REPORTS

ON

SANITARY ENGINEERING IN HOUSES,
HOSPITALS, AND PUBLIC
INSTITUTIONS.

BY WILLIAM EASSIE, C.E.

II.

Ventilation and Disconnection of House-drains from the Sewer, etc.

SUPPOSING any of the drain-pipes mentioned in the former article to have been carefully laid and with proper fall from the sewer up to the outside of a building, the next question to consider is, how best to convey into them the various *effluvia* matters of the household. The common practice is to run the pipes into the house, and join the waste-pipes directly into them; but the consequence of this is, that the sewer-air, when compressed from any cause, forces the hydraulic seals of the traps, and disperses itself over the house. One safe plan, therefore, is to disconnect the drain-pipes inside the house from those outside the house by building over the channel of conveyance, somewhere close to the exterior side of the wall, a grid or grating, and so opening the drain at that point to the light of day. By such a procedure, the passage of the sewer-gases into an establishment is effectually prevented.

A simple system of disconnection is the constructing of a small and shallow square well at the side of the house, as drawn at Fig. 21; and the fixing between it and the drain proper of a syphon which will prevent the exit of the sewer-air. If sewer-gas should bubble up and escape, it would soon be dissipated in the open air. At about a foot or two above this well-hole, the rain-water pipes, and the sink, bath, and lavatory wastes are made to deliver their contents; and it is optional whether a grating be affixed to the top of the well or not. It is found in practice, however, that an open drain-ventilator of this description very close to a house sometimes proves a nuisance. Another method of achieving the same end, and avoiding this, is to terminate these pipes about the same height from the ground, and cause them to spout their contents over such a trap as that drawn at Fig. 22. This trap is furnished with a water-seal; that is, a small body of water is interposed between the air of the sewer and the respirable atmosphere. A syphon like that drawn on the sewer-side of the ventilating well (see Fig. 21) is in this case not absolutely needful, but it would be an additional precaution.

There is a ready-made article, known as Mansergh's ventilating trap, which comes sufficiently near, for most practical purposes, to what is wanted; and this is sketched in section and elevation at Fig. 23. For instance, a sink-pipe is made to terminate over a small trap on an upper shelf of the main body of the trap. The drain-pipe from the sewer leads into a lower and larger trap; and opposite this is a ventilating pipe, of about four inches diameter, which runs up the side of the wall to the top of the house, and takes any excess of sewer-gas which may be in the drains between the trap and the sewer. Should, however, the sewers become overcharged by the tide or by heavy rain-falls, and any sewer-air force this lower water-trap, it will at once rise to the open grating at A, which is over the space between the drain-pipe and the sink-pipe or other waste-pipe, and be scattered abroad. This ventilating medium of Mr. Mansergh's is to be trusted to, provided that the rain-water pipes are not made to act as the sole ventilators. The pipe which enters the trap is needed for ventilation alone; and, if the rain-water be required to enter the same gully, the whole trap, which is of earthenware, should be bodily lowered just so much as will allow the rain-water pipe to be bedded in the pavement as far as the grating over the central chamber of the trap. It is a fallacy to rely upon the

rain-water stack-pipes to properly ventilate the drains; for, when most wanted—viz., after a storm—they are performing their own specific duties.

Mr. Molesworth has lately invented a trap which is worth a description, as it is about the only other article in the market which carries out this kind of drain-ventilation. A sketch of his arrangement is given at Fig. 24.

Here the rain-water pipes and smaller waste-pipes and overflows empty themselves so as to run through the grating at A. The fouler sink and scullery wastes are supposed to be brought into the drain by the pipe B. The sewer-air is prevented from entering the sink-pipes and so passing into the house, by the water-trap; and even if this water-seal were forced, owing to a sudden change of temperature in the main drains, or any like cause, the foul air, which escaped would rise through the large grating at A and be harmlessly distributed. Fig. 25 exhibits his method of ventilating the soil-pipe of the water-closets. A sigmoidal bend is attached to the base of the closet as usual, and from this there rises up an air-pipe of wide diameter D to a few feet above the eaves. This pipe ventilates the drain inside the point of disconnection.

Deodorisation of House-Drains.

Sufficient has been said concerning disconnection; but, as cases will continually occur in which the escape of any smell whatever would prove noxious, it will be necessary here to point out how the house-drains can be deodorised as well as ventilated.

An excellent plan would be to fix somewhere above the line of drain-pipe between the sewer and the place of disconnection, a square perforated box containing charcoal, which would purify the mephitic gases as they were formed, and prevent them reaching the house, or even the back yards of the house. A protruding ventilator of this description is sketched at Fig. 26.

In the case of shelving terraces, or of houses built at different levels, it would not be difficult to understand how the ventilating continuations of the soil-pipes of the lower placed houses might taint and perhaps dangerously infect the atmosphere of the houses above. To avoid this, the top of the ventilating pipe could be fitted with a ventilating shaft, such as is shewn at Fig. 27, which is a hollow column provided with gratings, upon which are placed canisters of charcoal or other disinfectants. The above two methods of deodorising the drains were lately patented by Dr. Taylor.

It must be understood that, as Dr. Stenhouse did not in 1854 protect by letters patent the use of charcoal for this purpose, patents which provide for the slow combustion of the sewer-gases by charcoal, can simply monopolise peculiar methods of exposing that material. Another registered design for the end of the soil or ventilating pipe is given at Fig. 28, the invention of Mr. Lidstone. The space around the central perforated chamber, which is equal in diameter to the ventilating pipe, is packed with charcoal, and, in consequence, the ascending air of the drains is purified before it can emerge into the exterior atmosphere.

In the grounds appertaining to a large public building, where from the very length of the drains there must be a generation of some foul gas, a ventilating pipe and deodorising arrangement become in most cases necessary; such a contrivance is sketched at Fig. 29, which is a view of the drain-pipe ventilator of Messrs. Brooke and Sons, largely adopted—especially in the north of England. A much larger venti-

lator, suitable for erection over a square shaft, and very well adapted to the larger drain-pipes, is given at Fig. 30, and here the charcoal is laid upon a portable spiral tray. The rain or road-water enters in at the annular gratings outside, and when the grit box is full, *i. e.*, as high as A, it runs away down the small square trough underneath the shelves of tray and so into the sewer. All the gases rising from the sewer are compelled to pass these charcoal barriers. It is impossible, also, for water to get at the charcoal and so expel the oxygen there.

The main sewers are formed either circular in shape, as drawn at Fig. 32, or egg-shaped, as at Fig. 33. In both cases, it is usual to lay in the bottom with what are called invert. These are sketched at Fig. 31, and are shown in their places at Figs. 32 and 33. Where the drain-pipes of a house enter the main sewer, a flap-trap similar to Fig. 34 is fixed in the sewer-walls. A square one, for instance, is shown in the sewer at Fig. 33. These flaps swing open to allow the house-drains to empty themselves, and close again to shut out from the drain-pipes the foul air of the sewers.

Sewers.

A patent mode of ventilating the sewers, the invention of Mr. T. Walker, and one largely adopted in Birmingham, is drawn at Fig. 35. A peculiarity of the system is, that the earthenware drain-pipes lead into the sewer at the bottom, and not half-way up, as is usual. Moreover, instead of a flap-trap, there is a water-trap. The ventilating pipe is a very good feature in the arrangement, whatever might be said about the liability to choking up at the entrances to the tributary drains.

It might be useful to explain that, when two sewers join together, in the direction of the flow of the sewage, as they should always do, what is called a *bell-mouth* is formed, with a ventilating shaft up to the roadway. One description of these junctions is drawn at Fig. 36. There are also side entrances into the sewers; and one of these flights of steps, which are arched over, is exhibited at Fig. 37. Two sections, also, of a common roadside gully are given at Fig. 38. These are fixed in the road beside the kerb of pavement, and, as will be noticed, are so constructed that they will intercept the road-grit, and so prevent the filling up with gravel, etc., of the space left for the water.

The sewers are deodorised and disinfected in many ways. A view of the apparatus which is inserted in the crown of some sewers, in the

middle of the street, is sketched in plan and sections at Fig. 39. The charcoal-trays can be observed in plan at D, and in section in the sketches above and below. Fig. 40 represents the common method of ventilating and disinfecting the larger pipe-drains of the streets; and here the charcoal screen is placed in an upright position (see D). The sewers are similarly treated, but the movable filtering screens are laid across the shaft, as drawn at Fig. 41. When there is a break in the sewer, a flap is fixed at A; and this prevents, or is intended to prevent, the foul air from reaching the higher districts of a town. The sketches Figs. 40 and 41 were first prepared by Mr. Rawlinson, and are copied from an official pamphlet of his.

The foregoing description of the drain-pipes and sewers will probably be deemed sufficiently explanatory; and we will therefore, in the next article, point out the most useful kinds of traps.

ASSOCIATION INTELLIGENCE.

YORKSHIRE BRANCH.

THE autumnal meeting of this Branch will be held at Scarborough, on Tuesday, October 22nd.

Gentlemen who purpose attending the meeting, or bringing forward communications, are requested at once to communicate with the Local Secretary.

W. PROCTER, M.D., *Honorary Secretary.*

York, October 2nd, 1872.

SOUTH WALES AND MONMOUTHSHIRE BRANCH.

THE autumn meeting of this Branch will be held at Pontypool, on Friday, October 25th; T. J. DYKE, Esq., F.R.C.S., President, in the Chair.

Members who are desirous of reading papers, etc., are requested to communicate their intention to one of the Secretaries, without delay.

ANDREW DAVIES,

ALFRED SHEEN, M.D., } *Honorary Secretaries.*

September 25th, 1872.

BIRMINGHAM AND MIDLAND COUNTIES BRANCH: PATHOLOGICAL AND CLINICAL SECTION.

THE annual meeting will be held on Friday, October 25th, at the Midland Institute, Birmingham. The Chair will be taken by Mr. HOUGHTON, at 3 P.M.

T. VINCENT JACKSON, *Honorary Secretary.*

Birmingham, October 14th, 1872.

CUMBERLAND AND WESTMORLAND BRANCH.

THE autumnal meeting of the above Branch will be held at the Green Dragon Hotel, Workington, on Friday, November 1st, instead of October 30th, as previously announced; T. S. CLOUSTON, M.D., President, in the Chair.

Gentlemen intending to read papers or cases, or be present at the dinner, are requested to give notice to the Secretary as early as possible.

HENRY BARNES, M.D., *Honorary Secretary.*

Carlisle, October 16th, 1872.

SOUTH-EASTERN BRANCH: WEST SUSSEX DISTRICT MEDICAL MEETINGS.

THE autumn meeting of the above district will be held at the Norfolk Hotel, Arundel, on Tuesday, October 29th, at 2.45 P.M.; Dr. TYACKE, of Chichester, in the Chair.

The dinner will take place at 4.30 P.M.

Members who are willing to read papers, or bring forward cases, are requested to communicate with the *Honorary Secretary at once*, in order that notice of the same may be inserted in the circular convening the meeting.

WM. J. HARRIS, *Honorary Secretary.*

13, Marine Parade, Worthing, October 14th, 1872.

BATH AND BRISTOL BRANCH.

THE first ordinary meeting of the session will be held at the College Green Hotel, Bristol, on Thursday evening, October 31st, at 7 o'clock; T. G. STOCKWELL, Esq., President, in the Chair.

E. C. BOARD,

R. S. FOWLER, } *Honorary Secretaries.*

Bristol, October 1872.