

wiped off. Gutter bolts vary in size from $\frac{3}{4}$ -in. by $\frac{1}{4}$ -in., 1-in. by $\frac{5}{16}$ -in. and $1\frac{1}{2}$ -in. by $\frac{5}{16}$ -in.

Whilst the above is the commonest form of joint, some gutters are specified to have inside sockets; these are necessary if the exterior of the gutter is not to be interrupted by the sockets, as is sometimes advisable for moulded gutters. An inside joint is also indicated in section at y.

TROUGH GUTTERS.—These are large cast iron gutters which are used, especially for factories and similar buildings, instead of lead parapet and V-gutters.

DOWN-PIPES

The size of down-pipes varies from 2 to 12-in. *internal* diameter, those specified for houses being generally $2\frac{1}{2}$ or 3-in., and are in 6-ft. lengths *including* the sockets (see j). Short lengths are also obtainable. The thickness is similar to that of eaves gutters.

SPECIAL FITTINGS.—These include swan-neck bends, rain-water heads, offset bends, shoes, and single, double and Y-branches.

Swan-neck Bend (see f and perspective sketch).—This is necessary to connect the nozzle-piece or outlet (see d) of a gutter which is fixed to an overhanging eaves and the top length of a down-pipe.

Rain-water Head (see p).—These are obtainable in many stock sizes and designs; they are used to receive water from parapet gutters (see b and c, Fig. 71), waste-pipes from lavatory basins and baths, and as ornamental features they are fixed at the top of down-pipe stacks to receive water delivered from swan-necks.

Offset Bends (see x and sketch).—These are similar to swan-necks and are required to negotiate plinths, etc. Double offset bends, called *pass-over offsets*, are obtainable to clear string courses.

Obtuse bends, long bends, quarter-curved bends, etc., are also available for special purposes.

Shoes.—These are fixed to the lower ends of rain-water pipes and discharge over gullies—traps connected to drains (see perspective sketch). That shown at w is the standard type and is satisfactory for fall-pipes which discharge rain-water only. If the pipes deliver waste-water from baths, etc., a nuisance may be caused by the water splashing over the gullies; such is prevented if *anti-splash shoes* (see v) are used, the projecting plate (see section) breaking up the flow. *Boots* are similar to shoes but have legs up to 12-in. long.

Single, Double and Y-Branches are used for connecting two or three branch pipes to a common down-pipe; a single branch is shown at o.

The above bends and shoes may be obtained with or without lugs cast on (see below). Cast iron pipes are also made of rectangular and square sections in sizes varying from 3-in. by 2-in. to 8-in. by 8-in. Holderbats (see later) are made to match.

SUPPORTS.—Rain-water pipes are supported by means of (a) spikes which are driven through *ears* or *lugs*, or (b) by *holderbats*.

(a) Down-pipes can be obtained with or without lugs cast on. Those with lugs cast on (see k) are used for ordinary work. All cast iron pipes should be fixed at a distance of 2-in. from the face of the wall to allow the backs of the pipes to be painted, otherwise the metal will corrode and rain-water will escape through the holes or cracks which eventually form to cause disfigurement and dampness. The pipes are maintained at this distance by the use of either cast-iron bobbins (see t) or hardwood bobbins; two of these are required at each lug and the pipes are secured by driving stout spikes (see u) through the holes in the ears and bobbins into wood plugs which have been fixed in the wall (see k and x).

(b) One form of holderbat is shown at s. These are cast iron supports which are suitable for fixing into joints of brickwork; similar supports for fixing to stonework have dovetail lugs (shown by broken lines) which are let into holes formed to receive them, and secured by molten lead which is caulked. The lugs project 2 in. from the wall. Each length of pipe is secured by slipping the triangular pocket which is cast on the lower bead of the socket over the triangular pin which is cast on the holderbat. This provides a neat and effective support and is used in good work.

Alternatively, rain-water pipes without ears (as shown at j) may be fixed by clips (see r); the wrought iron band or clip is secured by a screw and nut to a pair of lugs after it is passed round the socket of the pipe.

JOINTS.—It is a common practice to fix down-pipes with dry joints (no jointing material being used), and the lengths of the pipes are made rigid by lead or wrought iron wedges which are driven down between the spigots and sockets. Wood wedges should *not* be used as they are apt to expand and split the sockets.

The section at l shows a joint with red lead putty; a short piece of yarn gasket (rope) is wrapped two or three times round the spigot and tightly packed to prevent any mastic from entering the body of the pipe, and the putty is neatly finished off with a fillet.

The joints between heavy cast iron pipes (such as soil-pipes¹) may consist of (a) molten lead, (b) lead wool and (c) lead wool and molten lead. Two of these joints are shown at z, Fig. 75.

(a) Molten pig lead is run between the spigot and socket, and then caulked to consolidate the material; a piece of yarn gasket is tightly packed before the joint is made (see right of section).

(b) Lead wool (fine strands of lead, twisted to form a rope) is packed into the joint and well caulked. This forms an excellent joint and the material is convenient to handle.

(c) The lower half of the joint is caulked with lead wool to within $1\frac{1}{2}$ -in. from the top and the remaining space is filled with molten pig lead which is subsequently caulked (see z).

LEAD EAVES GUTTERS, DOWN-PIPES, HEADS, ETC., are used for high-class

¹ The subject of drainage, which includes soil-pipes, is treated in Chapter Two, Vol. II.