gully is bedded upon 6-in. of concrete, and its outlet is curved, as an alternative to that at Q, Fig. 28, in order that the upper end of the drain (especially if subjected to overhead traffic) may have increased cover and protection, and to provide a good connection to a branch drain having a steep gradient.

The trapped bath waste pipe at B discharges into a hopper head of a rain water pipe which is disconnected over a gully at the ground level. This gully is in the form of an S trap and is suitable for a short branch pipe to the drain shown. It will be observed that, because of the depth and close proximity of the main drain, this branch drain consists of a slow bend and a short pipe which is cut to the required length to fit the junction at the main drain. Economy results if, as shown by broken lines at B, drainage from the roof is provided by the rain water pipe which delivers into the hopper head. The anti-splash shoe shown is effective in preventing fouling of the adjacent paving, etc., which often occurs when the ordinary type of shoe is provided, and especially when a large volume of water is discharged from a bath at a high velocity (see p. 72).

The trapped lavatory basin waste pipe shown at C is connected to a vertical pipe which is continued to the ground level where it delivers over a gully. Some authorities require such a vertical pipe to be continued above the connection and (like the ventilating pipe at D) terminated above the eaves. This is an alternative arrangement to B.

These waste pipes are of lead or copper, and the traps are provided with cleansing screws to afford means of access when required.

WATER CLOSETS.—These must be connected direct to drains (see principle 9). There are many types of these fittings; those shown at D and E are of the *washdown pedestal* type, and have a 2-in. seal. If situated on the ground floor, as at E, it is usually connected to the drain by a bend. A pedestal provided on an upper floor, as shown at D, must be connected to a cast iron or lead *soil pipe* which is jointed to the drain and its upper end is continued as a ventilating pipe terminating at least 2-ft. above the eaves (see p. 82).

These various sanitary fittings are included here in order to make the description more complete. They are not usually studied in detail in the second year of a course.[1]

DRAINAGE SYSTEMS SHOWN IN FIGS. 30 AND 31.—A drainage plan of a small one-storied house is shown at A, Fig. 30. It complies with the principles laid down on p. 78. The gully at F receives a rain water pipe and the lavatory basin waste pipe, and the 4-in. drain from it is laid with a uniform gradient of 1 in 32 to the inspection chamber L. The water closet is connected direct to the drain which is also taken to the chamber. A rain water pipe and the lavatory basin and bath waste pipes discharge over gully J connected to a 4-in. drain. As these drains are laid in straight lines to the inspection chamber they can be easily rodded if necessary. The main drain is continued at the same gradient to the intercepting chamber M,[2] collects the short branch drains from the gullies at H and K, and proceeds with an increased gradient to the public sewer to which it is connected in the direction of the flow. A ventilating outlet is connected to the head of the system at F; *if required*, a ventilating inlet is provided at M (see p. 82). A section through the main drain is shown at E. In order to provide additional protection to the upper portion of the drain (which will be necessary if there is likely to be any traffic over it) it may either be encased in concrete (see P, Fig. 29) for two or three pipe lengths, or the drain at the connection to gully F may be given additional fall (see B, Fig. 32). Details of the intercepting chamber are shown at B, C and D and have been explained on p. 81. The construction of the inspection chamber L is somewhat similar to, but smaller than, that illustrated in Fig. 31 and described on p. 80.

A key plan of portion of another drainage system is shown at A, Fig. 31. This has been introduced to show the application of a deep inspection chamber, detailed on this drawing, and which has been already described.

[1] Details are given in Vol. IV.

[2] This has been shown as an intercepting chamber to satisfy the requirements of those local authorities who still advocate the use of the intercepting trap. As pointed out, however, on p. 82, many local authorities deprecate the use of interceptors, and therefore in those districts coming under their jurisdiction the trap may be omitted at the chamber at M which would then serve as an inspection chamber only.