

## Sanitary Matters.

### HOUSE DRAINAGE.—I.

The Sanitary Committee of the Society of Arts (London) were able to obtain evidence from Messrs. W. Eassie, Rogers Field, and E. F. Griffith (three engineers having wide experience) on various matters connected with house drainage. The following is the part relating to the examinations of houses and to works:

#### MR. WILLIAM EASSIE:

Will you be so good as to describe, as practically as you can, what is the course of your examination in diagnosing, so to speak, the condition of the house?—In the "Practical Hygiene" of Drs. Parkes and De Chaumont, I have furnished a description of how this is usually carried out in ordinary cases. I first begin with the drains, which I lay bare when I can do so, at various places, in order to see of what they are composed. When I find that they run inside the house, and are not concreted around, I pour in at the end of the drain a measured quantity of water, and collect it at the opening made somewhere in the area, not far from the outfall into the sewer. In some cases I find it necessary to fill the drain with water, and notice if this water disappears, because if it does so, it betokens unsound pipes or bad jointing, in which case I take it up and relay the drain. In testing the suitability of a drain for properly conveying away solid matters, I work the closet by pouring into it some suitable substance, and watch at the opening in the area whether it speedily appears. If it does not quickly make its appearance, and especially if the scouring dislodges any excess of paper or solids not introduced by me during the testing, I conclude that the drain is not calculated to retain improperly the voidance, and I then recommend the drain to be taken up and relaid. By these means I am able to ascertain the general soundness of the pipes, their freedom from forming deposits, and their velocity of flow. If the house has been rebuilt upon an old site, I also examine for any old cesspools or brick drains. I next ascertain the absence, presence or condition of the main trap between the house and the sewer, which is generally found in one of the area vaults. If it is a dis-trap, I invariably find it acting as a cesspool, and remove it, and I do the same with some patterns of syphon traps. Where I am permitted, I then construct a disconnection chamber, with a fresh-air inlet of some kind suitable for the place; and as the next thing to consider is the ventilating outlet of the drain, I pay particular attention to the absence or presence of the ventilating pipes. If the soil-pipes be adequately ventilated, and if these are at the extremity of the drain, carried up to the roof, and terminating sufficiently far from windows and chimneys, I consider them calculated for the work which they have to perform in the matter of ventilation. But I sometimes introduce special ventilating pipes. When the soil-pipes descend into the house, I fill them with water in order to ascertain their soundness; and if, as I frequently find, they leak, I recommend them to be taken away and others fixed, it be at all possible, outside the house. I always assume the soil-pipes to be faulty, owing to improper jointing or decayed solder seams, and subject them to the water or some other test. An examination of the closets follows, and if they are of the horrible pan pattern I condemn them, and if of the valve pattern, with D-traps I remove the latter. Of course the woodwork around the closets must be taken round, and if the trays or safes have their wastes conducted into the D-traps, I make a note of the removal. I pay particular attention to the servants' closets, and see whether they flush properly and are of a good pattern. The next inquiry is regarding the cisterns which supply the closets, and it frequently takes a considerable time to ascertain whether these cisterns also supply drinking water, and to where the overflows are led. If I find them supplying taps from whence drinking water is likely to be drawn, I proceed to notice where a separate cistern can be fixed for this service, and make a memorandum of recommendation to this effect. An examination of all other cisterns follows, and I carefully notice whether the overflows are properly disconnected, and also the physical appearance of the water and the state of the cistern interiors. I notice whether any of the basement closets are supplied direct from the mains. Very likely next in rotation would come the waste deliveries of the sinks, baths, and lavatories. If, as I too frequently find, they enter the soil-pipe, the closet-trap, or the drain direct, I specify their immediate removal. It is sometimes difficult to disconnect some of the sinks in the interior of the house, but it is always possible to contrive some method of doing so. I always make a note insisting upon the disconnection of the rain-water

pipes, and their delivery over a gully. When I find an improper disconnection as is frequently the case with sink wastes, I indicate the best method. Sometimes a too free method of disconnection has been followed, as, for instance, where an untrapped sink waste is made to deliver close to the trapping water of a gully, and where the effluvium from the latter is led into the room. I find it very often necessary to draw attention to the position occupied by the closets, and to the want of ventilation of the spaces in which they are placed, as also to the general ventilating arrangements of the house, and whether there is a proper air flushing, it possible, to the rooms and staircase.

What forms, sizes, and inclinations do you usually adopt for house-drains? My chief desire is to make use of the smallest possible pipes, and I use stoneware pipes of four inches diameter when these can perform the work, and if they will not, then pipes of six inches diameter. Sometimes I am obliged to use pipes nine inches diameter, but this is more rarely, and only as a main when several six-inch pipes junction into it. I rarely find use for twelve-inch pipes. The fall greatly depends upon the depth of the sewer, and I take as much fall as the latter will afford me, providing a little extra fall before the main disconnection chamber. Where there is a good means of flushing, the amount of fall is of less consequence. I find houses where it is impossible to get a fall of more than an inch in ten feet. Mr. Field's self-acting syphon is of immense advantage in such cases, and I have fixed them in connection with the sinks whence the cleaner kinds of wastes are delivered.

What are the modes you find applicable for testing the sufficiency or competence of this description of work?—If the pipes are laid down on proper lines, surrounded by concrete, with occasional man-holes it is very easy to ascertain whether they act properly. As for the disconnected traps, their efficiency can be seen at a glance. The chief delinquencies are found at the water-closets, and the proper working of these is tested by the rapidity with which introduced paper, etc., can be carried to the disconnection chamber, which I mostly cover for this very purpose with an iron man-hole cover easily lifted up. If any smell arises in a properly laid drain, and from a closet, the soil-pipe of which is ventilated by a pipe of the same diameter, to the outer air, I generally attribute it to some temporary stoppage of the drain, owing to the introduction of some foreign substance, such as a duster down the closet. In any case the fault ought to be easily remedied when the work has been properly executed. In every case where pipes are led down inside the house, they should be cased in with hinged casings, and the seats and risers of water closets should also be so constructed as readily to afford inspection. It is not in my opinion necessary to employ a workman to test the efficiency of any drain, and as I provide a plan of the house, showing the position of the man-holes and air-chamber, it is only necessary for a servant to raise the covers to see if the drains run clear. Screw caps on the various traps render it easy to remove any temporary stoppage at these places. With a proper plan of the drain in his hand, and with an air-chamber, i.e., a disconnection chamber, easy of access, a man should be able to test the efficiency of all the waste removals, in the course of an hour, even in the largest houses.

#### MR. ROGERS FIELD:

Will you be so good as to describe, as practically as you can, what is the course of your examination in diagnosing, so to speak, the condition of a house?—The first point is to ascertain whether the drains pass underneath the house or outside it. If they pass underneath the house I test them carefully for soundness (to ascertain whether they are water-tight), as well as testing them for freedom from deposit and velocity of flow. If they pass outside I merely apply the two latter tests. The test for soundness is managed as follows: The drain is opened down too, at its lower end generally in the area between the house and the street, and carefully stopped with a plug of clay. Another opening is made in the drain, and the drain is then gradually filled with water. As soon as the drain is full the water is turned off, and carefully watched at the upper opening. If the water remains in the drain, the drain is sound, but if not, the drain is leaky, and the rapidity with which the water sinks indicates the amount of the leakage of the drain. It is not at all unusual for the water to run away so rapidly that it is impossible even to fill the drain so as to make the water show at the upper opening at all. The test for deposit is by flushing from the closets, sinks, etc., and pouring down a large quantity of water and watching the drain at the opening at the lower end (of course without any plug in it). If the water comes down thick or with a bad smell, it shows that there is a deposit; if it runs clear and sweet, it shows that the drain is clear. The test