor; and thus ventilation, without any trouble or cost, is very efficiently secured.

5. MR. TAYLOR'S damp-proof course is an admirable invention, as it prevents damp rising up the walls, and gives ventilation throughout the ground-floor. It may be had in slabs three inches thick, at Cox's Wharf, Upper Ground Street.

6. Agriculturists urge the importance of subsoil drainage. This is equally an essential to make *a house what it should be*, particularly where there is a basement story; for water will sometimes rise, 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.

7. The best sites are those on trap, granite, and other metamorphic rocks, where water readily escapes, consequently the soil and the air are dry. Cholera is rare in houses on such sites. Permeable sandstone, gravel, and chalk, are also healthy. Sands which contain organic matter, clay, and alluvial soils, are always to be suspected.

8. Dampness of ground necessitates dampness of the air and of the walls. This causes chemical alteration in the organic materials in the house, with absorption of oxygen, and discharge of other gases; it favours, too, the growth of low animal and vegetable organisms, which poison the air of the dwellings, and produce

disease. The decomposition of the organic contents of the soil is hastened by rapid alterations of its hygrometric state,—which is, perhaps, the chief condition of outbreaks of cholera.

9. Dry or earth closets are almost an impossibility in the Metropolis, but in the country these may very advantageously be used to supersede the water-closet. Not necessarily those which are patented: most builders are capable of fitting up places suitable to each locality. The thing may be rude at first, but practice will produce a perfect machine. I saw one some time ago—a square box of galvanized iron, on wheels which fitted close under the seat of the closet, and, when full, was easily removed, or might be removed by the gardener every morning; another box of dry earth, with a small scoop, completed the apparatus. None of these things will be successful until there is a properly organized set of men to attend to them, like the dustmen.

10. The subject is not at all new; for when I was a school-boy at Yarmouth, some seventy years ago, the privy and the dust-bin were one and the same; the ashes from the fire, and the sand from the floors and passages nearly preventing disagreeable smells, and which the addition of a little earth (for the mixture of earth and ashes is far better than either alone) would have effected entirely. But at Yarmouth there is scarcely any earth. I mention this to show that in most houses there are generally sufficient carbonaceous matters to deodorise other matters. (See MOULE'S Company.)

11. In all large establishments out of the Metropolis, dry closets are of immense advantage; there is no sewer-gas evolved, no plumber's bills, and no water-rate to pay, and therefore they cost nothing. At Dover Castle, the farmers around bring in fresh dry earth, empty and take away the contents of the receptacles gratuitously, finding ample remuneration for their labour in the excellent manure they thus obtain. *The command is fulfilled*, and, therefore, enteric fever is unknown there.

12. Some such-like arrangement is, I believe, carried out in the charitable institutions founded by the beneficent wife of the Primate of all England, under the able direction of Messrs. SEDDON and SPOONER.

13. The insalubrity of country houses generally arises from the faulty Bramah in the house. Formerly there were no such things,

but a cabinet a little distance from the mansion; one, I remember, at a baronet's, situate in a shrubbery; in which, I think, there were seven seats arranged in a quadrant, where you might sit and smoke, or converse on the events of yesterday, or decide upon the doings of the day. A little earth thrown in occasionally, or the ashes from the house, kept all sweet and wholesome. It is thus that all places of the kind should be treated.

1. *Fire-proofing.*—The public cost of preventing damage to property from fire, amounts, in the Metropolis alone, to £770,000 a year! This does not include payment for losses incurred, or afford much security against the irreparable loss of life in a house on fire. All this might be saved and prevented by building houses fire-proof. Capitalize the fire-insurance premium, and you provide the means for doing so.

2. 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 were 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 done by patent methods of flooring, as well as by the usual practice of Parisian architects, and by other inventions for obtaining the same most desirable result, for which "Wisdom cries aloud." There are above a dozen patentees, among whom the system of HORNBLOWER combines strength with lightness; that of TALL being the cheapest of any other; but it requires very great care in proportioning the materials, and in mixing them, to form strong concrete.

3. The general principle adopted in carrying out fire-proof arrangement, 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.

4. The following sketches illustrate the construction of the floors

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

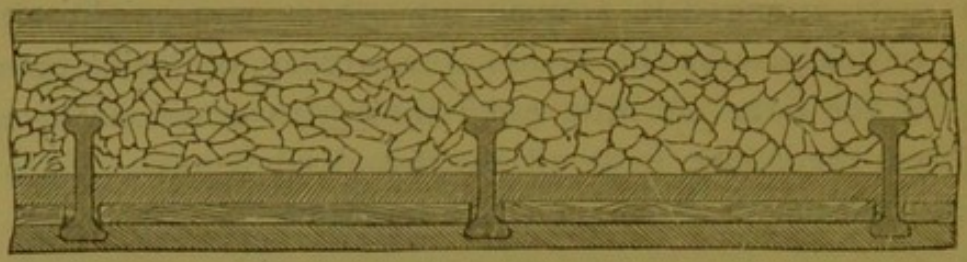


FIG. 1.

with a cement or other similar surface; and Figure 2 is a section between, and in the direction of the joists, with a boarded

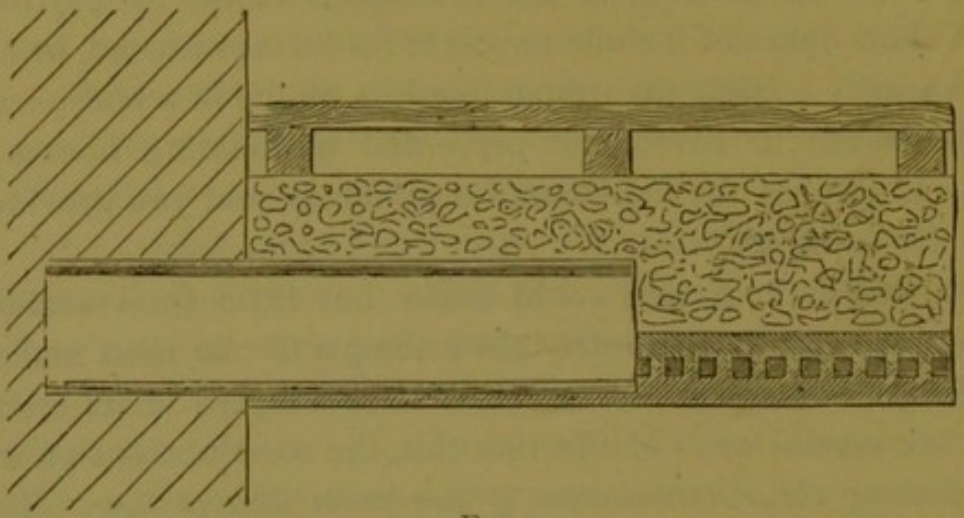


FIG. 2.

surface, the joist being broken off to show the construction of the floor.

5. 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 tiles, etc. 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.

6. 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 *commonest* 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 1¼-inch, ditto	21	9	5	,,	7	9	0	,,

7. In the Dennett arch system the cost of the construction varies somewhat, according to the distance from the gypsum quarries, which are almost entirely confined to the counties of Derby and Nottingham. The cost of the arching in London, in ordinary spans, including centring, is about 75*s.* per square of 100 superficial feet. A finished upper surface, where such is required, involves an additional expense of from 15*s.* to 25*s.* per square. These prices do not include iron girders; but as so few of these are required as compared with other methods of fire-proof construction in which concrete is used, this system will be found to possess strength, rigidity, and a highly fire-proof character.

8. Drake, and Tall, also construct concrete floors at very low prices. The former uses iron girders, and fills in between with concrete. The latter depends on the strength of the concrete alone. In both cases it is best to corbel out with four courses of bricks, to form a cornice all round the room, for lateral support.

9. 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 Putney 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. 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.

10. 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 3*s.*, together with a tax of 1*s.* 6*d.* upon each £100, would amount to £8 2*s.* 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.*

11. Above all things there must be a fire-proof staircase. This is easily done by inclosing the steps with a wall on each side, in the Scotch fashion. Or if but narrow, a wall enclosure is not necessary, if only the stairs are fire-proof. Concrete is effecting a revolution in building, so that houses will no longer be made for burning. The wall may be pierced with pillars and arches. The steps may be made of stone, or slate, or marble; or, very cheaply and durably, of concrete.

12. DRAKE'S floors of concrete cost, for ground-floor, from 2*s.* 6*d.* to 3*s.* 6*d.* per yard super., 3 inches thick; for upper floors, with iron girders, at the present high price of iron, from 14*s.* to 16*s.* per yard super.; staircase steps, 3 feet long, 7 inches rise, and 11 inches tread, 9*s.* 9*d.* each.

13. In order to prevent the transmission of sound from floor to 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 of 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

ARROWSMITH'S

SOLID PARQUET FLOORS & BORDERS.

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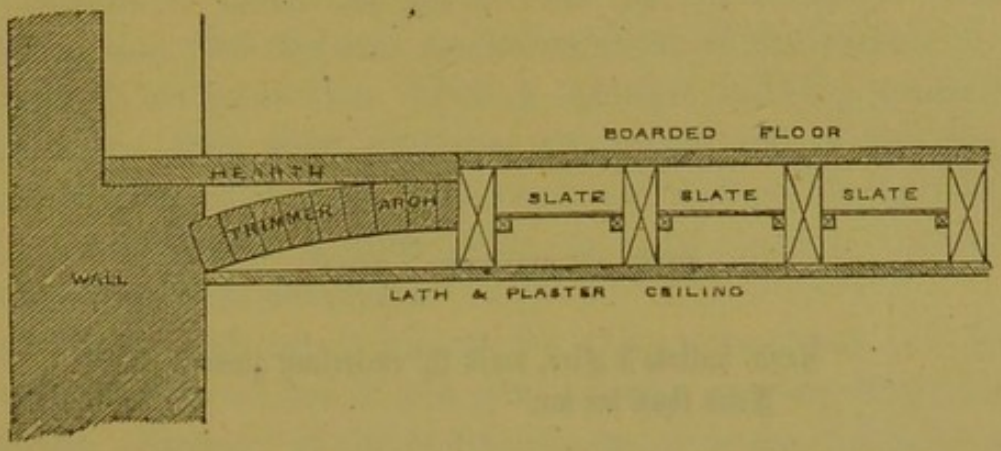
close joint; and, at the same time, all upward currents of air will be prevented.



14. The slates are wrongly placed in the engraving, but should be immediately beneath the boards, on the same principle as that of Mr. HARTLEY'S fire-plates; so that fire in one floor could never be transmitted to the next; and a house provided with either of these beneath the floors, and with concrete, or stone, or slate stairs, could not be burnt down.

15. The main object of the Building Act is to prevent the spread of fire, and these measures are but another step in that direction.

16. 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, they can be painted over almost immediately, and made to represent the most beautiful graining of either wood or marble.

17. This illustration, and the one among sanitary appliances, shows ARROWSMITH'S solid parquet, as a very handsome covering for fire-proof floors, greatly enhancing the beauty of the rooms by its cheerful polish and intrinsic appearance, with cleanliness. Now in use for the last twenty years. It is very durable, and costs no more than the price of a Turkey carpet.

THE ANTIDOTE.—FIRE.

"Lead, hallow'd Fire, amid th' encircling gloom,
Lead thou me on."

1. THE FIREPLACE.—Ordinary fireplaces or grates may 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 the public generally: for with half the quantity of coals, it is obvious we can have but half the quantity of smoke; the coals being at the bottom of the fire instead of at the top, the gases pass into the body of the incandescent cinders, and the carbon is consumed.

2. Poke out all the cinders, and fill the grate with coals, pressing them down very hard, that the interstices may be filled up with very 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.

3. Where 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. If masters of houses would insist on the fires being so lighted, it would greatly improve the air of London; but telling servants is like preaching to the wind, for we have not ABRAHAM'S power "to command our household."

4. Also, this way of lighting a fire would be very useful in large houses, with a number of rooms only occasionally used. Its valuable principle is recognized in the construction of a reversible grate, brought forward again for the third or fourth time, like

so many other patent things, as if it were something new,—it being now well-known that the combustion of coal when burnt downwards is much less rapid than by the ordinary mode of burning, and with far less smoke, as most of the carbon is consumed. This grate has both a bottom and top grating, so constructed that when coals are put on the top of the fire, the grate is reversed, and the fresh coals are then at the bottom, the smoke from which is thus made to pass through the red-hot cinders, and there consumed.

5. These, and other means for the consumption of smoke detailed further on, are, if not new, at least praiseworthy; for the palpable obscurity of the metropolis between the hours of seven and nine in the morning, when the fires are lighted, is frightfully increasing.

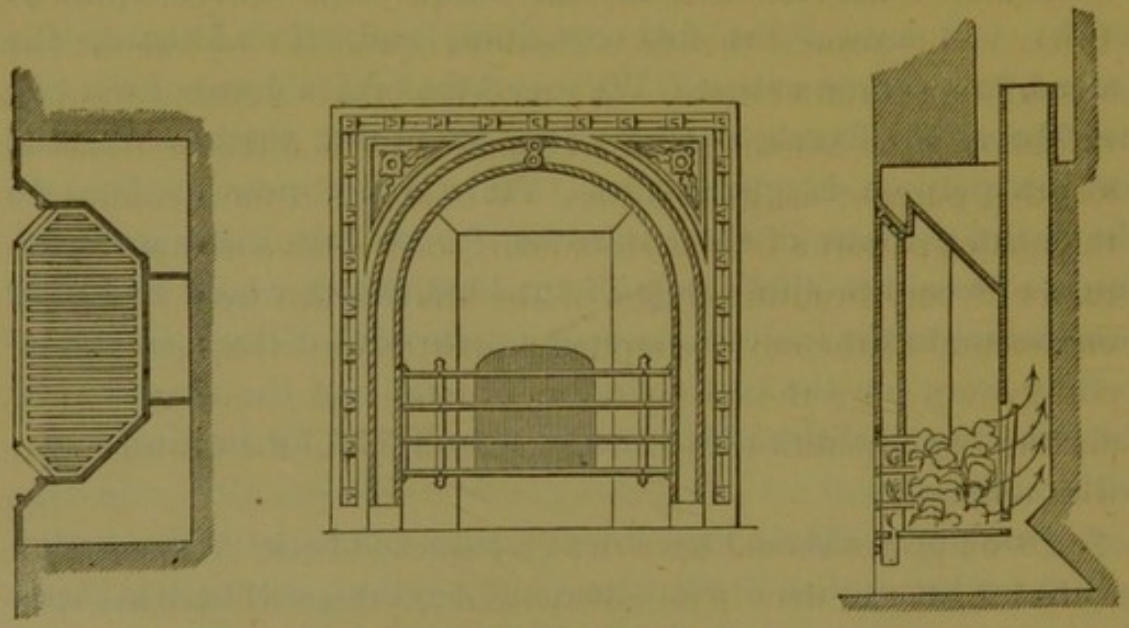
6. There are few things about fireplaces so unphilosophical as those with black sides and back, and these usually of iron. Iron grates are always at hand, but iron is a bad material for grates, being, it is true, a good conductor, but, unless highly polished, a bad reflector, therefore by no means economical, 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. 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 useful for heating rooms with economy.

7. Iron grates should have fire-clay sides and back. Combustion is then far better than in iron alone, and anything will burn in them. A chamber may be made in the back, and air from the exterior introduced by a pipe, as shown in the lithographed plate 1, and with another pipe opening into the room; the air heated in the chamber will flow in a warm stream into the apartment. A valve in the chimney-breast, as shown further on, will give exit to the vitiated air. By this means a wholesome system of warmth and ventilation is provided without any trouble. This may be carried out at a

small expense, with almost any grate, and render a sitting-room healthful and comfortable.

8. In a very large house in Ireland I, many years ago, fitted up the grates with fire-clay hollow backs of this shape, into which the air from the outside of the house was conducted by a pipe through the chimney-jamb, dried and warmed in the hollow back, from whence it flowed out through the jamb on the other side by an ornamental grating into the room, to the great comfort of the inmates; who thus, in a damp climate, are enabled to enjoy fresh, dry, and warm air. I have one of these fire-clay backs at my house, which any person may see and have copied, if they please. Various modifications of the idea have been *patented* within the last twenty years by several persons. It is one of the best methods of obtaining a healthy room, superseding most other very ingenious contrivances for ventilation.

9. Mr. LESLIE makes his fires upon the hearth, without any grate at all. In this manner:—Place one of the largest fire-clay slabs upon the hearth, build up the sides of the chimney-opening



QUARM'S SMOKELESS GRATE.

with fire-bricks, or stone, in the usual form of a grate, and face with marble, if you like, towards the room. Next, where would be the back of a grate, place a fire-clay slab, two inches above the one on the hearth, and close up the chimney-opening above that, sloping outside instead of in; build up behind so as to leave a

flue nine inches by four inches, and in this, just beneath the mantel, put an iron regulator worked from the outside. Make your fire upon the hearth, and the smoke will be drawn down through the two-inch aperture, on the same principle as that of QUARM, shown here. You may thus have an economical fire, radiating a great deal of heat, *and without smoke.* It may be seen in operation in PRINCE ALBERT'S model houses.

10. To those who prefer an upward draught, and who see the superiority of fire-clay slabs over iron grates.—Place one slab to form the bottom, and three others for the sides and back, or two only, set upright at an angle of 45 degrees. Put a bottom six inches above the hearth, and put iron bars in front, fastened into holes drilled into the bottom and side slabs ; you may then have a capital fire, giving out more heat than one in an iron grate, with less smoke and more perfect combustion of the fuel.

11. The money that is wasted in delusive patents is something wonderful. The patentees of grates are many hundreds in number ; but, unfortunately for them, their productions are very little known. There is the slow combustion grate, in which a fire will burn for twelve hours without attention, no dirty ashes to be seen, and after it is first laid no additional coals are required.

12. LEWIS'S "warm air ventilating fireplace" is a self-contained grate, complete in itself, with the exception of a pipe for the supply of external air.

13. CAPTAIN GALTON'S stove has the great desideratum of both warming and ventilating ; but it appears to be for chimneys in external walls, where, as we have said, chimneys should not be. The passengers by the steamboats marvel at the ludicrous instance of those chimneys in the sides of the Temple library, which wouldn't act, and therefore metal tubes are carried to the ridge, where the chimneys ought to have been ! Warned by this want of knowledge of the first principle of architecture—fitness, or use—it is probable that the external chimneys which shone in full blossom in the design for the new Law Courts will not appear in the erection of that building.

14. Those ladies or gentlemen who do not like to have their fireplaces disturbed, and can afford the expense of a hot-water boiler and pipes, may obtain a constant supply of fresh warm air into the house, independent of doors and windows, by having a coil

of pipes heated to about 120 degrees Fahr., in an ornamental perforated case, placed in the hall, the external air being admitted beneath the case, by a four-inch stoneware or iron pipe, running to the outer wall of the house. A current of fresh warm air will then be established, and diffuse itself throughout the mansion.

15. So also, if it is thought inconvenient to displace existing grates for the substitution of new ones, it will be then advisable to get some fire-clay in a plastic state, and carefully line the back and sides of the old grates three or four inches thick. Every one must have noticed that, when a fire goes out, the coals at the sides of the fire are left unburnt, while the centre is consumed. *This arises from the cooling powers of the iron,* and hence the complaint that "you must have a large fire or none at all." With fire-bricks the whole of the fire is kept alight, and even after a fire is extinguished, the fire-brick lining will continue to diffuse a warmth for some time. A no less important advantage is, that less smoke is produced.

16. But if this should be too much trouble, then get LOOKER'S stone tiles for economizing coal in open fireplaces, and put one in each of your grates. You will then have a bright fire, and more perfect combustion, with half the quantity of coals, and less than half the quantity of smoke. These are sold at from 1*s.* 6*d.* to 5*s.*, according to size.

17. It is evident that by the use of some of these appliances, arrangements, mixtures of fuel, etc., more than one-half of the smoke enveloping London will no longer be evolved—most necessary precautions, on account of the thousands of chimneys which are being added yearly to the metropolis, thereby increasing our dark days in density and in number.

18. An immense enlargement of an old trade is about to be developed. It appears that chalk is an admirable adjunct to coal, in radiating heat at a cost not one-quarter that of Wallsend—practically reducing the price of the latter from 40*s.* to 14*s.*, with less than one-half the smoke. Put in the grate the usual paper and wood, on these a layer of coals, then a layer of chalk, another of coals, and of chalk, finishing with cinders.

19. Very large halls and staircases of stone, or of marble, are very difficult to warm by open fires; while hot-water pipes are expensive. Some of the iron stoves, *if over-heated,* vitiate the air

and render it unwholesome. Notably in the case of the long room of the Custom House, where all the clerks became ill, and the stoves had to be removed. The plan I have found successful has been to adopt the old Roman idea of heating the floor: this I did by constructing a furnace something like that of a hot-house, and making the flue traverse the floor to any required length. In one instance I made use of the heat from the *sides* of the flue, by having a four-inch space on each side, into which air was admitted from the exterior, and poured in warm streams into the house, through ornamental gratings; over which it was amusing to see the ladies stand, when coming from a ride, or a walk, on a cold day.

20. This plan has been *patented,* with slight modifications, by several persons, after having been in operation for many years. Yet surveyors, and people having the charge of churches and other public buildings, resort, from ignorance, to all sorts of novel and expensive contrivances,—such as iron stoves, which burn the air, give the congregations headache, and often set fire to the place,—rather than take the trouble to provide the ancient and more efficient method, at one-quarter the cost.

21. It is quite possible to get rid of smoke and accumulation of soot, visits from sweeps, cold feet, and heated heads. The cause of smoke ascending the chimney is that the air in the flue is rarefied, otherwise the smoke would as readily go out of the doors or windows; therefore the absence of the necessary amount of rarefaction is the primary cause of smoky chimneys. Our fire-places are supplied with air from doors or windows, chinks and crevices, annoying our backs with draughts in proportion to the warmth we are receiving in front. The air also, rushing up the chimney above the fire, reduces the temperature of the flue, and prevents its use as a ventilating shaft, and even as a smoke flue; for it is soon overpowered by some other fire, and the room becomes filled with smoke.

22. These are some of the defects of the ordinary grates, and we have shown some of the ingenious inventions to remedy these defects; but of all these methods those of Mr. JOHN TAYLOR bear off the palm.

23. These grates consume the smoke with great economy of coals, and effect thorough ventilation by themselves, without other appliances.

24. The EARL OF BEVERLEY had very delicate lungs, and was ordered by his physician to live abroad. But hearing of these grates, he had one fixed in his private room, which made him so comfortable that he would live in no other, and the necessity for his going abroad was obviated.

25. Figure 1 represents the front of the grate.

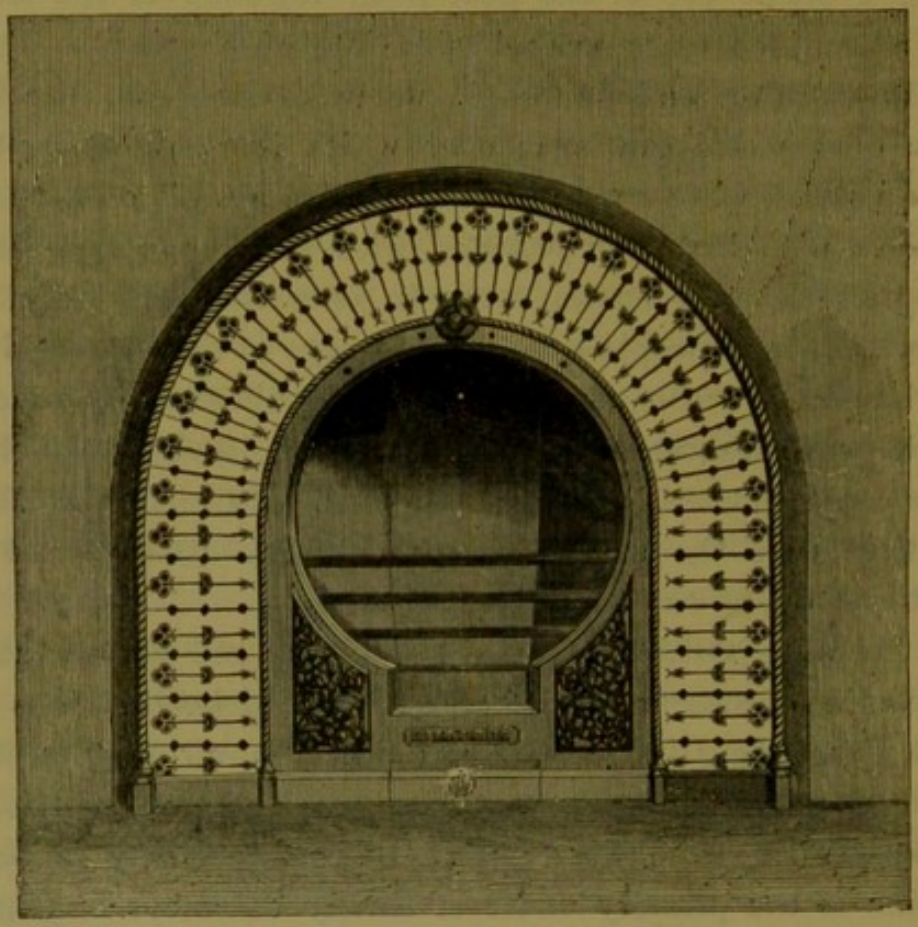


FIGURE 1.

26. Figure 2 shows the grate in section; the front being removed, the way in which the smoke is brought round to the fire again, and the heated air-chambers are seen.

27. No smoke goes up the chimney; for it is made to pass through the fire, and there deprived of its carbon; this black stuff being arrested, the ammonia and other products of combustion pass off *invisibly*. The air does not rush to the chimney in hurtful draughts, lowering its temperature, but the flue becomes a powerful ventilating shaft, which extracts the vitiated air from the *upper part* of the room, rendering any kind of valve there unnecessary.

28. One man had one of these grates in use for twelve years, and then, thinking it time to have the chimney swept, sent for the sweep—but there was no soot! Another man's house, from the

impossibility of obtaining sunlight and thorough ventilation, was unhealthy, but is rendered wholesome by the use of these grates!

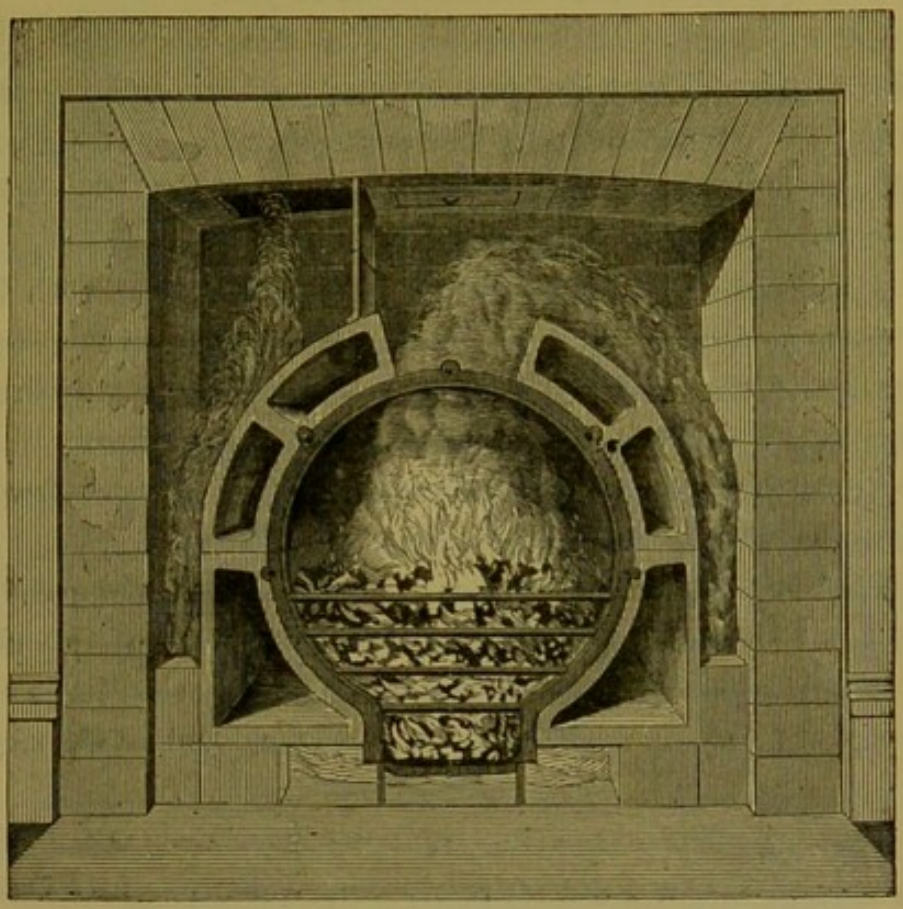


FIGURE 2.

29. Talk of C. B.'s, JOHN TAYLOR has promulgated more good for the well-being of the Metropolis than all the C. B.'s put together. Think what a boon—if you will accept it—to have your apartments comfortably and sanitarily warmed and ventilated with a smokeless fire, clearly burning with less fuel than is ordinarily used! Think of the immense advantage of a metropolis free from smoke! Ye who seldom see the blessed sun during ten months in the year, accept this great gift, and exert all your energies to get rid of smoke. The thoughtful inventor of this last method we have described remains wholly unrewarded, except in the consciousness of the good he has endeavoured to effect.

30. But all the foregoing are eclipsed by the most wonderful of all fires—that which is made without wood or coals; which is lighted instantaneously, and in a short time presents a red-hot mass of brilliant material, which lasts for ten years without being renewed! "Good gracious!—What, only to lay a fire once in ten years!

Well, I never," says my bonny Betty Broom, "and I have to lay all mine every morning, and sometimes the dirt and bother twice a day. Oh, Sir! we'll build a monument to you."

31. Let me explain this wonder. The grate costs from £2 to £5. It is filled with a mixture of pipe-clay and asbestos, in lumps a little larger than a walnut, which costs eight shillings. A jet of gas is turned on this mass, and lighted; a splendid fire is the result, burning at the cost of one halfpenny an hour!

32. This stove may stand in a recess, embellished with little or much ornamentation. A pipe may be led to it from the outside of the house, which will keep the room constantly replenished with fresh warm air, unalloyed by smoke or dirt of any kind.

33. An important part of a house is the kitchen. A few words, therefore, on kitchen ranges may be acceptable.

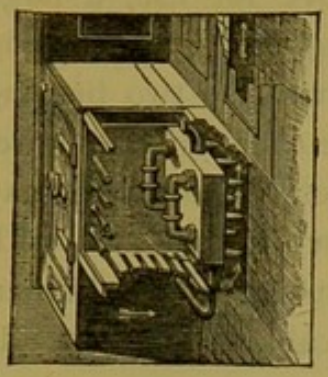
34. The Belgian cooking-stove costs seven guineas, but it requires a very small quantity of fuel, and that of the cheapest sort. Slack, which may sometimes be had for ten shillings a ton, is better for this stove than coals of a larger and more expensive kind.

35. The kitcheners are in great variety, and most of these enable a cook to get a dinner ready very quickly. But kitcheners are a veritable furnace, and consume a great quantity of coals; yet the room itself is not so hot as a kitchen with an open fire, and the cooking utensils are easily kept bright and clean.

36. At BENHAM & SON'S extensive show-rooms, may be seen ranges of all kinds—from the small kitchen grate by which it is necessary to warm as well as to cook, to the grand apparatus for sending up a luxurious banquet, without raising the temperature of the kitchen higher than is agreeable.

37. The American stove stands out from the chimney-opening; and thus, instead of nine-tenths of the heat going up the chimney, nine-tenths of the heat is radiated into the room—an important saving of fuel to families with narrow means. Also, a pipe may be led from this stove to what is called in Canada a dumb stove, placed in a room above the kitchen; and thus two rooms are warmed by one fire.

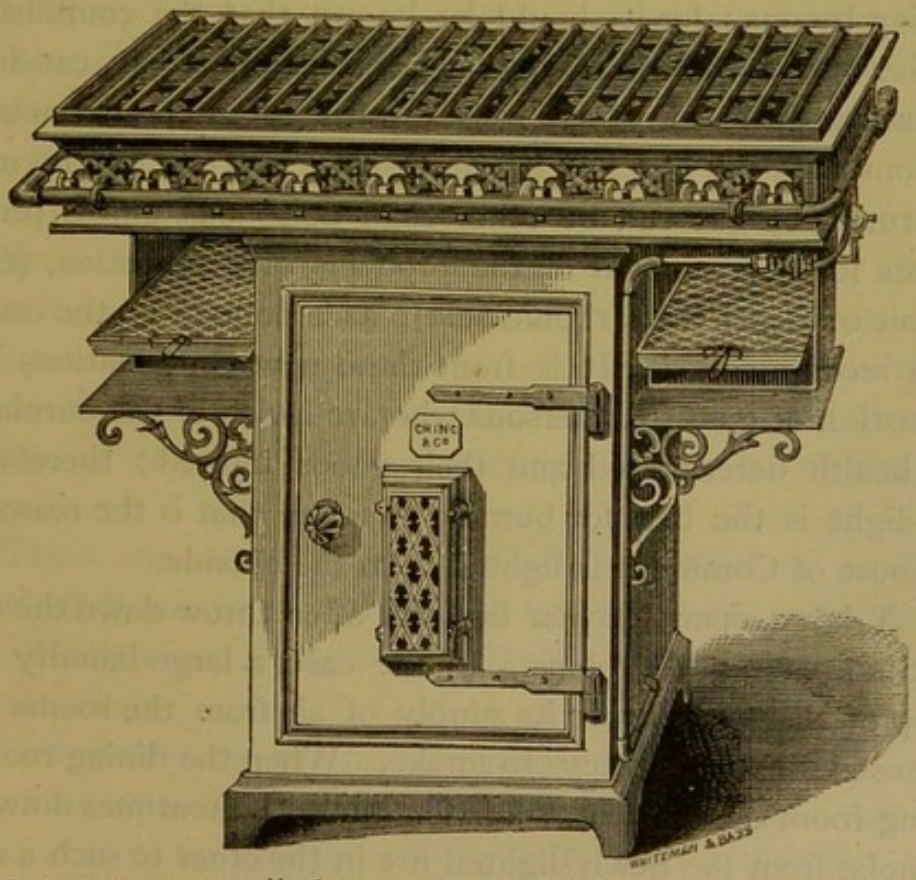
38. COMYN CHING'S kitchen ranges, with patent boiler, and hot-water circulating pipes, heated behind the kitchen fire, will warm the whole of a ground-floor, and thus in some measure



nullify, or rather utilize the wilful extravagance of cooks. The apparatus may be fitted to existing ranges, and a hall, library, and conservatory may be warmed and ventilated without further expense, and no trouble to any one.

39. GAS STOVES.—For some years past, gas, as a means of heating and cooking, independent altogether of its lighting power, has occupied the attention of some of our leading men, and improvements are constantly brought forward in the methods of its employment for this end. A small gas-burner—say, a No. 3 fishtail, covered with a perforated copper bulb, somewhat less than an inch in diameter, for the admixture of a certain portion of atmospheric air with the gas previous to combustion, and burning about three feet of gas per hour—will boil a pint of water in six minutes; therefore, with gas at 3*s.* 6*d.* per thousand, some trifle over one-tenth of a penny is the cost of the process.

40. Gas stoves in a kitchen are far better than the deleterious charcoal stove. COMYN CHING AND CO.'S new gas cooking and



stewing range seems all that can be desired in any stove. It has

a large oven for roasting, a large boiler-stove for fish, a large stewing-stove for stock-pot, and six other frying, boiling, or stewing stoves, for fish, vegetables, gravies, etc. It has also two broiling stoves, for fish, rumpsteaks, chops, etc. The oven, when not required for roasting, is a very powerful hot closet. The whole may be in use at one and the same time, each stove being fitted with a distinct regulating tap; or it can be minimized to one burner, for simply boiling an egg—a most economical arrangement. It may be used as a fixture or portable.

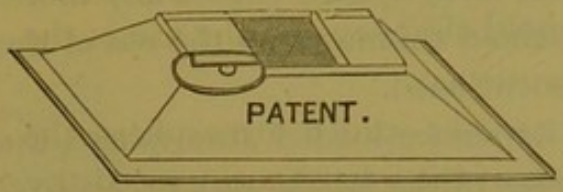
41. After mentioning the varieties of grates, and their appliances for making a "*house what it should be*," I would add that an inveterate smoky chimney may be cured by placing a screen of wire-gauze, forty wires to the inch, in front of and fitted to the fireplace. No smoke will then pass through into the room, nor will there be any diminution of the radiating heat—this being the principle of the Davey lamps, with which the coal-miner works in comparative safety.

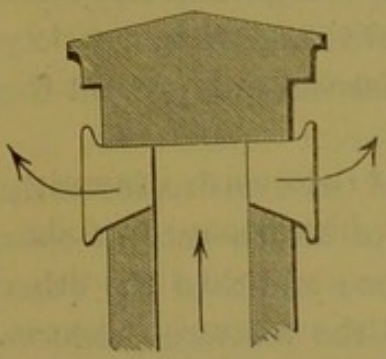
42. The heated surfaces over which air passes in order to be warmed should never be higher than 200 Fahr., or the air will be scorched, and thus deteriorated. Still more care is required in warming by gas; for it should be known that the combustion of gas *does not annihilate it*, but rather decomposes it, causing the elementary gases of which it is formed to enter into new combinations with the gases of the atmosphere. Therefore no method of warming by gas can be other than poisonous, unless provision is made for the removal of the products of combustion, (*i.e.*, the carbonic oxide, or the carbonic acid); as is done in all the instances herein recommended. It is from these new combinations in the combustion of gas, that persons who are lavish in gas-burning find their health deteriorated and their goods injured; therefore the globe-light is the best for burning gas, and that is the reason why the House of Commons is lighted from the outside.

43. A large open kitchen fire will often throw down the smoke from the fires in other rooms. In one case, a large laundry fire at the top of the house drew its supply of air from the rooms below, and caused all the chimneys to smoke. When the dining-room and drawing-room are adjacent, the fire in one will oftentimes draw down the smoke from the newly-lighted fire in the other to such a degree that the visitors are obliged to vacate the apartment. Fire must

have a supply of air from somewhere. Hence the great folly of people endeavouring to make doors and windows air-tight; for then the supply of air is drawn more and more from water-closets, sinks, and drains.

44. Without sufficient air, chimneys without smoke-consuming grates must smoke. Some patentees have doctored the throat, and some the top of the chimney. Mr. MOON has done both successfully. His contractor—which indeed may be imitated in brickwork—causes a rapid draught, and prevents the deposition of soot. By this chimney-top the unsightly 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.





45. By the use of these we 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.

46. Then there are those of the late Mr. BILLINGS, which divert the effluent smoke diagonally upwards, while a short brattice prevents the return smoke from entering the adjoining flues.

47. These may be mentioned as among the 450 patentees of inventions for the prevention of smoke, all of which are rendered unnecessary, except for kitchen chimneys, by the use of Mr. TAYLOR'S grate.

48. There are also patentees of various ways of producing smokeless fuel, who, I trust, will be successful, and in some measure lighten the fearful pall under which the Metropolis is so often shrouded.

49. With smokeless grates and smokeless fuel, the chimney flue may be very small: a four-inch pipe will be sufficient. I saw a flue in CORMACK'S chapel, on the rock of Cashel, only four inches square. Consequently our big chimney-tops and tall-boys will all disappear.

50. 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 1,000, for manufactories, breweries, etc., most of which *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. This will also cease from our household chimneys by the use of the smoke-consuming grates already mentioned.

51. In London, on account of its smoke-loaded atmosphere, the cost of washing the linen and dresses of the inhabitants exceeds by £200,000 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 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!

52. When any part of a house is discovered to be on fire, instantly send to the nearest chemist for one pound of bicarbonate of soda and one pound of tartaric acid; put first one and then the other into five gallons of water in a *close* cask: the mixture produces carbonic-acid gas, which extinguishes life as well as fire. Throw the mixture through a spout upon the flames, and the fire will be immediately mastered. This is the principle of "L' Extincteur."

THE ANTIDOTE—AIR.

"Aer vitæ spiritus."

NOW beautifully and how abundantly this "king of the elements" is prepared for us by the vegetable world, mixed up with an innumerable host of vivifying spirits which the blood lives upon, and drinks for its refreshment! It is for these aromas we seek when we go for "change of air;" for it is the different smells, odours, or aromas that constitute good or bad air.

2. Air consists invariably of oxygen and nitrogen in the same proportions, whether found on the breezy heath or in the fetid cellar; but it is the noisome odours in the latter which poison the blood, and it is the aroma of herbs innumerable—an infinite host of delicate aromas which cannot be named—which impart life and vigour to the frame; oxygen and nitrogen being merely the vehicles by which health-destroying or health-giving particles are conveyed. Luckily for us that we have got noses, by which we discover that there is something more in the atmosphere besides oxygen and nitrogen! How delicious the smell of a bean-field in spring, and of a turnip-field in autumn! How bracing the salt-smelling air of the sea, or the heather-scented gales of the hills and downs, laden with something that life can appreciate, that the nose can detect, but which defies the analysis of chemistry! In short, we live upon aromas; and the more pure and delicate these aromas are, the purer our blood and the richer our life; while the foul gases engendered by close animal existence infuse their poison into the blood and destroy its vitality. Hence the various diseases which civilization has introduced by its crowded dwellings, its bad ventilation, and its offensive odours. This mischief it has now to undo, and to remove the diseases which itself has engendered, and which, *being in the air*, are best removed, not by giving the medicine to the man-sufferers, but to the atmosphere; and I trust

the great importance of all this will excuse my apparent iteration. For the atmosphere is the receptacle for all noxious gases and impurities arising from exhalation and evaporation, which it is of the utmost importance to counteract.

3. The necessity for ventilation is now well known; yet how few understand how, or are able to provide proper ventilation, although just as requisite as providing a chimney for the smoke! The perfection of our joinery is such that our doors and windows are so close fitting as to exclude air, and our halls are defended by double and even treble doors. But no house can be healthy unless provision is made for the supply of fresh air, and the withdrawal of that which is vitiated; and *contra*, that no foul air can be extracted from the interior of any building, however well arranged the means for its exit may be, unless an ample supply of pure air is admitted. Most people are now aware that non-ventilation is a fatal cause of disease; it is known to be productive of rheumatism, colds, indigestion, nervous complaints, diseases of the joints, of the skin, of the delicate organs of the eye and ear, of scrofula; and, in short, a predisposing cause of *every* bodily affliction to which mankind are subject.

4. 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 independent 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!

5. We have before shown that about 1,200 cubic feet of fresh air are required for each adult per hour, if the air of the room is to remain in a state of approximate purity. Now, 1,200 cubic feet of air cannot, under ordinary conditions of temperature and pressure, get through the interstices of doors and windows; for that volume of air would require an opening at least six inches

by four inches to enter slowly enough not to be felt as a draught. But this dimension would not be sufficient if gas is burnt—for each burner consumes as much oxygen as a man—one cubic foot of gas destroys the oxygen of eight cubic feet of air; and there is also that required by the fire; so that it is obvious how ridiculously small are the inlets for fresh air in any modern house. (See Dr. PARKES on Hygiene.)

6. Thus we see how the air in sitting-rooms, without proper ventilation, must become very impure in the course of an evening; so much so that when at, say six o'clock, there was in the air oxygen to the amount of 20.96 and carbonic-acid 0.04—the usual quality of pure air; at ten o'clock there will be only 20.46 of oxygen and 0.69 per cent. of carbonic-acid,—an air certainly not to be inhaled long with impunity, and in which, with a very little increase of the one and diminution of the other, candles would not burn! This is the effect of close rooms, producing blood-poisoning, premature old age, and DEATH IN THE HOUSE.

7. The natural ventilation of persons is produced by the warmth of their bodies, their breath, and the wind. The 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.

8. For apartments BOYLE'S ventilators are effective.

Fig. 1.

11 in. by 7 in.

Fig. 1 is a front view of a self-acting outlet ventilator, for ventilating through chimney breasts into smoke flues, or other shafts, or direct into the open air. It discharges the heated vitiated air from rooms, and effectually prevents back draughts.

Fig. 2.

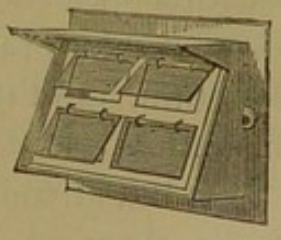


Fig. 2 is a back view of the interior part of fig. 1, showing the valves partly open. The valves are composed of mica, which is light, rigid, and incorrodible. These valves are so sensitive that they act with the lightest appreciable motion of air.

11 in. by 7 in., 6*s.* 6*d.*; 10 in. by 9 in., 9*s.* 6*d.*

9. These necessitate an additional quantity of fresh air; but apply a pipe to bring air from outside the house to beneath the fire-grate, or to an air-chamber behind the fire, with an opening into the room, as already shown in several inventions, and in the lithographed plate 1, for the admission of warm air, and you will have it fresh at *plenum*, with the additional advantage, that no smoke or smells from drains can enter a room so supplied.

10. When the introduction of pipes, and fixing new backs to grates, is thought too troublesome or expensive, rooms may be ventilated by inserting one of BOYLE'S 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 a brick at the bottom of the room beneath each window, and insert therein an inlet ventilator or draughtless air-brick. It consists of a metal box of the dimensions shown, having a hinged door or cover, which cover is composed of wire gauze. It is intended to be used in conjunction with an ordinary iron air-brick inserted in the outer surface of a wall or partition. You have thus 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.

7 in. diameter.

Bronzed Iron, 6*s.* 6*d.*

11. But if it is thought best to admit the air at the top of the room, then cut out a portion of the cornice, or just below the cornice, exactly opposite the fireplace, and insert therein one of SHERINGHAM'S ventilators. The current of fresh air will travel in

a thin film along the ceiling to the opposite side of the room, where it will meet the ascending current of warm air, and mingle together, so that no draught is felt below.

12. 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. One gentleman admits the air beneath the carpet of the room, the other through apertures in the skirting. This is summer ventilation.

13. In the sitting-rooms occupied by a family, or evening visitors—in clerks' offices, and in all public rooms, one of BOYLE'S ventilators, 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.

14. In the drawing-rooms or other reception-rooms full of company, a globe-light in the ceiling, with a tube arranged as at Marlborough House, will, when lighted, materially improve the air of the apartments. (See illustration.)

15. A retired builder suggests as follows:—

"In the centre of each stack of chimneys should be a foul-air flue, carried up above the chimney-pots, and having an inlet of air from without at the bottom. Into this flue should be a pipe from every room, provided with an ARNOTT'S valve, or a pipe from a gas-burner in the ceiling. All the vitiated air from the rooms will be drawn into this flue."

16. A drying-closet to each set of rooms was a feature par-

ticularly insisted on by the lady afore-mentioned. To accomplish this I resorted to the plan I have before described for a single room; but here advantage was taken of the fireplaces being back to back, and so ventilating two rooms; this being one mode of introducing warm air into a house economically. A four or six-inch stoneware pipe is led from the outside of the house to a chamber behind the fire-grate. A second pipe conducts the heated air from the chamber to the drying-closet, through which it passes and finds its exit by the 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 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.

17. I have extolled at page 6 the use of perfumes at balls and drums, and I would urge their use still more in domestic life; for perfumes exercise a healthful influence on the atmosphere, converting its oxygen into ozone, and thus increasing its oxidizing influence. The essences that develope the largest quantity of ozone are those of Cherry, Laurel, Cloves, Lavender, Mint, Juniper, Lemons, Fennel, and Bergamot; those that give it in less quantity are Anise, Nutmeg, Cajeput, and Thyme. The flowers of the Narcissus, Hyacinth, Mignonette, Heliotrope, and Lily of the Valley develope ozone in closed vessels. Flowers destitute of perfume do not develope it, and those which have but slight perfume develope it only in small quantities.

18. From these facts we see the wisdom of filling our sitting-rooms with sweet flowering plants, which not only delight the eye, but give life to the lungs. In houses situated in marshy districts, or in places infested with animal emanations, the inhabitants should use plenty of perfumes, and surround their houses with beds of the most odorous flowers.

19. Few of our towns population have the opportunity of "considering the lily how it grows;" yet in the delicate appreciation of these most beautiful gifts of nature there lies concealed one of the most humanizing influences of which we are susceptible.

20. How the universal heart of man blesses flowers! They are wreathed round the cradle, the marriage altar, and the tomb. The Persian in the Far East delights in their perfume, and writes his

love in nosegays, while the Indian child of the Far West claps his hands with glee as he gathers the abundant blossoms,—the illuminated scriptures of the prairies. The Cupid of the ancient Hindoos tipped his arrows with flowers; and orange flowers are a bridal crown with us—a nation of yesterday. Flowers garlanded the Grecian altar, and hung in votive wreath before the Christian shrine. All these are appropriate uses. Flowers should deck the brow of the youthful bride, for they are in themselves a lovely type of marriage. They should twine round the tomb, for their perpetually-renewed beauty is a symbol of the resurrection.

21. Were our dwellings made fire-proof, and with flat roofs—and there is no valid reason they should not be so—every house would have its own laboratory for the production of oxygen from the plants in the greenhouse on the roof. Glass is now so cheap,—thanks to my representations on the impolicy of the tax on it, to Lord Monteagle, while staying with him at Mount Trenchard, when he was Chancellor of the Exchequer.

22. These house-top gardens would be the Oriental idea, and may be Anglicized by covering them with glass, so as to become a greenhouse or hothouse, according to the degree of heat applied; and thus every one might grow his own apples, pears, peaches, grapes, etc., on the productive little fruit-trees in pots or tubs, which are now shown to be more fertile than larger trees, and would produce a very handsome per-centage upon the outlay. What more delightful occupation could the ladies of the family enjoy than the cultivation of a succession of flowers in "a dainty paradise?" For

> Who that has reason and his smell,
> Would not among roses and jasmine dwell,
> Rather than all his spirits choke
> With exhalations of dirt and smoke?

23. In addition to perfumes, sedentary persons will find benefit from the inhalation of iodine—reminding them of sea-breezes, or of æther—both from stoppered bottles, three or four inhalations at a time (not more) by one nostril, stopping the other. Nostrils reminds us to say that no one can be healthy who sleeps in the vulgar manner, with his mouth open. "Man's breath is in his nostrils."

24. Having mentioned ozone, and other component parts of air in the beginning of this article, and in several other parts of the work, we conclude this division by saying that ozone is an instrument employed by Providence for the production of the grandest phenomena of nature. It is the agent which presides over the laws of atmospheric electricity, and the means of restoring to the atmosphere the oxygen destroyed by the respiration of animals. Ozone is oxygen electrified; hence the purification of the air we all enjoy after thunder and lightning. It destroys sulphuretted hydrogen, and all oxydable miasms, and is therefore the most powerful disinfecting agent yet discovered, being rapidly absorbed by vegetable and animal substances, and by the blood. Air, in its normal state, contains one-ten-thousandth part of ozone; when the proportion is greater, the air is healthier; but it it rises to one in two thousand, it is powerful enough to kill small animals.

25. What a mighty, unsuspected means of LIFE or DEATH does the Ruler of the universe thus hold in His hands! An excessive and preponderating electricity would convert the oxygen into ozone, and all the inhabitants of the earth would be suffocated; while a slight alteration in the admixture of gases would wrap the whole world in flames.

1. THE BEDROOM.—In ventilating apartments, the greatest attention should be paid to that of the bedrooms. 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 64, beneath one of the windows at the bottom of the room, for the admission of fresh air; and one of BOYLE'S

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.

2. In the United States, where the variations of temperature are so very great that windows cannot at all times be kept open, it is usual to have a small window above each bedroom door, for the purpose of admitting air somewhat modified by passing through the corridors.

3. In London the air is much purer at night than it is in the day, therefore it is healthful to sleep with one of the sashes open. I have done so with advantage for many years. The practice must be begun in the summer, and then may be continued all the year safely. Or a small aperture may be made above the door, and closed with a curtain. "When windows were without glass, we had men of iron, now we have only men of straw."

4. Although we know that in Italy there were glass windows in the second century, yet the sovereigns and nobles of England had not any until the twelfth. The Confessor had none in his dining-room, nor had the Abbot of Battel in the dining-room of his town house; in both of which rooms I have been. An ample wood fire in the centre of the hall diffused warmth all around, and the smoke escaping through a *louvre* in the roof effected perfect ventilation; while the inmates, clothed in the coarse woollen robes of the period, bade defiance to the cold of winter. This mode of heating and ventilating was in use until very recently in the boys' dining-hall of Westminster Abbey. It was not until long after the twelfth century that the people generally had glass in their windows; indeed, at the present day there are shops in the metropolis which have not and never had glazed windows.

5. We do not, after a due consideration of the Greek, Roman, and Arabic medical records, find that phthisis occupied that place in their attention, which, had it been equally frequent in their time as in ours, it must needs have done. The ordinary habits of the ancient Greeks, Romans, and Arabs alike was not only to spend a great deal of their lives in the open day, but also to pass the night in chambers communicating by an open door with an open room. Modern usages are very different. The shut-up bedroom, with

closed doors and windows, its curtains, carpets, blinds, and hangings —in short, its every apparent expedient for promoting the stagnation and impurity of the atmosphere, is now the rule, as in former times it was the exception. If we admit, as we must needs admit, that air was given to be respired, and the lungs to respire it withal, how shall we explain our management of the atmosphere, which we treat as if air, pure and unalloyed, were not, day and night, ever and always, the most absolute and unconditional of all requirements—impossible, short of disease and death, to be done without? The habits and usages of daily life—the palliation sought in, if not yielded by, our climate—the requirements, real or artificial, of trade, commerce, industry, combined with the most incredible ignorance and indifference as to organic necessities of the masses—all unite to create and aggravate the disastrous results flowing from the respiration of an atmosphere loaded with human excretions, and almost unfit for human requirements. At night, especially, the free supply of pure air to our bedrooms is of the utmost importance. Each sleeper draws into the chest, about fifteen times in every minute, a certain quantity of the surrounding atmosphere, and returns it, after a change within the body, mixed with a poison. One hundred and fifty grains by weight of this poisonous ingredient are added to the air of a bedroom in one hour by a single sleeper; more than one thousand during the night. Unless there be a sufficient quantity of air to dilute this, or unless ventilation provide for a gradual removal of foul air, while fresh comes to take its place, health must be seriously undermined.

6. The unfortunate schoolmaster at Eastbourne, fully impressed with the importance of having his pupils' bedrooms airy, had a square hole cut in the ceilings of the top rooms, and covered with a perforated zinc plate, through which the effete air passed, and rendered these rooms perfectly wholesome.

7. "And," says Miss NIGHTINGALE, "get your patient to bed, and then you may safely ventilate him by opening all the windows, and giving him all the fresh air you can by any possibility command."

8. To have a HOUSE WHAT IT SHOULD BE, I would most earnestly enforce on mothers the necessity of having the children's bedrooms large, lofty, and airy. *Scrofula is produced almost entirely by children sleeping in close rooms.* Nor should there be ever

any curtains, except those of gauze or muslin, to a child's bed. If the air in a thickly-draped four-poster, in which two persons have been sleeping, becomes so vitiated in the night that a bird suspended in its cage within the enclosure is killed by the foul air therein generated, it cannot be healthy to allow the same to act upon the delicate organism of a child.

9. After this—and surely *germane* to our subject—comes diet; for the precious little darlings must be fed; suckling mothers and nurses, if they would build up the framework of a fine strapping boy, must eat, as *pabulum* for the supply of phosphates or bony matter, oatmeal, haricot, pea-soup, and such like. The chief food of the *bony* Scot is oat-cake and oatmeal porridge.

10. Those unfortunate persons who have no children must eat plentifully of vegetables which contain ALLYLE; these are watercress, onions, horse-radish, garlic, leeks, shallot, chive, and mustard. All these contain allyle in very small quantity; for in a whole hundredweight of onions only two ounces of allyle can be found. During the last forty years that the great type of all God's people dwelt in Egypt they probably trebled in number. When in the wilderness, how they longed for the "cucumbers, the melons, the leeks, onions, and garlic of Egypt!" But it was denied them, and during their forty years' sojourn, there was no increase of number, for there were three millions and a half—about the present population of London—in the exodus from Egypt, and the mystic *three and a half millions* entered the Holy Land.

11. A certain portion of allyle is essential to our health; we cannot thrive without it; those families which reject the use of the plants containing it, degenerate, and become extinct; and, but for some portion of their population delighting in things flavoured with this subtle essence, whole kingdoms would be extinguished.

12. Next to the regular admission of air, the furniture of a bedroom deserves some little attention. The free circulation of air should never be impeded by large sofas, easy chairs, or heavy draperies composed of absorbent materials, with which bedrooms are so often encumbered.

13. Let us rather take the chamber of the illustrious DUKE of WELLINGTON as almost a model bedroom, 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, so as to be in the line of the electric or magnetic current, and also in accordance with the oral law handed down by a succession of High Priests from AARON, which enjoined that all beds should be placed north and south, and not east and west. The feet of the bed should be 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 wash-hand-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 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 bedroom.

14. It is often a question amongst people who are unacquainted with the anatomy and physiology of man, whether lying with the head exalted, or even with the body, is the most wholesome. Most, consulting their own ease on this point, argue in favour of that which they prefer. Now, although many delight in bolstering up their heads, and sleep soundly without injury, yet it is a dangerous habit. The vessels through which the blood passes from the heart to the head are always lessened in their cavities when the head is resting in bed higher than the body. Therefore, in all diseases attended with fever, the head should be pretty nearly on a level with the body ; and people ought to accustom themselves to sleep thus, to avoid danger.

15. Then as to plants in a bedroom.—Mr. D. BEATON, in the *Cottage Gardener*, remarks, that "although it is quite true that plants do vitiate the air of a room to comparatively a fractional degree, it is equally well ascertained that they consume and destroy a very great deal of foul air ; and that without foul air, such as would kill a man, plants could not be kept alive at all. We gardeners know this fact from our every-day experience ; we cannot grow plants so well, or so quickly, in the sweetest air, as in a stinking hotbed. All the animal creation vitiate the common air, every time each one

breathes the breath of life, or life-sustaining air; and were it not that all the vegetable kingdom depend upon this vitiated air for part of their subsistence, and a great part, too, this world would have been at an end as soon as animals covered the face of the earth. Therefore, and without the shadow of a doubt, plants are the best purifiers of all the agents that have yet been known to cleanse the air of a bedroom, or any other room in a house."

16. 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 bedrooms, 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.

17. 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!

THE ANTIDOTE.

THE SUDATORIUM AND GYMNASIUM.

THE SUDATORIUM.—To complete WHAT A HOUSE SHOULD BE, a Sudatorium, or Roman Bath, is an essential part of a dwelling to such persons as can afford the luxury. It may be arranged in an inexpensive way, in the manner of that which was so necessarily used in 1848, by those gentlemen who earnestly and successfully devoted themselves to the object of exposing the horrors and suppressing the practice of the intra-mural interment of dead bodies. It is by the stop put to this revolting custom that the healthiness of the Metropolis is so wonderfully increased. I shall be happy to furnish plans for such baths. If this means of purification were in general use, Physicians would be almost needless. A clean skin is necessary to perfect the growth of body and soul, and those who have not learned this truth have yet to acquire the first law of nature.

2. Where the means will not permit of having a private Sudatorium, recourse should be had to one of the many so-called Turkish Baths, as one of the methods by which health can be maintained, and disease in its many forms eradicated. Cleanliness cannot be attained without a Sudatorium, and without cleanliness health is impossible. Water alone cannot effectually cleanse the system of its impurities. The hot-air bath does ; it opens the pores of the skin, and enables it to throw off the effete matter of the body. The skin is the main organ for getting rid of this matter ; it is perforated by *seven millions* of drains for this purpose. Yet people often close these outlets by flannel, waterproof coats, hats, and overshoes ; sometimes by a respirator to shut off the air from the lungs, and sometimes by a plaster on the chest !

3. But copious perspiration and exposure of the body to the air are the true means of preserving it in health. This was well known by PRIESSNITZ, the founder of hydropathy, FRANKLIN, and the poet SHELLEY, who all spent some hours of the day divested of clothing. It is as necessary for the skin to breathe as the lungs; if you cover it up closely it cannot exhale its carbonic acid, or inhale its oxygen. The ladies' stays, and close-fitting garments, are therefore unwholesome.

4. When LEO X. was raised to the Pontificate, a child was gilded over at Florence, to represent the golden age; the child died in a few hours. Guinea-pigs, rabbits, and other animals have been varnished and gilt, with the same result—death in a few hours; the skin could not breathe.

5. The Scotchman in his kilt, and the fair Lady in her evening dress, exhibit the great advantage of a partial exposure of the skin to the open air; enabling it to imbibe the legitimate stimulant of the body—oxygen, imparting warmth, and an appetite for enjoyable exhilaration, which a man shut up in his clothes cannot obtain, without resorting to the sideboard. Those who are much exposed to the air, even without exercise, often live to a great age. (Mrs. DIX, of Dunwich, whom I knew very well sixty years ago, died in this present year, aged 103.) While the hard-working labourer, sweating at his employment, is a far cleaner man than the sedentary gentleman who uses his sponge bath every morning, but who cannot be clean unless his skin is made to take on healthy action by violent exercise or the use of the Sudatorium.

6. Numerous remains of the Roman hypocaust* are found in various parts of England, showing the general use of the Sudatorium by the Romans during their occupancy of this land. In Rathlin Island, on the north coast of Ireland, I have heard of extraordinary structures of stone, shaped something like a Beehive, the interiors of which are heated by large fires of turf. Into these places, when the fire is partly withdrawn, the girls creep, in order to clear their complexions, and make themselves look beautiful before the annual fair-day.

7. A far superior Sudatorium to these at Rathlin may be made in most houses, for from sixty to a hundred pounds. Ladies would

* I saw a very fine one on the site of the Coal Exchange, in Thames Street.

find this the greatest preserver of health : it would heighten every personal charm ; the complexion especially would become clearer, the eyes brighter, the person fragrant ; and, like NINON DE L'ENCLOS, they would remain unwrinkled the greater part of their life. HOMER indeed does not exaggerate when he describes ACHILLES, on issuing from the Bath, as looking taller, fairer, and nearer the gods.

THE GYMNASIUM.—In every open space of our towns and cities, in our parks and gardens, and on our commons, should be erected gymnasiums (lesser or larger), to which early and late youths may resort, in order to obtain an erect, proud, manly posture, a warm and animated look, and a form of body capable of enjoying as well as enduring life.

CHAPTER IV.

THE FUTURE.

"The stronger constitutions shall
Wear out th' infection of distemper'd days,
And come with glory to outlive this fall,
Clear'd from oppressing humours."

—*Chaucer.*

THE FUTURE. We considered under the article air the beneficent provision of an all-wise Providence, in 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.

2. The leaves of the Nasturtium, above many plants, give out a quantity of oxygen equal to their own bulk. This plant, therefore, and 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, 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 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.

3. 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, as before said! 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.

4. In a time of architectural darkness, some ninety years ago, there were noble 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 their height, and formed a pleasant contrast 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 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? The reason why they allow them is pretty plain. The *sapient* law-makers ordered these surveyors *to be paid by the very men they were appointed to control!* The evil is frightfully increasing, *pari-passu*, with the value of the frontages, and it must increase until the district-surveyors are paid in a way more accordant with human nature.

5. I can only mention these few instances of the filling up of open spaces; there are, no doubt, many others in the Metropolis, but far beyond my ken.

6. On seeing the immense multitude of artisans, in their clean blue blouses, which assembles 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 workmen, in their mud-coloured clothing, hide themselves? Have we no places of recreation for them? 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 a 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?

7. The object of sanitary legislation is to secure to each individual the greatest amount of fresh air, pure water, sunshine, and dryness of soil. It should provide for the people sufficient width of streets, the best paving, the removal of projections, the prohibition against building over *any* open space, and the establishment of large places for the circulation of air for breathing, and for recreation.

There should be no time lost in doing all these things; for procrastination adds daily to the difficulty and expense.

8. The great point is to get the district-surveyors paid by salary, instead of by fees, and to have these men appointed by the Magistrates, as heretofore. We then want the houses set back to their original line, the fore-courts restored, and again planted with trees, so as to form wide, umbrageous avenues. We want on the line of the Embankment all the sheds removed, and the site of those, and all vacant ground, planted with trees; and no houses to be built beyond the present frontages of buildings. For if these low buildings are allowed to remain, pretences will soon be found for raising lofty ones on the site, to the great detriment of the crowded environs. This is an additional reason for the immediate opening out the end of every street to the river.

We want broad *trottoirs*, unobstructed by perambulators—those cruel things for infants—and unimpeded by such news-vendors as the one at Charing Cross corner. We want crossings raised to the level of the curbstone, as is done at Bath. We want new thoroughfares opened out, such as that one, so often projected—the uniting Charing Cross, by a direct street to Tottenham Court Road—through the centre of the National Gallery,* and filling up the pit which BARRY excavated for his fountains, which nobody likes. We should thus obtain a continuous street, seven miles long. This it would pay to do, for the new frontages in such a street would be worth six guineas per foot per annum. We want our great lines of thoroughfare widened, for the width of streets should never be less than the height of the houses. 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

* Each division might form some other public building, running up each side of the new street, for to retain the National Gallery in smoky London is virtually *to continue the deterioration* of some of the finest efforts of human genius. The corrosive action of sulphurous smoke defaces the finer tints of a painting in a year or two, and covers its beauties with a sooty coating. This coating must be removed from time to time, in order to see the picture. The solvents and attrition used to do this ruin the Master's work irretrievably. Thus, in some the aërial perspective is gone: the del Piombo—once one of the finest pictures in the world—has been nearly repainted; and all, unless speedily removed into the country, will be subjects of derision to foreigners in the FUTURE. Therefore to buy glorious paintings for destruction in London is a most wicked waste of money. Richmond Park would be one of the safest places for a National Gallery.

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.

9. 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 this should be followed on his property. 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. This has been unfortunately done by Mr. SMITH'S surveyor on this important line of street.

10. 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 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.

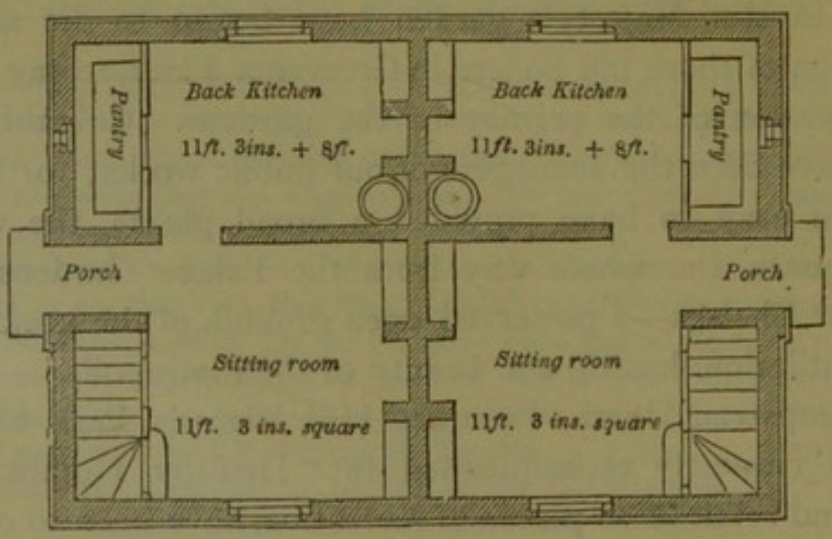
11. Hampstead Heath, Primrose Hill, Victoria Park, and other places as earnestly recommended in "Healthy Homes" to be secured and retained as places of recreation, have been so obtained. There were several other places mentioned at the same time as

necessary for the like purpose, which I do not repeat here, but broadly lay down the principle, that every open space, whether Square, Green, Common, Heath, Park, Wood, or Forest, within twenty miles of ST. PAUL'S should be most religiously saved from the encroachment of bricks and mortar, for reasons already given, and for others further on, *if we would preserve London as a habitable place;* for the difficulties of healthy habitation increase as the number of persons to the acre increases.

12. 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.

13. 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 the 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.

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



15. ACCOMMODATION.—These cottages are built in pairs, in

such a manner as to have the fireplaces 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. (See "Healthy Homes.")

16. The Shooter's Hill cottages, costing £57 10*s.* 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.

17. Cottages on this plan have been built in many other parts of England, and in our Antipodes, from plans supplied by the author for that purpose, at a charge, for plans, elevations, and specification, of five guineas.

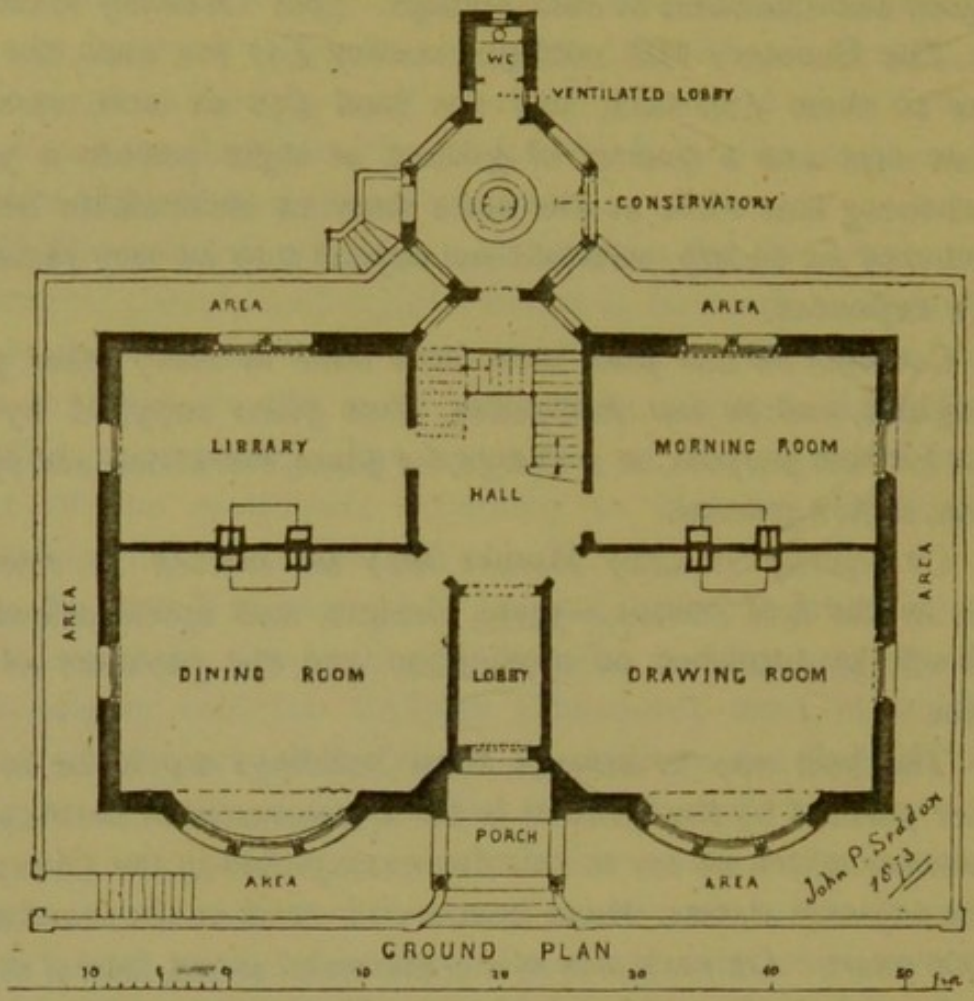
18. Or equally Healthy Homes may be erected in rows, as shown in the first edition,—plans, designs, and specifications for which will be furnished on application and the payment of five guineas.

19. 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 playground would be provided for the poor children, under the eye of the mothers. The backs of the houses would be at least sixty feet apart, and in the centre of this space should be planted a row of trees.

20. The future Peabody buildings will probably be less costly and more suited to the means of the poor. The present buildings are inhabited by the well-to-do classes, for whom astute builders have been providing without assistance. Mr. PEABODY'S bequest was strictly for the London poor, who require such dwellings as are shown in "Healthy Homes," or those of Miss COOPER'S, in Pye Street, or those designed for the late CHARLES PEARSON, which are still to be seen, I suppose, in the City Solicitor's office.

21. This illustration is the plan of a Villa of the FUTURE, which

is shown in perspective as our frontispiece. It is by Mr. SEDDON, of Park Street, who, not only well versed in sanitary matters, is so thoroughly imbued with the spirit of mediæval architecture as to



render his productions in that style much superior to those of the mere copyist of quaint bits of Gothic art. It will be seen that, as has been insisted on in preceding pages, the cabinets are separated from the house by a conservatory, as in the prior plan for a Villa at page 30.

22. 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 enclosure of our commons, and forests, and heaths, under the pretence of growing corn?

23. 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 adult 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.

24. An opportunity presents itself for forming urban plantations in the suppressed graveyards. Among the least civilized tribes, the burying places of their ancestors are held sacred; and shall the Anglo-Saxon of the nineteenth 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.

25. Having suggested this measure in "Ancient and Modern Temples," published nearly forty 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 a divine 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, one of the City churches, St. Stephen's, Walbrook, might have its beautiful plan fully developed, which it was impossible to accomplish in the cramped-up site it now occupies. The removal of this charming church to the suburbs, where space might be found to accomplish SIR CHRISTOPHER'S grand design in all its integrity—a church, says RALPH, without a rival in Italy or elsewhere—would give, with a few other removals, that which is very much wanted—a street seventy feet wide from Queen Victoria Street to King William Street, and thus materially relieve the traffic in front of the Mansion House, now so danger-

ously great. Some of the ground covered by these churches may be given up for public thoroughfares, if wanted; because public convenience requires it, and public welfare equally demands—to say nothing of 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 unfit for its purpose. If we only go 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: warehouses have taken he place of dwelling-houses, and the inhabitants have been forced into the suburbs.

26. 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 archi-

tecture 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 Danes, if that most conspicuous churchyard 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!

27. The places here mentioned have, with some other churchyards, been planted and preserved as open spaces, against the will of the mammon worshippers, who regard every piece of open ground with greedy eyes, and a desire to appropriate it, or encroach thereon. To such an extent has this been carried, that were it not for the new parks, squares, and the Royal demesnes, breathing space would be scarcely attainable in the Metropolis.

28. The Authorities of the noble city of London beneficently granted sites for a Magdalen, and an Orphans' Asylum, with each its pleasure garden, no doubt intended to be in perpetuity. Lately these gifts, to the lasting injury of the neighbourhood, have been ungratefully sold. On the site of one, hundreds of persons are located. The other is now partly occupied by a huge factory, with its lofty chimney, which will dwarf and otherwise injure the *æsthetic* effect of the future Surrey Chapel, in the same manner as the majesty of the colossal Tabernacle is destroyed by the overwhelming Rabbits. MR. SPURGEON now sees that a tall steeple is useful for other things than to be "only fit for people to hang themselves in."

29. So also the preposterous and impossible lions in Trafalgar Square dwarf everything around. The sooner these are removed and broken up the better, for nothing but insanity could have produced them, nothing but ignorance could have allowed them to be fixed, and nothing but indifference can allow them to remain in the FUTURE.

"Cruel Nature that gave to France the *goût*,
But gave us only gout."

30. What can we say to that inharmonious and incongruous monument lately put up in Hyde Park, which the refined taste of the wise and much-to-be lamented and exalted personage to whose memory it is erected would have been the first to denounce—a thing so UNARCHITECTURAL in design, that the Gothic part could not have been erected at all, but by means of an iron core; which the first flash of lightning might shiver to atoms: while the delicate Grecian part is fit only to be under cover; and the Roman part, the steps, render all the rest insignificant?

31. How different is this to the solemn grandeur of the Mausoleum at Windsor, where the Architect had leisure studiously to work out his design! While, in the other case, a man who grasps at everything, from cathedrals to cottages, while 800 of his brethren in London can barely subsist, cannot be expected always to excel.

32. The new-fangled Metropolitan Board of Works, composed of men whose antecedents gave them no knowledge whatever of the important matters brought before them, from time to time have at a vast expense partly embanked the Thames; and allowed the reclaimed land on one side to be covered with—of all buildings in the world—an hospital; thereby narrowing the river to a mere gut, through which the wind rushes with violence enough to cut in two the passengers across the low-parapeted bridge. Death has already resulted from this, particularly to persons coming from the warm baths; as it has also resulted from the road which goes off at a right angle from the bridge itself—which it has spoilt; and the would-be remedial tinkering up of inclined planes, subterranean passages, and lofty granite walls, has cost an immense sum to bolster up this unprecedented contrivance. So that, on approaching from Westminster, our noble river is nowhere, and we have to toil up a hill merely to go down again! A contrivance which will appear still more ridiculous and dangerous, when the road on the west side of the Houses of Parliament is made to the Embankment, on the south side of the same. The secret little conclave which decides so autocratically on these almost vital matters—which indeed requires a whole life of study—had better put a stop to St. Stephen's Club, so illegally projected beyond the line of

other buildings; clear away the equally illegal railway sheds, and reduce to a level with Parliament Street the absurd hill they have thrown up; or the deformity will be perpetuated by the rebuilding of Bridge Street on the old foundations, instead of setting back the line of frontage sixty feet, in order to widen the approach to the bridge, and thus lessen its dangers, which the intelligent policemen would explain. It is time incompetency should be at an end, or we have a sad prospect in the FUTURE.

33. For the misappropriation of the Lambeth land, a rebuke was instantly adminstered by some person, who, seeing the necessity for open spaces, called upon the Primate to give up his official gardens to the public! On the west side they have so mismanaged as to allow a club-house—against the law—to jut out beyond the line of other houses, just *where the road to the Embankment from Bridge Street ought to have been.* Other encroachments are threatened by the Chief of the Woods and Forests, which the public must arouse itself to prevent.

34. I happen to know that if SIR B. HALL had continued in office, this anomalous Board would have been dissolved: "For," said he, "it is not working at all satisfactorily."* But LORD JOHN coming in, with his mediæval sentimentality, said, "I shall continue you, because you are so much like an old Anglo-Saxon institution!"

35. It certainly took away the *onus* from the Government, for no Government would have dared to tax the Metropolis as this Board has done for the effectuation of so much mischief. While they have neglected what they should have carried out, namely, MR. NASH'S grand street from Charing Cross to the British Museum; the rudiments of which are seen in St. Martin's Place; for here they have allowed an expensive shop to be built just in the centre of this much-to-be-desired thoroughfare. But of course the Board and the officials it appointed knew nothing whatever of this would-have-been important street.

36. It is sad also to see the bungling mess which has been made in Downing Street, although under a different authority. Here a fine opportunity of opening the Park to the river has been lost. I mention this in hope that New Charles Street and Derby Street

* When the Board was in treaty for Guest House, Sir Ben. put a stop to it by taking the house for Sir John Lefevre: "They shall not come down here!"

will be made to form an avenue from the Park to the river, as well as that from the Horse Guards, by the removal of Carington House.

37. Is there no one with spirit enough to support LORD ELCHO? —for it is said the Board are quite jubilant at the prospect of destroying Northumberland House—a house which fixes itself vividly in the memory of every visitor to the Metropolis—the last of the palatial edifices which once adorned the whole length of the Strand. Why destroy Northumberland House? Because the Members of this Board saw, in some plans by ingenious men for a bridge over the Thames, that the best approach to such bridge would be through the site of Northumberland House; so, by a curious sort of *non sequitur*, it must also be a good approach to the Embankment, ignoring the fact that the bridge must necessarily be twenty feet above the level of the Embankment, and *therefore* Northumberland House formed the best approach to the bridge; but the approach to the Embankment is a different matter altogether, and its centre should be between Northumberland House and the Insurance Office, giving a gradient of one in seventy-two instead of one in twenty-eight; flanking these two edifices with a row of shops twenty-five feet high, which would *recoup* the cost to the extent of £150,000. Above the shops the wall of Northumberland House should be pierced with a row of characteristic mullioned windows, and culminate with other ornamentation commensurate with the dignity of that princely structure.

38. Should we ever have an administration wise enough to open the Park to the Strand, as has been so often proposed, and have Temple Bar removed and reconstructed in its pristine integrity as an entrance to the Park, CHARLES THE FIRST would become the centre of the most important piazza in London, and this Park entrance most useful on all state occasions, instead of the dangerous St. James's, or the gloomy Horse Guards. The approach to the Embankment, leaving Northumberland House intact, would appear to be the natural continuation of the Park and of Cockspur Street to the river. A large slice must be taken off the gardens of Northumberland House to form the road, but the remaining trees in the gardens would blend with those of the Embankment, while the road curving off right and left would produce a grandeur

of effect which could not be attained by the passage through Northumberland House.

39. There is yet another reason for rescuing this historical home from the grasp of a vulgar Vandalism. It is true, a large slice must be taken off the gardens, but then this will not be built over, but will remain open ground as added to the roadway ; whereas by destroying the unique mansion, *a double line of lofty houses will arise on its site, and on that of the now airy gardens*, depriving the inhabitants around of light and air !—making Scotland Yard, and Northumberland Street, miserably unhealthy holes, to the irreparable injury of the whole neighbourhood.

40. On a par with the acumen displayed by the Metropolitan Board of Works, *a professor of architecture* volunteered—at a meeting on the subject—his crude opinion, that the approach to the Embankment should cross the Strand diagonally at its most dangerously crowded part! Evidently not understanding that this costly Embankment was provided mainly to lessen the vehicular perils of that over-gorged thoroughfare, the Strand,—perils which will become intolerable when the Law Courts are unwisely torn from their dignified seat of 1,000 years, at Westminster, and placed in the busiest street in the World. With the lamentable consequence, that these Courts will not only add to the inconvenience of the streets around the site, but by depriving Law of its *prestige* of Kingly authority, the notorious increase of lawlessness will be augmented.

41. The vast number of new streets added yearly to the Metropolis has created some little difficulty in devising names for them, and in altering the names of those streets of which there were tens or dozens of the same name. The Metropolitan Board of Works, eager to clutch at everything, took this matter out of the hands of SIR ROWLAND HILL; but instead of appointing a Nomenclator, with a system for so designating the streets that a postman *on seeing the name would instantly know in what part of the Metropolis such street was situated*, they appointed a clerk at £150 a year, to work under the domination of one or two members, these men having assumed the powers without at all comprehending the duties of an Ædile. Confusion is worse confounded, by re-naming streets without any system! They have re-named—to the great indignation of the inhabitants—the street in which the illustrious

FARADAY was born ; so that any one inquiring, in the FUTURE, for FARADAY'S birthplace,* will be puzzled to hear that there is no street of the name in the district! In short, MR. GLADSTONE says, "There is still a lamentable and deplorable state of our whole arrangements with regard to public works. There is a total want of competent authority to direct and guide." How can it be otherwise, while a few retired or other tradesmen undertake the solution of intricate municipal problems!

42. These are some few of the evils of that which in the democratic cant of the day is called Local Self-Government, under which the Metropolis is groaning. "Local Self-Government," quoth my Lord Mayor Waterlow, with consummate taste, at a banquet given to the Magnates of the Imperial Government,—"Local self-government is the best." The Keeper of Her Majesty's conscience was quite equal to the occasion, and shouted out—satirically, I must hope—"We want to govern ourselves." The 200 provincial Mayors looked on aghast at the idea of selling off their paraphernalia ; for if the Mob are to govern themselves, Mayors' maces and velvet robes will not be required in the FUTURE. Local self-government, —the children to govern the household, every Vestryman to set aside in his own particular case the laws which are binding on the other parishioners. Home rule,—a parliament in Edinburgh, and another in Dublin. A few gentlemen get together and make laws, but vanish into obscurity again when those laws are found to be evil. Surely we are drifting into anarchy ; for how different is all this to the teaching of that true exemplar of a perfect gentleman, the noble ST. PAUL! The annals of History prove that the Head of Gold is better than exalted feet of miry clay, and a benevolent despotism a far happier authority for the people than the misrule of mob government ; for in the former good men are fostered and promoted, in the latter, pretentious impudence is the most successful.

43. Under a future Government we may hope for a better state of things than those we have detailed in these few pages. To which may be added one remark more. It is now pretty well known that that sainted personage the PRINCE CONSORT—the most brilliant example ever seen on earth of what a man should be in every

* NEWTON'S observatory has lately disappeared, but his house is happily preserved as an adjunct to Orange Street Chapel.

relation of life—found DEATH IN THE HOUSE in the same way as that which prostrated his SON. Surely this little work will not have been written in vain if our "upper ten thousand" will take warning from the facts herein stated. LORD DERBY has sanitary matters very much at heart. MR. DISRAELI says, "Pure air, pure water, the inspection of unhealthy habitations, and many kindred matters, may be dealt with by the Legislature. The first consideration of a Minister should be the health of the people." In accordance with our motto, "Salus populi suprema est lex."

44. Happily, in Westminster, we have just obtained as our new Canon one of England's foremost men in philanthropic thought and work—CHARLES KINGSLEY. Under such men as these we may hope for the accomplishment of much good. JOHN BULL, though often abused, is one of the most liberal of men when money is required for anything that has been thoroughly drilled into him; then he responds most nobly. For if he is slow to admit conviction, he is no less quick to act when convinced of the propriety of the matter.

45. Can we not inaugurate a succession of PEABODYS? Millionaires! there are plenty of them who know not what to do with their money when alive, but who leave it to heirs who, knowing nothing of the toil of getting it, recklessly and uselessly squander it away in folly. But no one has ever denied the possession of ability or energy to "our upper ten thousand." We only want twelve out of this number, each to immortalize himself, and spend his million (perhaps to return to him again) in pulling down the rookeries in twelve different districts of the Metropolis, and building fit habitations for the poor on the sites, altering the names of such districts into their own names, and so become blessed in the present generation, and renowned in the FUTURE as the TWELVE METROPOLITAN WORTHIES.

46. The man who had this million at his command, and could rebuild either the environs of Jacob's Island, of St. George's Southwark, and St. George's-in-the-East, of Holborn, of Drury-lane, of Shoreditch, of Whitechapel, of the New Cut, of Berwick Street, of Pye Street, or of other places having a population of from 200 to 400 persons an acre,* must be a man of great capacity, one who

* While in all England there is scarcely one person to an acre, and in south London twenty-one, in the purlieus of Berwick Street, in the royal parish of St. James's, there are 429! Surely this makes out my case.

holds his wealth as a trust, and who, with God's help, will work at his trust as at a profession.

"'Tis from high life high characters are drawn."

47. Notwithstanding the black spots just mentioned, London will go on increasing. Surely it is not too much to hope the blackness may be eradicated, and those places in its midst rendered sanitary by some means or other. One Lady to whom I mentioned the subject, immediately put £50,000 into the hands of a member of the present Government,—the *Arbiter Elegantiarum*, as the most proper person—towards the renovation of one district. Had he so applied it at once, she would probably have given £200,000 or £300,000 more; for, living most frugally herself, she had the money at her disposal, and did'nt know what to do with it.

48. London is by far the largest city the World ever saw. Babylon, Thebes, Rome, were never so populous as London. It is continuing to surround itself with villas, and so absorbing towns and villages into its circuit, that, says CHATEAUBRIAND, it is no longer a city, but a province. Soon to be like Nineveh of old, a three-days' journey from its outskirts to its centre, presenting the aspect of a mighty rural city, fifty or sixty miles in diameter!

49. Far better will it be that it should thus spread out, interspersed with gardens and broad avenues planted with trees, as at Jeddo, than adopt the vertical superposition of story above story in lofty houses, throwing dark and damp shadows over the streets.

50. The population of London, in 1873, is nearly four millions, and if it goes on increasing at the same rate as it has done the last ten years, the inhabitants in 1973 will be fourteen millions, *if it should continue habitable.* For in London, more than anywhere else, are economical and social advantages to be enjoyed. It is the great radiating centre of civilization and of Christian knowledge, the treasury of the wealth and the mind of the whole World.

51. For London to remain habitable, the most stringent sanitary means must be devised. Many of the suggestions made in 1850 have been carried out, and are in the power of individuals to further accomplish for their own well-being; others must be organized by Imperial legislation, and then, half-a-century hence, London may safely spread out so widely as to look more like a rural than an urban city. Or she may become uninhabitable, and the seat of

Commerce be removed, on account of her insalubrity, the silting up of the Thames, which the Board of Works has done its utmost to hasten; or the failure of coal, or other contingencies may arise; such as cutting through the Isthmus of DARIEN on a level—if that were possible—from the Atlantic to the Pacific, and so the Gulf Stream would be diverted, and our present mild climate sink to that of Labrador, as it was once before, in prehistoric times.

52. From some one of these causes, London will be forsaken, sooner or later, for the EPHAH must be removed, and carried to the banks of the Euphrates, towards our Indian Empire, whither we are now constructing a railroad, which will bear the emblem of Commerce, literally with the swiftness of the wings of the wind, to its "house in the land of Shinar."

53. In conclusion, permit me to say that, seeing the numerous letters in the periodicals, yearning for advice in sanitary matters, I have ventured to come forward very humbly, to detail the result of my experience, and what I have done practically in these things for many years past.

54. I trust every one will find this to have been a well-spent half-crown; for if the improvements herein particularized are executed in all their integrity, every family will save thereby many hundred half-crowns a year, and rest in the full enjoyment of the consciousness of living in WHAT A HOUSE SHOULD BE. You have here the laws of Health, and those for the prevention of disease. Physicians and apothecaries may die out, for they will not be required in the FUTURE.

55. Having received so many applications for advice on sanitary matters, Mr. Bardwell must henceforth expect a P.O.O. for ten shillings with every letter, and a fee of one guinea for a consultation. 4, Great Queen Street, St. James's Park.

"MR. BARDWELL'S first Healthy Homes were built in 1828. In them there has been little or no sickness or death. In a parish in Norfolk where his principles are carefully elaborated by the devoted Rector, the people enjoy robust health; and the death of a child is unknown."

ADDENDA.

IN the ANTIDOTE a paragraph was omitted relative to the suggestion of one of the ingenious Autumnal writers in the *Times*, namely, that bad smells may be prevented in the house by making the rain-water pipes do duty as soil pipes! But rain-water pipes are frequently stopped. Imagine, then, the fearful nuisance, stoppages, and consequent burstings, would occasion in the public streets. Therefore this remedy could not be tolerated.

THE METROPOLITAN BOARD OF WORKS.

"Its capacity of doing mischief has been immensely increased by the borrowing powers which Parliament has recently granted it."—*Times*, May 16th, 1873.

NORTHUMBERLAND HOUSE.

On standing at the south end of the Haymarket, it will be evident to the most obtuse intellect where the approach to the Embankment ought to be; and on viewing the unique *tout-ensemble* of the house and gardens from the river at high water, every one must see that the threatened destruction, if carried out, will be an irreparable public loss.

WELL SEASONED TIMBER.

In building, it is a great advantage to have well seasoned wood, such as that which is kept in stock by RAFFERTY and SYNNOT, of Cannon Street.

THE SELENITIC MORTAR in ordinary brickwork, made with one part lime to four parts sand, is said to be stronger than Portland Cement. It dries quickly, and therefore may be advantageously used for plastering.

FOR VENTILATING HOUSE DRAINS, Mr. JOHNSON utilizes the heat behind a fire-grate by bringing a pipe thereto from the drain, and thence upward to the open air, the rarefaction in the heated pipe causing an upward draught.

MOULE'S Company have most nobly made known to the general public the great advantages of Earth-Closets, as well as these being as far as possible, in towns, in accordance with the command in Deut. xxiii. 13.

MORELL'S Company effect a double object—the saving of cinders for fuel, and the use of ashes for deodorizing, as mentioned in p. 42.

WATER-CLOSET SANITATION.

Since the printing and partial circulation of the earlier pages of this book, I am told that sanitary water-closets have been fitted up at Sandringham and elsewhere.

No. 24 and No. 26 in SANITARY RECIPES have been developed by Mr. BAKER into an unfailing disinfector, with a suitable apparatus for its use which I most earnestly recommend to those persons who dislike the smell of carbolic acid for the purpose mentioned in page 31.

SANITARY RECIPES.

DEODORIZERS AND DISINFECTANTS.

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 bedstead to pieces, and brush over the joints with spirits of turpentine, in which a lump of camphor has been dissolved, and you will be rid of the nuisance. If these noxious vermin have effected a lodgment in the floors and walls, chloride of lime is a remedy.

2. Artificial disinfectants cannot supply the place of cleanliness, ventilation, and drainage. Their use is for exceptional purposes. The great natural disinfectant is fresh air, abundantly and uninterruptedly supplied.

3. For purposes of artificial disinfection, the agents which most commonly prove useful are—chloride of lime, quick-lime, and Condy's manganic compounds. Metallic salts—especially perchloride of iron, sulphate of iron, and chloride of zinc, are, under some circumstances, applicable. In certain cases, chlorine gas or sulphurous acid gas may advantageously be used; and, in certain other cases, powdered charcoal or fresh earth.

4. If perchloride of iron or chloride of zinc be used, the common concentrated solution may be diluted with eight or ten times its bulk of water. Sulphate of iron or chloride of lime may be used in the proportion of a pound to a gallon of water, taking care that the water completely dissolves the sulphate of iron, or has the chloride of lime thoroughly mixed with it. Condy's stronger fluid (red) may be diluted with fifty times its bulk of water; his weaker fluid (green) with thirty times its bulk of water. Where the matters requiring to be disinfected are matters having an offensive smell, the disinfectant should be used till this smell has entirely ceased.

5. *Heaps of manure* or of other *filth*, if it be impossible or inexpedient to remove them, should be covered to the depth of two or three inches with a layer of freshly burnt vegetable charcoal in powder. Freshly burnt lime

may be used in the same way, but is less effectual than charcoal. If neither charcoal nor lime be at hand, the filth should be covered with a layer some inches thick of clean dry earth and coal-ashes.

6. *Earth, near dwellings*, if it has become offensive or foul by the soakage of decaying animal or vegetable matter, should be treated on the same plan.

7. *Drains* and *ditches* are best treated with chloride of lime, or with Condy's fluid, or with perchloride of iron. A pound of good chloride of lime will generally well suffice to disinfect 1,000 gallons of running sewage; but of course the quantity of disinfectant required will depend upon the amount of filth in the fluid to be disinfected.

8. Drains may be disinfected by using one pound of common salt in a bucket of water, and adding a teacupful of sulphuric acid, or by dissolving a pound of sulphate of iron in warm water; put this into a pail of water, and pour it down the drains.

9. Houses may be disinfected by solid chemicals, or by fumigation, or by gases.

10. Chloride of lime, either in a dry state scattered over the floors, or one pound added to a bucketful of water, and the walls and floors sprinkled therewith.

11. Gases evolved from putrefying animal matter are generally hydrogen compounds. These should be dealt with by volatile disinfectants; if possible, with gases.

12. A solution of chloride of lime, in the proportion of one pound to ten pounds of water, is most adapted for disinfecting air. A towel steeped in this, wrung out and suspended in a small room, will sweeten the air for twenty-four hours. It decomposes hydrogen compounds, and evolves ozone; it is therefore a grand oxydizing agent.

13. Four pounds of sulphate of iron, costing now only eighty shillings per ton, and one pound of fresh quick-lime, boiled together in two gallons of water for about an hour, continually stirring it. Its effects are marvellous in disinfecting drains, etc.

14. Lime-whiting is an excellent disinfectant, and should be used every year, in all areas, cellars, etc. Slake the lime in hot water, and add thereto two pounds of sulphate of iron to every half-bushel of lime for outside work, and sulphate of zinc for inside work; these harden the wash, and prevent its coming off upon the clothes. Ochres and umbers may be added, if more colour is desired.

15. Mix two table-spoonfuls of common salt, two teaspoonfuls of red lead, and half a wineglassful of strong oil of vitriol in a quart of water. The bottle must be kept cool, tightly stopped, in a dark place. A little exposed in a saucer, sprinkled on the floor, or soaked in sheets of old linen and hung about the room, rapidly destroys effluvia, and deodorizes.

16. For germs there can be no better disinfectant than carbolic acid—germs give rise to the most fetid gases, and are most completely coagulated by carbolic acid—and it is readily diffused throughout the air. Some people affect to dislike the smell of carbolic acid, but if they once become

acquainted with its life-preserving properties, they will snuff up its odour with delight.

17. In fumigating rooms, close all apertures, and take roll brimstone broken into small bits, mixed with a little saltpetre; lay the mixture on a few sticks and paper on an iron shovel: set fire to the paper, and carefully back out of the room; leaving it shut up for two or three hours. This is an ancient method, for it was used by ULYSSES to disinfect the bodies of his wife's lovers, whom he had slain in his own house.

18. Or fumigate with chlorine gas, by pouring diluted sulphuric acid over dry chloride of lime.

19. Or equal quantities of oxide of manganese and common salt, mixed in a plate or saucer, and pour on the mixture sulphurous or sulphuric acid, and quickly back out of the room.

20. Or the ceilings, walls, and floors, may be washed with quick-lime water; the wood-work well cleansed with soap and water, and afterwards washed with a solution of chloride of lime, two ounces to the gallon.

21. The person may be preserved from infection by the vegetable perfumes before mentioned, plentifully sprinkled upon the clothes, or by carrying in the pockets, packets of strong carbolic acid powder.

22. Rats, being remarkably clean animals, are much annoyed by anything which adheres to their fur. These pests, and mice also, may therefore be driven from a house by daubing all their holes with coal-tar. This so enrages them that they will tear themselves to pieces to get it off, and finally one and all will vacate the premises.

23. Thames water, within some miles of the Metropolis, holds in solution a large quantity of fluid animal matter; it swarms with infusoria (small animalculæ), exhibits an alkaline reaction, and when kept for any length of time, it emits an offensive smell, indicative of decomposition. Now, if to this or any other water resembling it, we add a small quantity of acid, these changes will be arrested, the animalcules will be killed, and the water will soon cease to smell disagreeably. The best acid which can be employed probably is the acetic, and the quantity added should be just sufficient to impart an agreeable, refreshing, and slightly acid taste. Mix well 40 grains of dry oxalate of ammonia with 90 grains of peroxide of manganese, adding thereto 350 grains of powdered charcoal. Agitate one imperial gallon of the water with one ounce of the above mixture: allow it to settle, and (after an hour or two) pour off the clear liquid. The first named ingredient throws down all the lime present as oxalate, which carries with it the mechanically suspended organic matter. The oxide of manganese oxidizes and destroys the organic matter in solution, the deleterious gases from which are entirely absorbed by the charcoal. Water treated in this manner becomes sweet, wholesome, and soft as rain-water, without the use of a filter, and even (what are called) "permanently hard" waters, can be made by this process beautifully soft, and adapted alike for lavatory or culinary uses,—economizing soap in washing and fuel and time in cooking.

24. Oxidizing disinfectants,—ozone, and chlorine.

25. Germ-destroying antiseptics,—carbolic acid.

26. Condy's fluid,—ozonic oxygen for its active principle; a large proportion of the vitalizing element by which all natural purification is accomplished.

27. We cannot exist without oxygen, yet it is the ultimate cause of death and decay. It is the giver of light and heat, for no combustible material can burn without it. In fact, were it not for oxygen, there would be a universal chaos of matter; there would be no living thing creeping or growing upon the face of the globe; and the sun would shine only upon a metallic spheroid. The air, containing one-fifth of oxygen, is the natural source for obtaining it; but to separate it by any direct process—to sift it out, as it were—is a problem as yet to be solved by chemical genius. When we want oxygen for experiments, we separate it from some material that has already drawn it from the atmosphere; such as from the oxide of mercury or manganese. The novice may also obtain oxygen from chlorate of potass. It is a very simple experiment. Mix a little chlorate of potass with an equal weight of washed silver sand; put the mixture into a clean oil flask, and set it over a clear fire. The chlorate will soon melt, and then boil: every bubble is a bladder of oxygen gas, which now invisibly fills the flask. To prove its presence, take half an inch of the sulphur end of a match, stick it on the end of a piece of fine wire, light the match, and then pass it quickly into the interior of your oxygen chamber; you will then see the intense vivifying effects of the "king of the elements"; and if you are expert, the wire will take fire when the bit of match is consumed.

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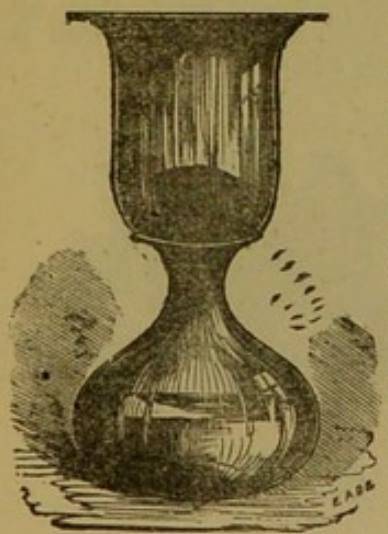
DR. FRANKLAND'S OPINION.

Extract from the Registrar-General's Report in *The Times*, October 24th, 1866.

"The quality of the water supplied in September has been tested, as usual, by Dr. Frankland: he gives a *remarkable instance* of the effects of filtration **[THROUGH ATKINS'S PATENT CISTERN FILTERS]** of the East London Company's water, supplied to the tenants of Baroness Burdett Coutts, in Columbia Square. The organic matter was reduced to the **MINUTEST QUANTITY.** *The hardness from* 20° *to* 7°. The filtration of the water for SEVEN HUNDRED PEOPLE is here performed without the slightest difficulty."



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These are the only Filters which can be cleaned by the purchaser, the filtering medium being a porous block of pure animal charcoal, through which the water passes, leaving the impurities on the surface, which has to be cleaned from time to time, according to the amount of impurity in the water. The cleansing is effected by simply washing the block in hot water and scrubbing it.

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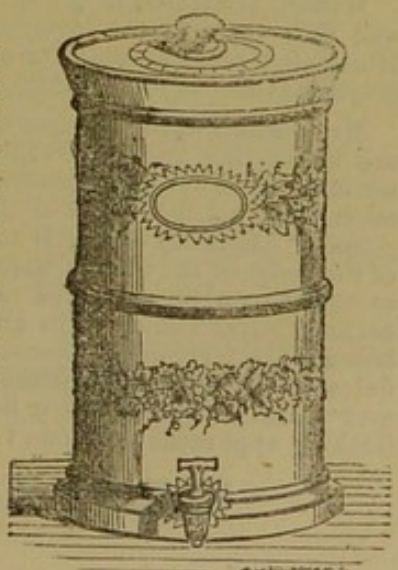
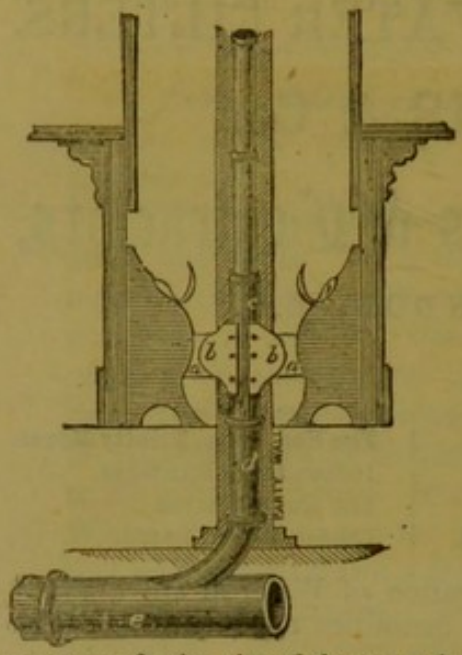


The Stone Household Filter.
In common ware, from 12*s*. 6*d*.
In drab ware, from 15*s*.

To Architects, Surveyors, Sanitary Boards, Builders, and others.



The Advertiser begs to call attention to his IMPROVED SYSTEM of VENTILATING SEWERS and HOUSE DRAINS, and is prepared to enter into Contracts with Local Boards for the Erection of Shafts for carrying off and consuming the gases generated in sewers, by means of his Apparatus. The Patentee is arranging with a well-known firm for the Manufacture and Sale of his HOUSE DRAIN VENTILATOR, attached to Stoves, Ranges, Kitcheners, &c. Further particulars will shortly be announced in the "*Building News*," "*Builder*," &c.; application, in the meanwhile, to be made to the Patentee,

MR. R. J. JOHNSON,
42, Lausanne Road, Peckham,
LONDON, S.E.

The Illustration shows the system as applied to ordinary house-drains in connection with sewers. *a* shows fire-brick forming back of stove or range; *b*, portable condenser; *c* shows a pipe composed of iron or other metal heated by fire-brick and condenser as shown at *a* and *b*, so as to rarefy the air; *d* shows a pipe leading from the house-drain to top of house; *e* shows house-drain leading into sewer.

"There is, we think, little doubt that the adoption of the sewer ventilator, in all new houses, would greatly diminish the accumulation of foul-air in the metropolitan sewers, and do away with the pernicious practice now frequently carried out of letting the stackpipes to back additions enter the sewers without being properly trapped, thereby allowing the foul air freely to ascend and enter the staircase and back chambers of houses. The additional cost would be trifling, and the result the prevention of much sickness in large cities."—*Building News*, March 21, 1873.

N.B.—For Descriptive Notice and Illustrations of Shafts and Furnaces for consuming the Gas arising from Sewers, see the *Building News* of March 21, 1873 (p. 326).

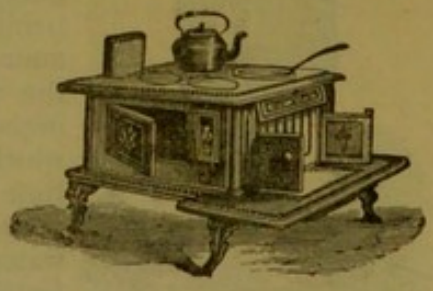
AMERICAN STOVES.

The American Stove, for heating purposes, stands out more or less from the fire-place opening, and thus, instead of nine-tenths of the heat going up the chimney, it is all diffused through the room, certainly an important saving of fuel. Indeed, the price of coals in England now, almost compels the consumer to look out for real economisers, which combine these advantages without sacrificing that home essential—"cheerfulness."

As these Stoves are made to show an open or closed fire at pleasure, it is more than likely that the householder who adopts them will in the end find that "dear coals" have added to his comfort and saved his pocket as well.

Messrs. MURDOCH & Co., 115, Cannon Street, Manufacture in Scotland "American" Stoves, and they show in the present International Exhibition some chiefly adapted for cooking, (as Illustrated below), which are very compact, and like all the domestic furniture which is originated across the Atlantic, simplicity in construction and fitting is studied.

Mr. Buckmaster's Lectures on Cookery at the Exhibition, are interesting and deservedly popular—popular in one sense at least, but not in another, and that in this case the most practical definition of the term "pertaining to the people." It is all very well to show how the *chef*, perhaps of the order of the *Cordon blue*, with the nimble handmaids to assist, can turn out the omelette before an admiring, perhaps royal audience, in an amazingly short time, but how are the forty-pound householders to go and do likewise unless they have the appliances? Is it not the old story over again "first catch your hare," &c. First get a proper Cooking apparatus and then?

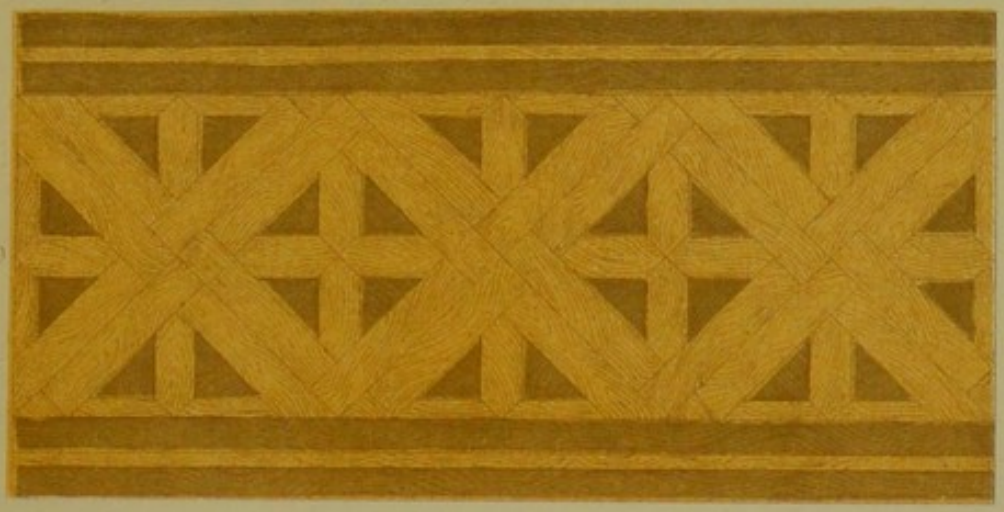


MESSRS. MURDOCH & CO.,
MANUFACTURERS,
115, CANNON STREET, E.C.

ARROWSMITH'S

SOLID PARQUET FOR FLOORS OR BORDERS.

2/2 10



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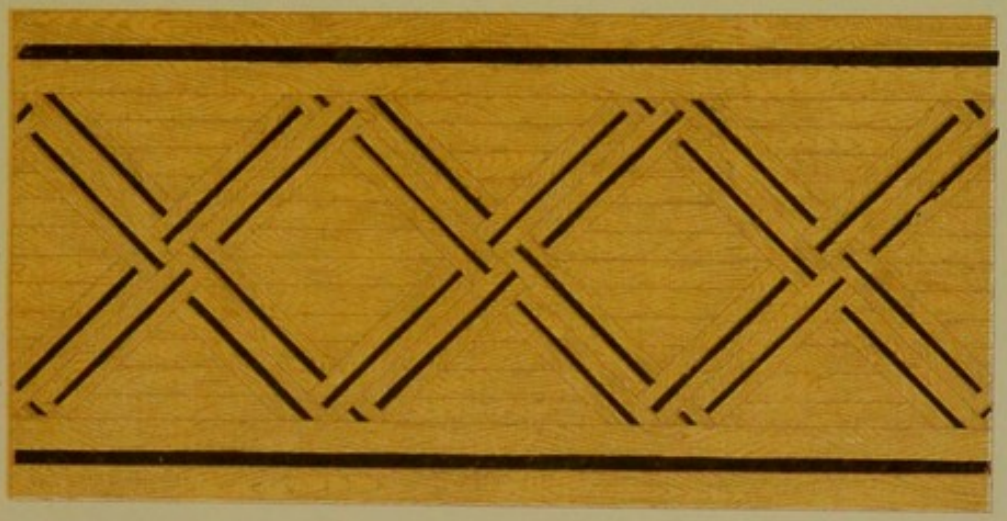

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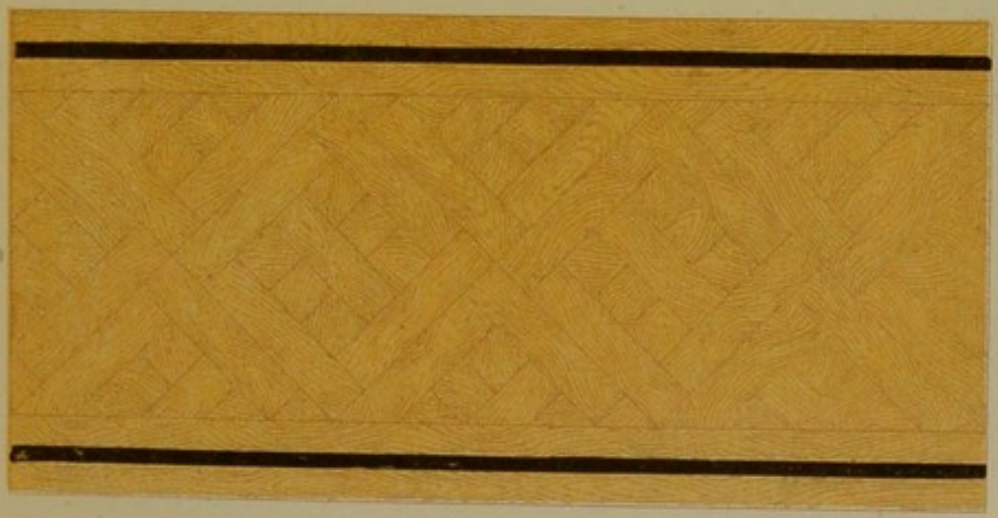


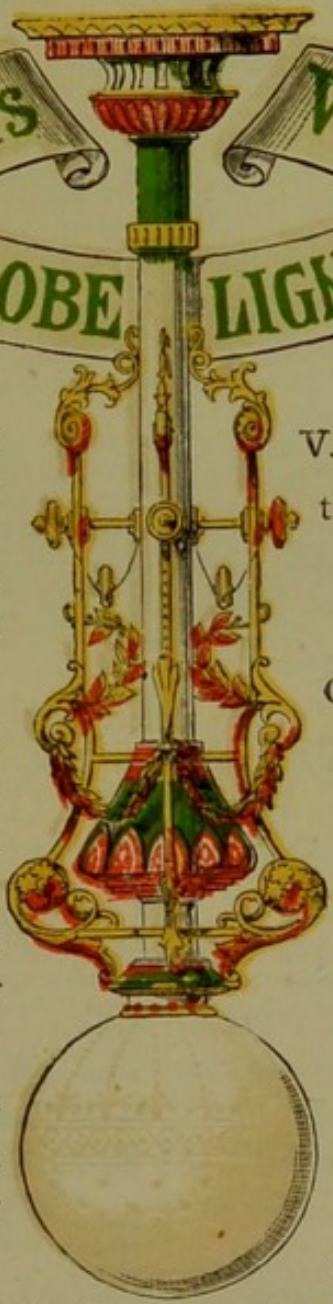
PRICES FOR MATERIAL ONLY,— PER FOOT SUPER—SOLID INCH THICK.

80. NEW BOND ST, LONDON.

GAS

WITHOUT HEAT SMOKE OR SMELL

Benham's Ventilating GLOBE LIGHTS



The following are some of the advantages of this mode of Lighting:—

I. It carries off all the heat and foul air from the burner.

II. It also ventilates the apartment by removing the heated and vitiated air.

III. It introduces a constant supply of external fresh air.

IV. The flame is powerful and steady, and cannot be affected by draughts.

V. No smoke escaping—the ceiling is not blackened.

With this arrangement Gas may now be introduced into Drawing Rooms, Dining Rooms, and Libraries, without any risk of damage to the Decorations, Furniture, Pictures, or Books; and the injurious effects on the health are also entirely avoided.

The above Drawing represents the Pattern supplied to H.R.H. THE PRINCE OF WALES at Marlborough House.

MANUFACTURED AND SOLD BY

BENHAM & SONS

50, 52, & 54, WIGMORE STREET, LONDON, W.

WHERE THEY MAY BE SEEN IN OPERATION.

GRANT & CO., LONDON, MANCHESTER, & PARIS.

BENHAM'S

PATENT COOKING APPARATUS,

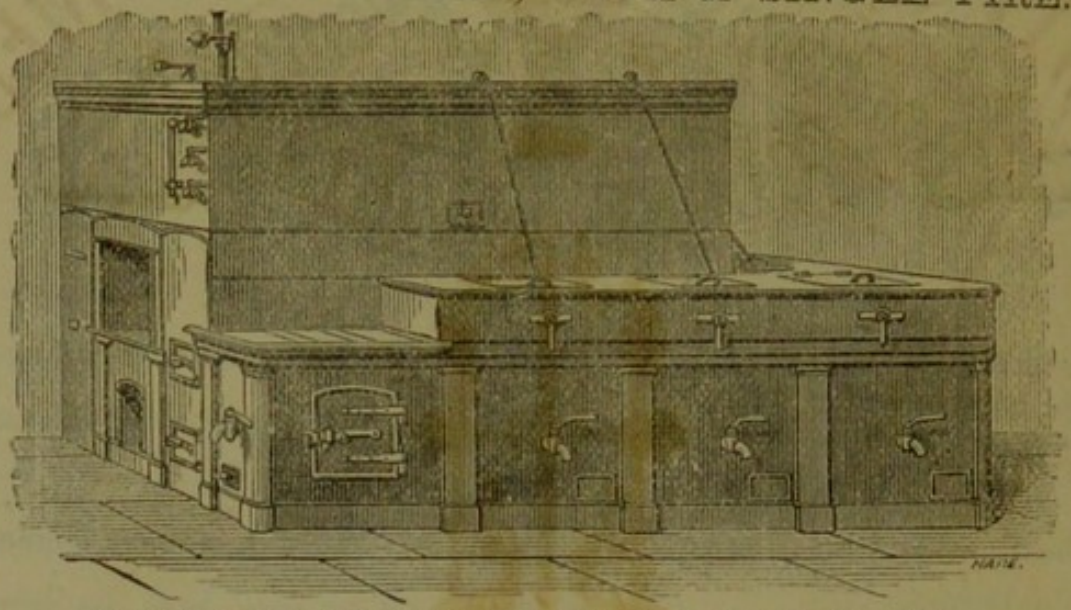
FOR

BOILING, ROASTING, STEWING, BROILING, STEAMING, BAKING BREAD AND PASTRY, ETC.,

AND

SUPPLYING HOT WATER FOR BATHS OR LAUNDRIES,

FOR LARGE NUMBERS, WITH A SINGLE FIRE.



THE SPECIAL ADVANTAGES OF THIS APPARATUS ARE:—

REMARKABLE ECONOMY OF FUEL; SIMPLICITY OF MANAGEMENT; PERFECT CONTROL; AND GREAT EXTERNAL COOLNESS.

The following examples, amongst others, may be referred to:—

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Greenwich Union Workhouse.
Islington Workhouse.
City of London Union, Upper Holloway.
Wandsworth & Clapham Union (Two Apparatuses).
Bromley Union, Kent.
West Malling Union, Kent.
Oswestry House of Industry.
St. Olave's Union, Rotherhithe.
Tonbridge Union, Kent.
Holborn Union (Two Apparatuses).
Woolwich Union.
Warwick Union.
Altrincham Union.
Royal Medical College, Epsom.
Royal Naval School, New Cross.
Wellington College, Wokingham, Berks.
Orphan Working School, Haverstock Hill.
Kensington Workhouse (Two Apparatuses).
Trent College, Long Eaton, Derbyshire.
St. Marylebone Schools, Southall, Middlesex.
Royal Hospital for Incurables, Melrose Hall.
London Orphan Asylum, Watford.
Herbert Hospital, Shooter's Hill.
Bethnal House Lunatic Asylum, Cambridge Road, N.E.
Westminster House of Correction.
Messrs. Cook, Son, & Co., St. Paul's Church-yd.
Railway Clearing House, Seymour Street, Euston Square.
Witney Union, Oxfordshire.
Messrs. Meeking and Co., Holborn Circus.

DESCRIPTIVE PAMPHLETS, CONTAINING FULLER DETAI' S, WITH TESTIMONIALS, WILL BE FURNISHED ON APPLICATION.

BENHAM & SONS are also prepared to undertake Engineers' Work of every description, for Asylums, Workhouses, and other large Establishments, comprising the following, viz:—

Steam Engines and Boilers.
Heating Apparatus by means of Hot Water, Hot Air, or Steam.
Hot & Cold Water Tanks & Services, Pumps, &c.
Baths, Lavatories, Urinals, and Water Closets.
Laundries, Wash Houses, and Drying Closets.
Gas Works and Gas Fittings.
Hoists (or Lifts) for Dinners, Coals, &c.

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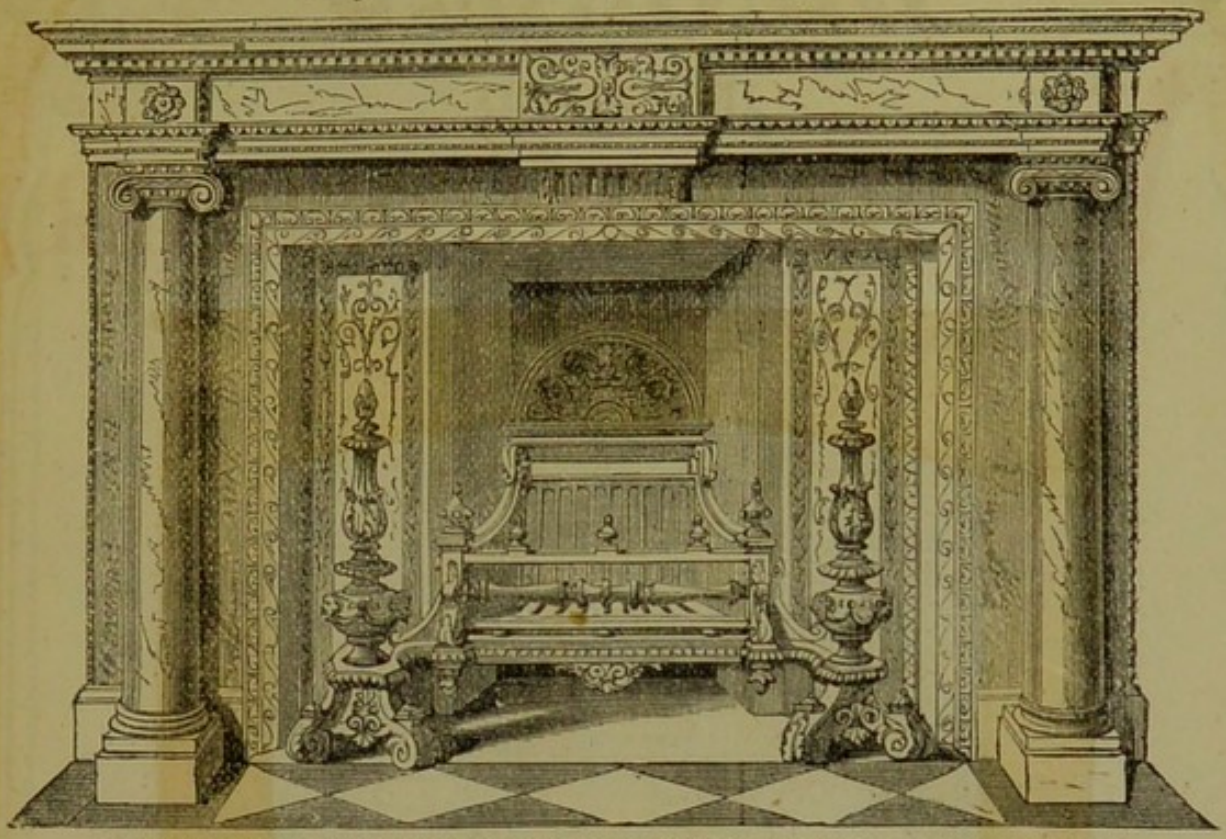
GENERAL FURNISHING IRONMONGERY CATALOGUE

May be had Gratis, and Free by Post.



IT CONTAINS ILLUSTRATIONS OF THEIR EXTENSIVE STOCK OF

STOVES, FENDERS, & FIRE-IRONS,

MARBLE CHIMNEY PIECES,

KITCHEN RANGES,

AND

COOKING APPARATUS,

For which Prize Medals have been awarded to them in the International Exhibitions of 1851, 1855, 1862, & 1867.

GAS WORKS, GAS FITTINGS, &c.

BATHS, PUMPS, AND WATER CLOSETS,

HOT-WATER APPARATUS, LAUNDRIES, CONSERVATORIES, &c.

CUTLERY, ELECTRO-PLATE, TEA URNS, LAMPS,

KITCHEN REQUISITES,

AND

EVERY DESCRIPTION OF GENERAL FURNISHING IRONMONGERY.

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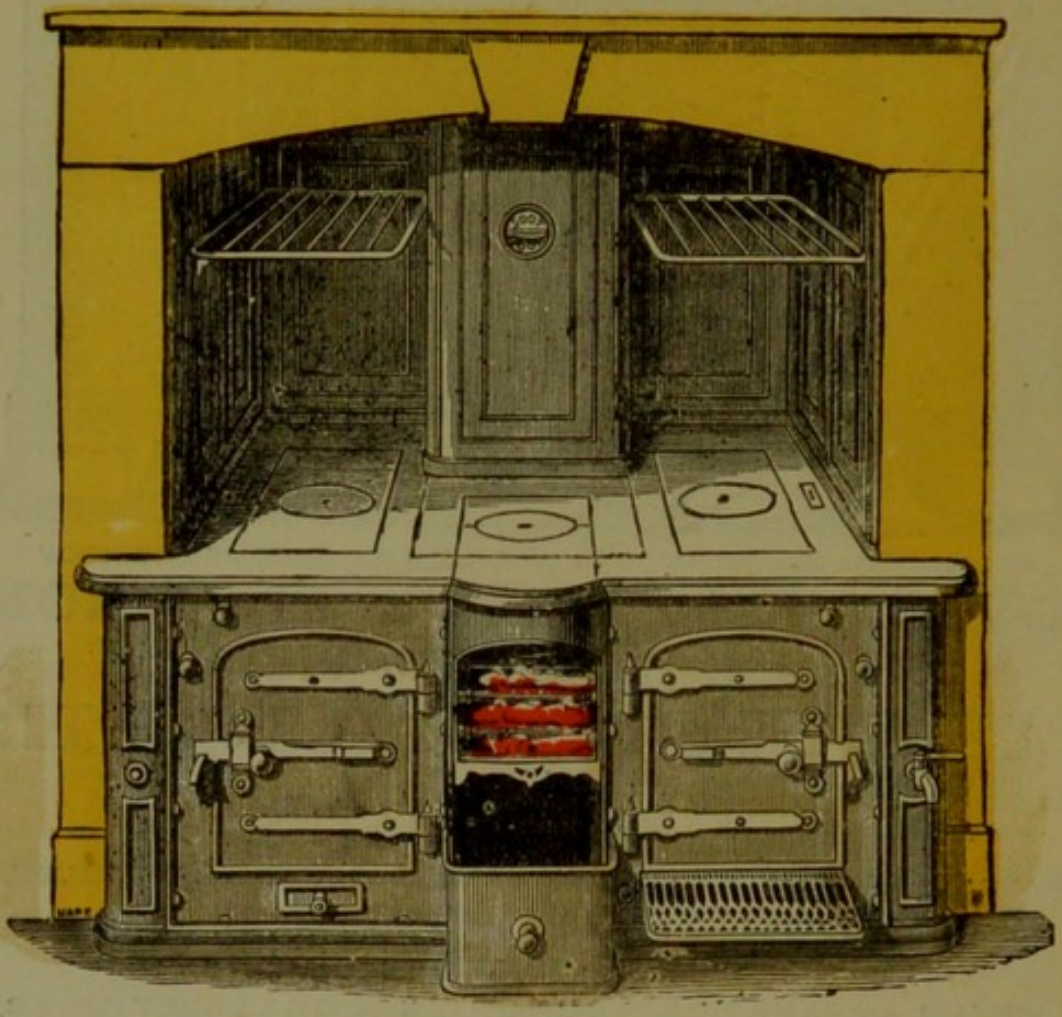
ALSO IN THE HARDWARE COURT OF THE CRYSTAL PALACE, SYDENHAM, S.E.

BENHAM'S

IMPROVED

VENTILATING KITCHENER



It requires no Brickwork to fix it.

It Roasts, Bakes, Boils, and Steams with One Fire, and supplies a Bath if required.

It carries off the Heat and Smell of the Kitchen.

It can be fixed in its place in a few hours, after the Fireplace is cleared out and prepared for it, and by Local Workmen, if preferred.

It can be removed, when required, in the event of a Change of Residence, being quite Detached and Independent.

It is not more expensive than the ordinary Kitcheners; whilst the cost of fixing is greatly diminished.

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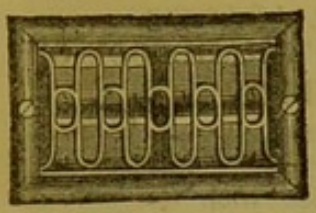
Boyle's Outlet Ventilator.



FRONT VIEW.

Boyle's Inlet Ventilator.

VENTILATION.

"THOROUGH" — "PERFECT" — "NATURAL"

CHING'S
BOYLE'S PATENT VENTILATORS.

See Article in THE LANCET, Feb. 15, 1873, p. 241.

"These ventilators have been tested by us, and appear worthy of attention."

Preserve health—enhance comfort. Give a constant, draughtless, controllable diffusion of pure air in every apartment to which they are applied, effectually removing all the noxious, vitiated air, and introducing pure air.

Suitable for every position where ventilation is needed.

PRICES { For Apartments, from 6*s.* 6*d.* each upwards.
For Ceilings and Roofs, from 20*s.* each.

COMYN CHING & CO.,

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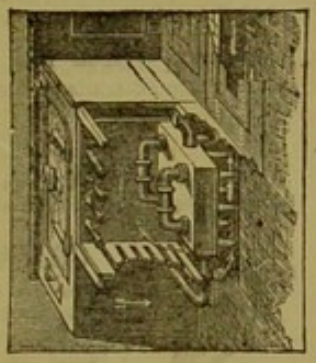
Ching's Patented Hot Water System.

SAVES FUEL! NEVER FAILS!

Several rooms or conservatory heated from one fire, Bath and Lavatories supplied at any moment with hot water in practically unlimited quantities.

To be seen daily in operation at the Patentees



COMYN, CHING & CO.,

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23, Little St. Andrew Street, Upper St. Martin's Lane, W.C.

PATENT SELENITIC CEMENT COMPY. Limited,

Offices—6, *Wharf, Belvedere Road, Lambeth, S.E.*

THIS invention consists of an improved method of using Prepared Quick-lime, which is thus converted into a species of CEMENT-MORTAR, which sets rapidly and well, and can be used for concrete and bricklayers' work with a vast GAIN IN STRENGTH. When employed as stuff for plastering it effects a considerable SAVING IN TIME over that made from Lime in the ordinary way. Selenitic Mortar SAVES HALF THE LIME, is FOUR TIMES AS STRONG, and SETS IN ONE QUARTER OF THE TIME of Common Mortar. SELENITIC CLAY can be used as a substitute for Parian and other similar Cements, PLASTERING ON WALLS can be done by the above process as Two-coat Work, while the ceilings can be floated immediately after the application of the first Coat, and Set in Forty-eight hours. The Mortar with six parts of Sand will be found to SET FAR HARDER and MORE QUICKLY than Common Mortar with two or three parts. Burnt Ballast can be used both for Mortar and Plastering to replace the Sand.

This process has been used in the erection of the Royal Albert Hall, International Exhibition Buildings, and the South Kensington Museum, the new Charter House Schools, for Mr. P. Hardwick, the New Law Courts, for Mr. Street, R.A., and at the Orphanage at Broadstairs, for Mr. J. P. Seddon, with complete success, also in many other buildings.

A Table of Results of this material as compared with Lias-lime, Portland, and other Cements, can be obtained on application at the Office, either personally or by letter, where Specimens of Work executed by this process may also be seen, and every information will be given.

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Agents have already been appointed in the following places:—Durham, Lancashire, Lincoln, Stafford, Leicester, Northampton, Warwick, Worcester, Hereford, Monmouth, Carmarthen, Pembroke, Glamorgan, Gloucester, Hants, Surrey, Sussex, Middlesex, Bedfordshire, Yorkshire, Northumberland, Bristol, Dumfriesshire, Kirkcudbrightshire, Fermanagh, Donegal, Tyrone, Londonderry.

Persons in the above districts having a good connection among Architects, Contractors, Builders, and Plasterers, may be appointed as sub-agents to promote the introduction of Selenitic Mortar.

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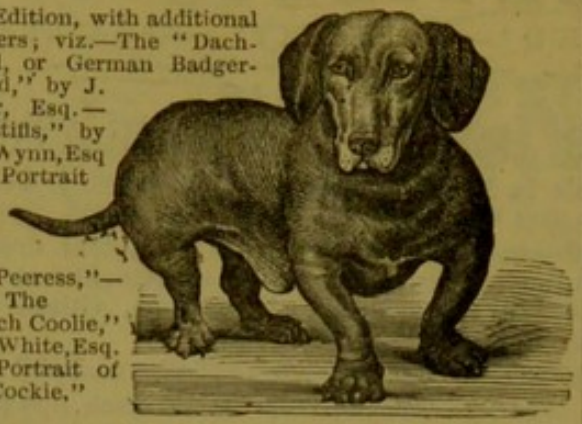
New Edition, with additional chapters; viz.—The "Dachshund, or German Badger-Hound," by J. Fisher, Esq.—"Mastiffs," by M.B.Wynn,Esq with Portrait of "Peeress,"—The "Scotch Coolie," by W.White,Esq. with Portrait of "Cockie,"



DOGS; their POINTS, WHIMS, INSTINCTS, and PECULIARITIES, with a Retrospection of Dog Shows. Contributions by Frank Adcock, C. E. Holford, Rev. J. Cumming Macdona, W. Cropper, N. Morton, H. D. Kingdon, Dr. Stables, B. Cobbet, S. E. Shirley, M.P., S. T. Holland, J. W. Dawes, H. Marshall, Miss Hales, and other Prize Breeders and Winners. Edited by Henry Webb. Crown 8vo., cloth gilt, above 60 Photographs of Champion and Prize Dogs. Price 6s. *post free.*

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Late of Ludgate Hill.

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IMPROVED LAUNDRY DRYING CLOSET.

THE IMPROVED DRYING CLOSET is particularly recommended for Laundries in large Establishments, Gentlemen's Mansions, &c.

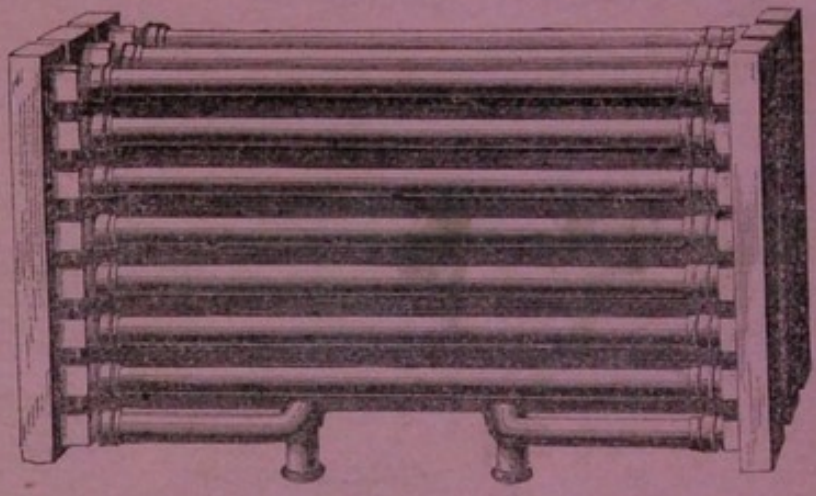
It is furnished with Sliding Horses, which run in and out on rails; the number and size of the Horses of course depending on the amount of work required.

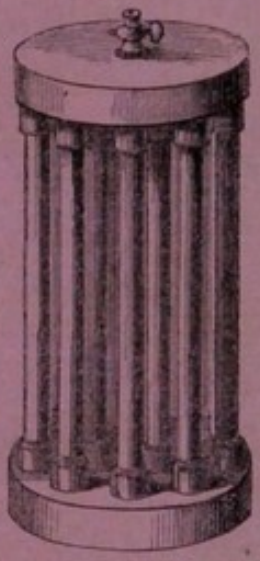
It can be heated by means of Hot Air, Hot Water, or Steam, the moisture of the clothes being rapidly extracted and carried away.

The clothes are thus dried in less time and in a better manner than by the old plan (which consists of a large suspending frame over the ironing stove), in addition to which, the Laundry is kept free from damp heated air; and all risk of accidents, and of dropping the clothes in the stove, is entirely avoided.

HOT WATER APPARATUS,

For warming Churches, Chapels, and Public Buildings; Halls, Staircases, and Private Houses; Conservatories, Greenhouses, Forcing Pits, &c.





The use of Hot Water Apparatus, for diffusing artificial heat, has now become general, and its merits are universally acknowledged.

It is perfectly safe, free from any unpleasant smell, and may be efficiently managed by any person of ordinary intelligence.

The hot water circulates through iron pipes. The whole of the water in the apparatus passes successively through the boiler, and communicates the heat which it thus receives from the fuel, to the various buildings and apartments where the warmth is required. There are no buildings, however large, to which it cannot be advantageously adapted.

The arrangements vary greatly, according to the nature and construction of the building. For halls and staircases, pedestal-coils are frequently used, which may be enclosed by an ornamental trellis enclosure, surmounted by a marble slab, as shown by the above engravings.

The pipes may also be placed out of sight, and the warm air introduced through the floors or skirtings of the apartments.

BENHAM & SONS,

50, 52 & 54, Wigmore Street, London, W.

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PATENT STONE

Is really a natural Stone in its chemical and mechanical construction, although produced by a highly scientific chemical process. In appearance and strength it is equal to the best natural stones, and resists weather perfectly. It is the cheapest and most thoroughly satisfactory material for all Architectural and Ornamental Stonework, Balustrades, Chimney Pieces, Vases, &c. &c.

It is also made into Grindstones, Filters, Scythestones, &c. &c.

Ransome's Solutions for Preserving Brick, Stone, Cement, &c. &c.

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RANSOME'S

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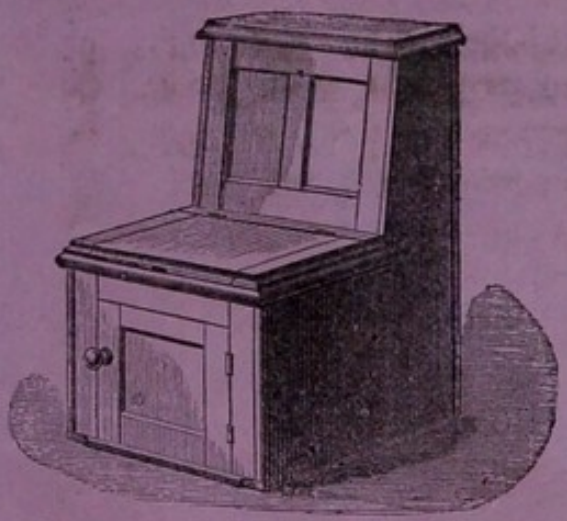
LIMITED,

HENRY BESSEMER, Esq., Chairman,

2, Queen Street Place, Cannon Street, E.C.

MOULE'S PATENT EARTH-SYSTEM.



Commode, 3 high, 1·11 wide, 2·2 deep.

MESSRS. H. I. & J. W. GIRDLESTONE,

Managers and Engineers.

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Moule's Patent Earth Closet Company, Limited,

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