resulting inadequate scour through the trap leading to an accumulation of solids. The trap is provided with a *clearing arm* (also called a *raking arm* or *cleaning arm*) through which a drain rod can be passed to clear any obstruction between the trap and sewer. A *stopper* or *cap* is fitted to the arm. There are several types of stoppers, including (1) a simple ware disc which is cemented to the socket; (2) a ware disc having a bituminous rim, which, when smeared with grease or a non-setting composition, is fitted to a similar bituminous ring on the socket of the arm (see M, N and P, Fig. 28); (3) a cap which is screwed to the socket to form a bituminous joint; and (4) that shown at L and known as a *releasing stopper*.

The latter is the best form. The body of the fitting is cemented into the socket of the arm; the stopper is tightly forced in position by means of a lever which engages in slotted projecting lugs; a chain is attached to one end of the lever and passes through a staple fixed near the top of the chamber. It is an airtight stopper; it cannot be forced out by pressure of gases in the sewer, and in the event of the trap becoming choked and the chamber filled with sewage, the latter is caused to escape down the raking arm by jerking the chain and releasing the stopper; otherwise, unless the obstruction can be removed by prodding the trap, the sewage can only be removed by baling or pumping.

None of the above stoppers (1), (2) and (3) can be removed like the releasing stopper to empty a chamber filled with sewage. In addition, when stopper (1) is cemented in, it is difficult to remove without causing damage; if left uncemented (as is general) the joint is not airtight and the cap is readily forced out, by excessive pressure of sewer gases, into the trap to cause stoppage of the drain. Stopper (2) is an improvement upon (1) as it is easily removed when required and the joint is airtight; it has, however, a similar defect in that it can be forced out by back pressure from the sewer.

The trap has a flat base, and it is set correctly by means of a spirit level placed upon the " true levelling edge " (see P, Fig. 28).

Formerly, most local authorities insisted upon the disconnection of house drains from sewers by the provision of intercepting traps. *In many districts now, however, the use of such traps is optional, and an increasing number of authorities advocate their abolition* for the chief reasons that (1) the trap is liable to become choked, preventing the escape of the sewage and its ultimate overflow at the gullies; (2) the air in soundly constructed sewers is not more harmful than drain air, and disconnection therefore serves no useful purpose; and (3) increased ventilation of the whole sewerage and drainage system results when interceptors are omitted. The generally accepted view now is that interceptors are unnecessary if the sewers are properly constructed and adequately ventilated, but such traps are essential if the sewers are neither self-cleansing nor suitably ventilated.

Both inspection and intercepting chambers are commonly referred to as *manholes*, but this term should not be used in connection with house drainage owing to its ambiguity.

VENTILATION.—Drains must be efficiently ventilated (see principle No. 5), and the Model Bye-laws require that " at least *one* ventilating pipe " shall be provided to a drainage system as far as possible from the connection to the sewer. The chief aim in drain ventilation is to reduce the pressure of the foul air within the drains by providing for its discharge into the open where it will not cause a nuisance or endanger health; otherwise the accumulation of the gases may be such as to unseal traps and thereby permit of the escape of noxious air into buildings or at the ground level.

The simplest and most effective means of ventilation, generally accepted up to within recent years (see below), is to provide an inlet at the lower end of the drain and an outlet at its upper end or head. The inlet is usually a short length of ware pipe taken from near the top of the intercepting chamber and continued by a vertical cast iron pipe, 5 or 6-ft. high, fixed to the boundary wall or fence; this is finished with a head having a louvred opening, behind which is a hinged aluminium or mica valve or flap (see C and D, Fig. 30). The outlet is a cast iron pipe provided at the head of the drain. Such an outlet ventilating pipe is shown at F, Fig. 30; this would be fixed to the wall of the building and continued at least 2-ft. above the eaves and distant from dormer, etc., windows (as at D, Fig. 32); its foot would be connected to the 4-in. by 4-in. junction in the main drain by means of a 4-in. diameter bend. Thus, air entering the drain through the valve at the lower end traverses the drain before escaping at the head. *In practice, however, the INLET pipe is often found to be an unsatisfactory feature owing to the valve becoming either stuck or damaged or detached, and thus acting as an outlet. It is for this reason that many local authorities do not now insist upon the provision of ventilating inlets, and existing inlets are often abolished, especially if they are adjacent to buildings or public footpaths.* The bye-laws state that the minimum internal diameter of a ventilating outlet shall be 3-in. and that the open end shall be protected against obstruction, such as a bird's nest, by the provision of a spherical galvanized iron (or copper) wire cage (see D. Fig. 32). As a ventilated soil pipe (see D, Fig. 32) acts as an outlet it may serve as the required outlet provided it is situated near to the head of the drain. It is not practicable to ventilate every branch drain, and this is an additional reason why branches should be as short as possible (see principle No. 6). In addition to the outlet at the head of the drainage system, many local authorities insist upon the provision of a ventilating outlet at the head of every branch drain which exceeds 30-ft. in length.

DISCONNECTION OF RAIN WATER PIPES AND WASTE PIPES (see principle No. 8).—Rain water pipes must not be utilized to ventilate drains. They must not therefore be connected direct to a drain but must discharge over gullies (see pp. 72 and 74).

Waste pipes from sinks, lavatory basins and baths must discharge over gullies outside (p. 72). In addition, and in accordance with the Model Bye-laws, each of these waste pipes when it exceeds 6-ft. in length must be provided with a suitable trap. The object of such traps is to prevent the entrance of gases from decomposing organic matter which coats the inside of the pipes; many local authorities insist upon all waste pipes being trapped, irrespective of their length.

These requirements are illustrated in Fig. 32, thus:

A trapped sink waste is shown discharging over a gully at A. The standard