even bedroom basins with common sewers by a continuous system of piping, in which the only safeguard against the entry of sewer gas is a single trap close to each sink or basin. This means that sewer gas, charged with the infection of a whole community, is brought within a few inches of the atmosphere of the dwelling, ready to contamin­ate it whenever the trap fails from any of the causes which have been named, or whenever, by a flow of water through it, the seal is sufficiently disturbed to allow bubbles of gas to escape into the room.

The remedy for this lies in having, at any convenient point on each house-drain, a disconnecting trap which separates the house system from the sewer, and so establishes what

may be called an outer line of defence. Any

accidental leakage of sewer gas through it then

does no more than cause a comparatively slight

pollution of the air within the house-drains,

and if these are well ventilated the effects of

this are insensible. At each individual basin

or other fitting a trap is still required, but its

function is now merely to shut out the air of

the house-drains from the rooms, and, as the

air of the house-drains is no longer polluted

by connexion with the servers, the occasional

failure of this function is a matter of com­

paratively small moment. Further, the dis­

connecting trap on the house-drain furnishes

a convenient place of access for fresh air ; and

the ventilation is completed by carrying the

highest point of each soil-pipe or waste-pipe

up to the level of the roof and leaving it open

there. This arrangement will be understood

by reference to fig. 6, which shows a soil-pipe,

open at its upper end, discharging into a

house-drain in which there is a disconnecting

trap provided with an open grating for the

entry of air. The soil-pipe is ventilated by a

current of air which (usually if not always)

flows upwards. This not only dilutes any

gases that are produced in the pipe, but

quickly oxidizes any foul matter that may

adhere to the sides. Care must be taken to

avoid having the upper end of the pipe open

near windows or under eaves. In the figure

the branch leading to a

water-closet is ventilated by

a pipe carried into an upper

part of the soil-pipe ; this

is scarcely necessary if the

branch be short. Another

construction is to carry a

distinct ventilating pipe up

from the top of the branch

to a point above the roof;

and where several fittings discharge into one soil-pipe, the same ventilating pipe may be made to serve for all. An example of the latter arrangement

is shown in fig. 10.

The form of dis­

connecting trap

shown in fig. 6

is that of Mr

W. P. Buchan of

Glasgow, who has

done excellent ser­

vice to the cause

of sanitary re­

form by practising

and advocating

the disconnexion

and ventilation of

house-drains and

soil-pipes. The same trap is

shown to a larger scale in fig.

7, where it appears imbedded

in concrete and covered by a

built manhole, which gives ac­

cess to the trap in case of its

becoming choked. The man­

hole may have an open grating

at the top ; or the top may be

closed by a solid plate (if a

grating there be for any reason

inadmissible), in which case a

ventilating shaft is carried from the manhole to some other open­ing. Fig. 7 shows such a shaft leading to a grating which is placed vertically in a neighbouring wall. Among other good forms of disconnecting trap, more or less like Buchan’s, mention may be made of Weaver’s, Potts’s, and Hellyer’s.

An arrangement of double disconnecting trap is illustrated in fig. 8. Any sewer gas forcing the trap next the sewer is still kept back by the upper trap and will

escape by a grating or open ventilating shaft which enters at A, while air to ventilate the house-drain enters the upper trap from the manhole. This arrange­ment no doubt gives more absolute protection than a single trap of the kind al­ready described, but it is probable that (except in cases where the sewers are very foul and liable to frequent excess of pressure) the ad­vantage is so slight as to be more than counterbalanced by the greater liabil­ity to accidental stoppage and greater complexity which this arrangement entails.

The extent to which it is permissible or advisable in practice to allow several fittings to discharge into a single waste-pipe or soil-pipe will vary in different cases. We can recognize a broad distinction between sewage from closets and urinals, liable to the most dangerous taint should disease occur within the house, and the comparatively innocuous sewage that comes from basins, baths, and sinks. Some sanitarians go so far as to advise that these two classes of sewage should be kept absolutely apart within the house, by the use of a complete double system of house drain-pipes. This, however, is an extreme measure ; no reasonable objection can be urged against the discharge into a water-closet soil-pipe of water from a bath or washhand basin in the same room, except perhaps that if the soil-pipe is of lead its corrosion is hastened by hot water ; and the additional flushing which the soil-pipe so receives is a distinct advantage. But to connect a water-closet soil-pipe with sinks and basins in other apartments is to multiply possibilities for the spread of disease within the house, and it is strongly advis­able to convey the waste from them by a separate pipe, protected from the sewer by a disconnecting trap of its own with a grating open to the air. This applies with special force to the washhand basins that are often fixed in bedrooms and dressing-rooms. Nothing could be more dangerous than the usage—of which many good houses still furnish instances—of multiplying these conven­iences without regard to the risk they involve, and making this risk as great as possible by placing each in direct communication through an ordinary trap with the soil-pipe, itself perhaps unven­tilated and provided with no disconnexion from the sewer. Even when the drain or soil-pipe is ventilated and disconnected from the sewer, no bedroom basin should, under any circumstances, be allowed to discharge into it without first passing a separate open trap. On the other hand, a bedroom basin may be made perfectly safe by leading its

waste - pipe (trapped

under the basin in the

usual way) into an

open-air channel which

communicates with the

sewer by a surface-trap

or gully outside the

house (fig. 9). Similar

treatment should be

adopted in the case of

pantry and scullery

sinks. Under most

plumbing fixtures it is

usual to place a safe-tray to receive any water accidentally spilt. The discharge pipes from these trays are sometimes, but very ob­jectionably, led into the waste-pipe or soil-pipe below the fixture. The proper method of providing for the discharge of water spilt into the safe-tray is to lead a pipe from it through the wall and allow it to end in the open air (fig. 10, where each of the safe-tray drains is marked “ waste-pipe ”) ; a flap valve fixed on the end will serve, if need be, to keep out draught.

Overflow-pipes from cisterns used for dietetic purposes should be led, in the same way, into the open air and not into soil-pipes or waste-pipes (fig. 10). Traps on them cannot be depended on to remain sealed, and any connexion of an overflow-pipe with a soil- pipe would result in allowing foul air from the pipe to diffuse itself over the surface of water in the cistern—a state of things peculiarly likely to cause pollution of the water. When a cistern is used only for water-closet service, its overflow-pipe may properly be led into the basin of the closet.

Rain-pipes, extending as they do to the roof, are sometimes used