Gilbert White's "Selborne" is the first prose work of note that is the fruit of this native contentment and love. Then a hundred years elapses before another prose work is produced, of conspicuous merit, informed with essentially the same spirit. Mr. Jefferies' recent books, "The Gamekeeper at Home," "Wild Life," and "Round About a Great Estate," etc., are the product of the same quiet contemplation and familiar intercourse with the ripe, half-domestic English nature as the work of the Selborne naturalist.

The work before us, Mr. George Milner's "Country Pleasures," while it hardly deserves to be mentioned in the same list with the above named works, is yet a fair expression of that unostentatious love of country life—the pleasure in trees, fields, flowers, birds, lanes, paths, frost, rain, the clouds, etc.—so characteristic of the English mind. A very good idea or picture of the procession of the seasons in the mother country may be had from its pages.

The bird and the flower are given, not so much from the point of view of the naturalist as from the point of view of the casual country sojourner. The record is tame and uneventful, and to the readers of such a writer as Henry Thoreau will seem positively flat and tasteless. Mr. Milner does not look at Nature with an intense and absorbing gaze, but he sees with good, appreciative, wholesome eyes. He never offends one, is not patronizing nor gushing, but writes down his observations and impressions in a genial and sympathetic, if not in an ardent and poetic, frame of mind. His volume is richly fraught with quotations from the poets, and it is in these two hundred gems gathered from the whole field of English song that, to our thinking, the chief value of the book consists.

HOME AND SOCIETY.

HOUSE CONSTRUCTION. II.

Sanitary Arrangements.

THE art of house-building is, perhaps, the oldest of the arts, dating from before Tubal Cain, yet, judging from the average structure in most civilized communities, it seems to be, like Milton's "great first cause," least understood, and is apparently becoming another of the "lost arts." A modern dwelling should be a tight, solid, durable structure, located upon a site free from damp, sheltered from inclement winds, yet with an abundance of sunlight and pure air, the interior spacious and comfortably warm, but not over-heated, and the whole absolutely free from all objectionable odors, whether from plumbing fixtures, the kitchen, laundry, cellar, or other sources. All of these requisites may be had with due care and moderate outlay. That they are not more common in the community is largely due to ignorance, false economy, or neglect.

The first consideration before preparing to build a house is the choice of a suitable site. Too much care cannot be taken to secure a healthful location, and to make sure that there are no hidden drawbacks to be discovered when it is too late to correct them. Bacon said: "He who builds a fair house upon an ill-seat, committeth himself to prison." All retentive soils contain more or less water in their interstitial spaces. To insure salubrity there should always be a deep crust of open, dry soil between the foundation of a house and the subterranean water level below. While it is desirable to avoid a site which is naturally wet or polluted, even such a site may be made dry and wholesome by proper precautions. Yet even upon a dry, porous soil, danger is incurred by carelessness in allowing water to soak into the ground adjacent to houses, from waste-pipes, leaching cesspools, and from dripping roofs. In consequence, such dwellings become filled with "dry rot" and unfit for human habitation, while the soil is thoroughly polluted. The risks to health from these causes are greater where there is a public water supply, and insufficient or no sewerage. The abundance of water encourages its lavish use, and the soil soon becomes saturated with the fluid waste.

Sunlight is another essential. There are hundreds of dwellings which are as deficient in sunlight as an average tenement house. Scores of families of ample means and refinement seem content to live in rooms which have no outlook beyond a blank wall or the rear windows of their neighbors. Human beings, like plants, need an abundance of light.

The reason why modern houses are so ill constructed is not far to seek. The blame rests partly upon the builder and the various mechanics employed by him; but a large share properly belongs to the owner's ignorance of what is essential to a perfect house, or to his unwillingness to pay for it when pointed out by others. While the architect has a recognized superiority in matters of taste and design, he is also better fitted to direct the great variety of artisans employed about a house than any one of their own number. It is a common, but mistaken, custom to give this direction to a contractor or builder, who is usually a mason or carpenter, and who is not thorough in his own trade, while lamentably ignorant of the details of other men's work which he has to superintend. The sole interest of such a man is to get through each job as soon as possible, and with the least trouble and outlay. He is the plumber's worst friend, when he winks at the latter's failure to do justice to the owner's interest, while, as he has no comprehension of the importance of good plumbing, he takes no pains to secure it. The practice of subletting plumbing to such men, or to any "lump contractor," is very objectionable, and all sanitary details should have the personal supervision of the owner or architect. The same reasoning will apply in the case of other departments of house construction, and proves the necessity of competent superintendence.

Again, the owner should not be in too great haste either to begin a building, or, when begun, to get

through with it. In English professional phrase such impatience is called being in a "jackass hurry." In one case in my experience, a gentleman asked a plumber in Newark to make a bid for the work in a ten-thousand dollar house in *half an hour's time*, which he very properly refused to do. Before undertaking any building or other like work, it is always best to draw up a detailed specification, with plans, to insure against errors or misunderstandings, which create disputes in settling accounts, and to thus make it clear just what it is proposed to do, and what are the duties and obligations of all parties concerned. Detailed sketches and working-plans will be found useful, especially for explaining designs to persons not familiar with building operations. A building specification should be concise and clear; nothing should be stated in general terms, as "the work to be done in a proper manner," or, "proper material to be provided," but the terms should be specific, particularly those relating to plumbing and drainage; the kind and character of each article of the material named should be defined, so as to prevent the substitution of an inferior article; and the weight of pipes, etc., should be stated. Care should be taken to have a distinct understanding in regard to "extras," so that in case of an advance or decline in the rates of labor or materials, there need be no question as to the price. In contracting for plumbing, it should be understood that the plumber's estimate does not include the carpenter's or laborer's work unless specially stipulated. And here it should be said that it is always safest and cheapest in the end to specify the best materials, especially for plumbing work. The difference in first cost, for example, between medium and heavy water, supply, or waste pipe, or between light and heavy lining for tanks or baths, is slight compared to the durability and safety of the better material. A chain is only as strong as its weakest link, and the quality of the material has a far more important bearing in plumbing than in other work. This is a matter of great importance, and one in which owners and even architects are liable to be deceived. It is a common thing for unscrupulous plumbers to substitute light weight pipe, full of sand-holes, where sound material was specified; and as there are no official tests for such material, only great watchfulness will guard against frauds of this kind. A few years ago, whole car-loads of condemned soil-pipes of this description were bought by "jerry" builders in New York and shipped to Boston, where they may be found in some of the finest residences in the Back Bay region—with what results the reader may easily imagine. In this connection, the rules of the New York Board of Health regarding the weight and quality of plumbing materials to be used in new houses may be consulted with advantage. In making contracts for plumbing, it should be remembered that the lowest bidder may be the most expensive man in the end. No bid should be accepted at so low a rate that the mechanic who takes the contract must either suffer loss or "scamp" the job, and therefore be tempted to cheat at every step. Let the owner inquire about the cost of materials and labor, and make sure for his own protection that there is a living profit left for the contractor, for the latter will "get even with him" in some way.

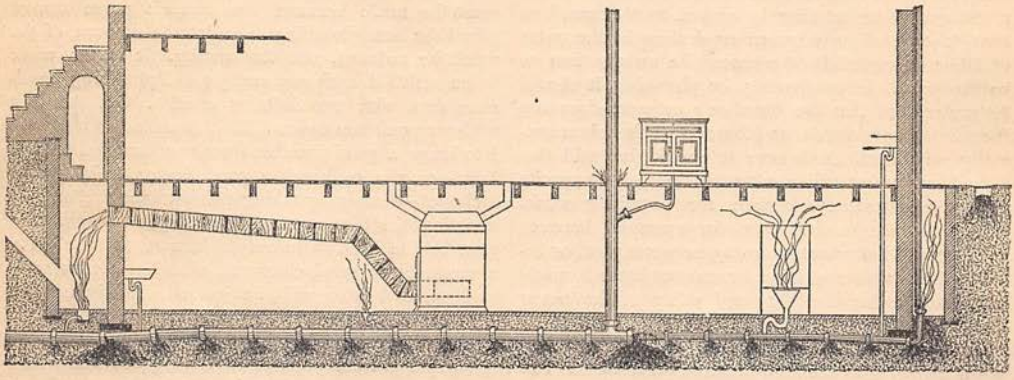
Two facts should be specially borne in mind by property owners. First, that a great saving can be made by having sanitary arrangements made right in the first place, instead of correcting them afterward; and, secondly, that a house in first-class sanitary condition will bring a much higher price than another which has only ordinary drainage arrangements. To illustrate the first point: The expense of putting in a proper drain when a house is constructed would be about half what it would cost to tear up a concreted floor, take out a defective drain and substitute another. The same ratio would occur in the case of carrying a soil-pipe to the roof for ventilation. When the house is building, it is easy to run pipes in any direction, but when plastering must be torn down and replaced, double expense is incurred. It is estimated that the difference between good plumbing and the average work of this kind does not exceed twenty-five per cent. of the original outlay. An average city house can be piped scientifically, with the best materials and in the best way, for about twelve hundred dollars, while the house could not be plumbed at all, provided the same plan were followed, for less than nine hundred dollars. If a compromise must be made because the owner's purse cannot afford the best plumbing, then let the amount of the work be reduced, not the quality. It is far wiser to be satisfied with one really good plumbing appliance than with two inferior articles. Get the best under any circumstances. If it is asked, "How am I to know a good plumber from another?" I answer how are you to know a good doctor or lawyer or architect,—simply by taking pains to inquire, and by avoiding the too common delusion that the cheapest man is the best. The only safeguard is to employ a mechanic of good character, who has a reputation to lose, and who will be guided by his interest and his probity to do only first-class work. If the public will insist on having good plumbing, they will get it. If a man persists in buying sour bread or diseased meat, no one pities him—why then should we condole with one who engages the first plumber who comes along, without taking the least pains to learn his capacity or honesty, and who in consequence gets cheated?

Prime sources of soil pollution are defective cess-pools, or, rather, we may say, the ordinary cess-pools, as they are universally bad in design and worse in execution. A proper cess-pool should be cemented tight, so as not to contaminate the soil in the vicinity; it should be well ventilated, and disconnected from any dwelling or building; it should be regularly cleaned out and disinfected, and not overflow into streams where its contents may cause a nuisance; it should not be within a hundred feet of any well, unless absolutely water-tight, nor near a house. But how many cess-pools fulfill these conditions? They are constantly found under houses and close to windows. They are built of brick or stone, with loose joints, so that their fluid contents leach into the ground about foundations, poison the air, penetrate through the soil to distant wells or water-courses, and breed infection on all sides. They are not ventilated, except by the waste-pipes, which carry the gases of decomposition directly into the living rooms; they are rarely large enough to retain any amount of

material, and hence must of necessity overflow somewhere, while they are seldom cleaned. At Princeton College three years elapsed without a cleaning, and they are usually forgotten until they force themselves on the attention. Householders trust to the permeability of the soil around their cess-pools to convey away their fluid contents, without a thought of what becomes of the material, or what evil influence it may exert on other people's premises. A physician traced a case of typhoid fever to the pollution of a well by a cess-pool one hundred feet distant. In another case the salt used in packing an ice-cream freezer, which was thrown on the ground after the ice had melted, penetrated to a well two hundred feet away. At Princeton a gentleman, suspecting that his well was too near a cess-pool, ordered another to be dug at what seemed to be a point far enough away; but before the excavation was completed the fluid sewage began to flow through a rift in the under-ground rock, and the site had to be abandoned. Where a cess-pool is constantly leaching into the ground, the soil becomes so saturated that the organic matter cannot get oxidized. All authorities agree that it is necessary to absolutely forbid all leaching cess-pools. Colonel Waring says, better run the house waste into street gutters than into "unventilated and leaky caverns called cess-pools."

A dry, tight, well-ventilated cellar is a prime necessity to a healthful house, yet Professor Chandler declares, with all the weight of his experience as a chemist and as president of the New York Board of Health, that "not one house in a hundred has a properly constructed cellar"; and the experience of every one who has opportunities of forming a judgment in the matter will sustain this statement. From my own experience in examining houses in both large and small communities, I do not hesitate to say that the risk to health in most modern dwellings is far greater from bad cellars than from sewer gas and all other unsanitary conditions.

A photographic sketch of the ordinary city cellar would astonish most householders. Let me set down some of its leading features. It is dark—a prime defect. It has little, if any, ventilation, and hence smells musty and damp. Even if floored with concrete it is not dry, for it is liable to be flooded during heavy storms. A supply of coal giving off noxious gases fills one side of the cellar. Barrels crammed with ashes, and too often with garbage, are found in another place. The cold-air box of the furnace is of unseasoned wood and full of cracks, through which the cellar air, laden with coal-dust, ashes, and damp, readily finds entrance. It is just the place for rats or cats to nest. The cold-air box ends at the front or rear area on a level with the surface of the ground, so that the air that enters it is liable to be saturated with soil moisture and surrounding impurities. If a wire netting is placed over the opening it usually becomes choked with dirt. In hundreds of cases these visible defects are enhanced by the hidden evils of broken drains under-ground, or open joints through which sewer-gas finds its way and pollutes the air. It is very probable that the cellar itself has a drain, either without a trap or with no means to keep the trap fed with water, if it exists. A favorite fashion is to carry this drain to the depression around the furnace, and thus create a strong suction from the furnace to draw sewer air into the house. The refrigerator, also, commonly has a waste-pipe connecting with the sewer. A sharp eye will usually discover openings in the walls or ceiling leading up through the house, by which the cellar air may enter the living rooms. Where these are missing the dumb-waiter supplies a ready substitute. If, in addition, the gas-meter leaks, and there is a foul water-closet for the use of the domestics, the cellar may be pronounced a model of neglect and bad arrangement.



AN UNSANITARY CELLAR.

All of these defects can be easily remedied. The cellar can be made and kept dry. The tile-drain can be replaced by an iron drain carried along the side wall in full view, so that any leaks will at once be visible. All surface-drains can be trapped securely, and the traps kept full of water. The walls and ceiling can be whitewashed, and, if kept scrupulously clean and well-ventilated, the cellar will be pure and sweet. The cold-air box to the furnace should be carried up several feet above the ground level, and the box made of galvanized iron instead of wood, or, if of wood, with tongued and grooved joints. Refrigerator wastes can be disconnected from the sewer, and a vast improvement thus effected.

Are modern improvements safe? The ravages of

disease, ascribed by physicians to the influence of sewer-gas in dwellings, has created wide-spread alarm. There is general distrust of plumbing arrangements, and undoubtedly there is much ground for this. But it should not lead to wholesale denunciation of, or total abolition of, what is undoubtedly a great domestic convenience and health preservative. A solution of the whole problem may be found by answering the simple question, Why is it that sewer gas is a comparatively new evil, whose bad effects have only recently attracted attention? Twenty years ago, the average dwelling was much better built than at present. The masonry was more substantial, the interior fittings better constructed, and the plumbing, though less in amount, was more thoroughly executed than is the rule now. The cause of the change which has since taken place is the development of the "speculative" builder, who has built most of the leased houses in New York, as in all our other large cities, and has found a ready market for them. Like Peter Pindar's razors, they have been constructed "to sell," and not for permanent occupation. Cheap, showy, and flimsy, their miserable deficiencies are known to every householder. Leaky roofs, flaking-off plaster, damp cellars, cracked walls, and unseasoned wood-work are a few of their ear-marks. But worst of all is the plumbing, which, being hidden behind partitions and below floors, is easily "scamped," and made to appear elegant and elaborate on the surface, while it is criminally deficient beneath. Marble basins and silver-plated faucets are poor equivalents for trapless and unjointed pipes, often with leaks from which sewer-gas pours with insidious flow, and for the countless other defects common in ordinary houses.

The blame for such unsanitary conditions should not be charged alone upon the underpaid and unappreciated plumber, who has no voice usually in regulating the quality of his work, but upon the unscrupulous contractor who employed him. A share of the blame also rests upon the householder, who rents or buys houses of this class without guarantees of their healthfulness. But the presence of sewer-gas and disease from the bad plumbing in contract-built houses is no argument against having good plumbing in other dwellings. Modern improvements are popular because they *are* "improvements." A copious supply of water is vital to health and essential to every household. The serious proposal to abandon these common features of modern civilization and return to the primitive and offensive sanitary practices of our forefathers is simply absurd. As well abolish stoves, the telegraph, the newspaper, and the use of steam, because each have their drawbacks. The present reaction regarding these matters is inconsistent and inexcusable. Progress is the order of the age, and so long as it is possible to make plumbing absolutely safe and wholesome it is folly to give it up. A properly plumbed house is the safest place to live in, and it is paradoxical to deny it. It must also be borne in mind that modern plumbing practice is not mere theory, nor the result of the whim or interested invention of the plumbing craft, but is the product of the experience of hundreds of keen and watchful observers, many of them with scientific training, and including not only plumbers and builders, but architects, engineers, and physicians.

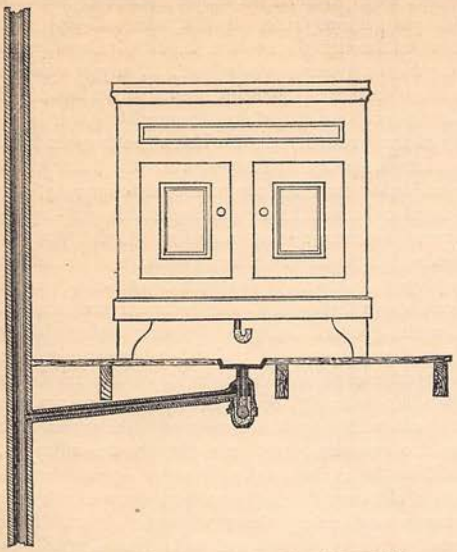
The following general recommendations are suitable for plumbing most modern dwellings: (1) A trap on the main drain, between the house and sewer or cess-pool, with an air inlet open where it will not cause offense, so as to flush the entire system of plumbing with pure atmospheric air; (2) the soil-pipe to be extended through the roof, at its full size, and ending away from chimneys or windows. If any one has any doubt of the necessity of this provision, let him simply take note of the obnoxious vapors which pour out of any of these openings, and which sometimes find their way into neighbors' windows, when the latter chance to be higher than the top of the soil-pipe; (3) traps to be placed on all fixtures, with suitable vent-pipes to prevent siphonage; (4) securing absolute freedom from soil dampness in cellar or vicinity of foundations by proper drains; (5) the furnace cold-air box to be raised above the ground to exclude soil moisture; (6) all under-ground drains to be tested when laid, to insure that they are not broken, and preference given to tarred iron pipe, with gas-tight joints carried along the cellar wall; (7) the tank overflow, refrigerator, and safe-wastes not to connect with the sewer under any circumstances, but to run direct to the cellar or to end over the kitchen sink; (8) no soil-pipe to connect with a chimney flue; (9) no pan water-closet to be countenanced, or any closet, without a cistern to keep it well flushed; (10) no well to be located within two hundred feet of a cess-pool; (11) no garbage or vegetables to be stored in a damp or unventilated cellar; (12) all cess-pools to be ventilated by two openings.

Sewer-gas has been frequently analyzed, and its chemical constituents are well known. Where a sewer is clean, ventilated, and well flushed with water it does not create hurtful gases. If the sewer is laid without a proper grade, so that its contents stagnate and do not flow off easily, or if it gets choked, then it becomes merely an "elongated cess-pool," and foul gases are thrown off in great volume. Decomposition is promoted by the hot water and waste steam from houses and factories which mingle with the sewage. The germs of human diseases that find their way into the sewers are light and almost infinitesimal in size, so that they may be borne with the impalpable and expansive sewer-gas through the house-drain connections along the line of the sewer and into living rooms. It is these germs of disease, of which the sewer-gas is the vehicle or carrier, that are so often the source of sickness.

Hence it is the duty of the authorities to ventilate the sewers by perforated man-holes, and it is the duty of the householder to bar the entrance of the sewer-gases into his house by a trap, and to ventilate his own plumbing as well.

How far disease can be traced to sewer-gas is yet an unsettled question. Men employed in the sewer department state that they can spend days and weeks in the sewers without ill effects. Again, some plumbers assert that they experience no discomfort from working near open connections and the sewer. Others state just the contrary, and I have heard repeatedly of instances of nausea, headache, and other like effects caused by inhaling the air from an open joint or disconnected pipe. In regard to the first statement, it should be borne in mind that it is made by men of vigorous constitution, leading out-door lives, who are actively engaged when in the sewer. The same

influences acting upon persons of less vitality, and engaged in sedentary pursuits, might produce very different results. It is just this class, particularly women and children, who suffer most from such



PROPER FORM OF REFRIGERATOR WASTE-PIPE.

causes, especially while sleeping at night in the average close, unventilated, American bed-rooms with adjacent and defective plumbing fixtures.

Sewer-gas may be created in the waste-pipes of a wash-basin or sink, by the decomposition of the soapy slime which forms the lining of these pipes, just as readily as in the sewer. Hence it is very important to place traps upon these pipes to prevent the gases getting into the rooms, and to ventilate them.

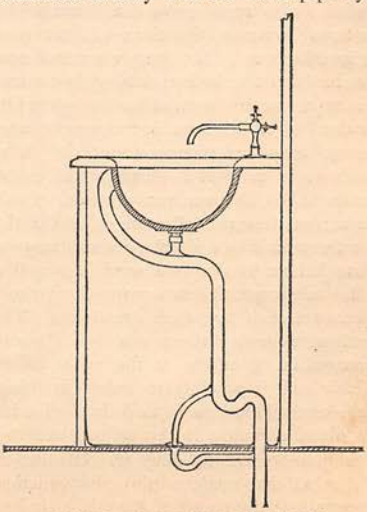
To avoid the chance of their contents being contaminated by foul gases, refrigerators should never be connected directly with any drain or cess-pool. Most food, and particularly milk and meat, is easily tainted if exposed to such influences, and, in repeated instances, cases of sickness have been traced to this cause. The proper method is to allow the refrigerator waste-pipe, with the end turned up, to discharge over an open pan, and this can have its own drain, with a trap to prevent any foul odors returning. Such odors have been created merely from the slime of melted ice adhering to the sides of the waste-pipe.

A sanitary water-closet should be durable, compact, with gas and water tight joints, free from all odors, well-flushed, cleanly, simple in action, with no hidden receiver to store up and decompose filth. The valves ought not to leak or fail to provide a sufficient scour of the bowl; there should be no pan to wear loose or corrode with gases so as not to retain water; there should be no putty-joints to dry and crumble or be gnawed by rats, nor half-made fastenings to rack and break; and, finally, it should be ventilated in every part, and if the compartment where it stands can be ventilated and isolated as well, so much the better. In many English cities, the location and arrangement of water-closets is strictly regulated. In some places they are not permitted under an occupied room, while they must also adjoin an outer wall so as to be readily ventilated. The too common American custom of having the bath-room in the center of the dwelling, with a light-shaft conveniently arranged to ventilate it *into* living rooms above, would not be countenanced by any English sanitarian. Wherever practicable, water-closets should be shut off from the rest of the house by double doors, and have plenty of sunlight and air. The English official requirement that all closets shall be supplied from a cistern and not direct from the main, might advantageously be enforced everywhere.

Even in the best houses water-closets need constant care. All parts should be accessible to the housemaid's scrubbing-brush and soap and hot water. The most absurd extravagance will sometimes be shown in the surroundings of water-closets when more essential matters may be neglected. I have found cheap pan-closets in bath-rooms superbly fitted with marble tiles and other luxuries. The warning about making the outside of the platter clean while the interior is vile should be commended to persons who wish to indulge in luxuriousness in sanitary arrangements.

Nothing is more objectionable, both on the score of neatness and of healthfulness, than the universal plan of boxing in all water-closets with wood-work, which is never taken down except when repairs are necessary, and which becomes, in nine cases out of ten, a receptacle for drip from joints, damp, rust, etc.

With Hopper closets, where the cost is not an obstacle, it is best to line the sides and floor about the closet with enameled tiles, and to remove all the wood-work except a hinged seat, which can be raised. Every water-closet should have a safe made of sheet lead, with the sides turned up and soldered to catch any moisture from leaks or dripping. Where there is risk of ceilings being damaged in case of a break, it is usual to have a small pipe to drain the safe. This is often connected directly with the waste-pipe by means



COMMON ARRANGEMENT OF BASINS.

of a trap supplied by a small pipe connecting with the valve of the closet, so that it is supposed to be filled every time the handle is raised. These feed-pipes, which are the size of a lead-pencil, are apt to clog with

sediment, or fail to act from some other cause, and then the water-seal of the trap on the safe-waste dries up, and there is nothing to prevent sewer-gas passing through it. This little trap may also be siphoned by the discharge of the closet or other fixture, when the same ill results will follow. In good plumbing work, therefore, it is the rule to carry the safe-wastes down to the cellar, or to empty them over a sink where they can do no harm.

Care should be taken to prevent rats nesting about plumbing fixtures, as they will gnaw the pipes if impelled by thirst, and sometimes they will eat into vent-pipes and thus leave openings for sewer-gas, which will not show themselves, as in ordinary cases, by leaks. It is also important to see that the openings in the floor below a water-closet to admit the plumber's pipes are closed at the top, as they may admit cellar air, and also increase the risk of freezing the supply-pipes.

Servants' water-closets are difficult to keep in order, both from their poor quality and the want of care in looking after them. Being out of sight, they are easily out of the mistress's mind. It is rare to find them cleanly or in good repair, but it seems to be thought that anything is good enough for servants. They should never be placed in a cellar unless the latter is well lighted and warmed. Any appliance that is to receive hard usage should be of the best construction and material; hence the servants' water-closets should be of the best make instead of the reverse, and located where the comfort of the domestics will be considered as far as possible. Much might be said regarding the sanitary provisions for domestics. Householders should reflect that their own and their children's welfare is involved in the health of their servants. More than one serious outbreak of sickness in families has been traced to the failure to care for the health of servants.

Charles F. Wingate.

THE WORLD'S WORK.

Protection for Workmen.

We have already referred to mica masks for the protection of workmen exposed to great heat.* Among the new devices for economizing the cost of labor by making the laborer more comfortable, or in guarding him from injury, is a water shield for furnaces. It consists of an apron of sheet-iron, suspended before the furnace, over which a film of cold water is allowed to flow continuously. The apron may be of any size or shape desired, and may be hinged at one side, or suspended on rollers, so that it can be pushed out of the way when it is necessary to open the furnace doors. The upper edge of the apron is bent slightly back, and just above the receding portion is placed a pipe pierced with holes along the lower side. This pipe is joined by means of a piece of hose to the water supply of the place. The lower edge of the apron is bent upward so as to form a trough, and this is connected at one end with a hose for carrying off the waste water. When the shield is in place before the furnace, water is let on through the hose, and escaping from the pipe it flows in a film down the outside of the shield, absorbing the heat of the furnace, cooling the air in front of the furnace, and catching much of the dust that may be in the air. The waste water from the trough may be used for cooling tools used in the furnace, or for any other purpose, or it may be run into a reservoir, and after cooling may be used again. The cost of the shield is very slight. Among appliances for protecting workmen while placing belts over driving pulleys while in motion, is a piece of sheet-iron formed in the shape of a spiral flange, fastened to the edge of the pulley for half its circumference. At one end it is as wide as the face of the pulley and at the other end it narrows to a point. It thus makes a supplemental face for half the circumference of the pulley, and having a spiral edge. On directing the belt, by means of a rod carrying an arm at the top, over the pulley, it meets this attachment, and is, as it were, screwed into place. If it fails to catch the first time it may be taken at the next revolution, and is then easily pressed over upon the face of the pulley. The device has been examined by experts, and is highly recommended as a cheap and ready means of preventing the accidents that so often arise in placing large belts in position. It does not appear to be patented. In lubricating appliances for engines or reciprocating machinery in motion, an automatic oiler, sometimes used in marine engines, deserves notice. It consists of an oil-cup of any convenient shape, having a hollow tube or pipe extending through the bottom, and reaching nearly to the top or cover. A wick, regulated by a screw, is passed through this pipe, and, dipping in the oil by being bent over the top of the pipe, hangs down below the cup. By capillary action the oil gathers at the lower end of the wick, the flow being regulated by the screw. The cup is intended to be suspended over a crank for lubricating the pin, or over any moving machinery, where the occasional delivery of a drop of oil is required. The flexible wick touches the crank-pin, cross-head, or other part of the machinery as it passes it, and thus all the dangers that attend oiling by hand are avoided. The wick in some forms of cups is replaced by a flexible metal strip, or spring, down which the oil flows. The end of the spring just touches the moving machinery, as it passes under it, and the oil is dashed or knocked off upon the place where it is needed. The wick would seem to be the safer and more economical plan, as it will yield most readily to any irregularity in the motion of the machinery. No patent appears to have been

* See "The World's Work" for February, 1882.