INSPECTION CHAMBERS.—All drains should be conveniently accessible, and, in accordance with principle No. 3, adequate means of inspection and cleaning must be provided. The only satisfactory provision takes the form of a chamber such as that shown in Fig. 31. The floor is of concrete, the walls are of brick or concrete and a cast iron cover provides means of access. The minimum internal dimensions are 1-ft. 6-in. square when the depth is 1-ft. 6-in. or less, 2-ft. 3-in. by 1-ft. 6-in. when the depth is 3-ft., and 3-ft. (preferably 4-ft.) by 2-ft. 3-in. when the depth exceeds 3-ft., the latter size being necessary to enable a man to pass down and do any operation required.

The concrete floor is 6-in. thick and this need not project more than is necessary to enable the walls to be constructed, *i.e.*, 3 to 6-in. Brick footings are unnecessary. The thickness of the walls need only be 4½-in. when the depth is under 2-ft. 6-in., but should be 9-in. thick for deeper chambers. The 9-in. brickwork is usually built of common bricks (which should be hard and sound) in English bond in cement mortar 1 to 3, to which 2 per cent. waterproofer is sometimes added; this bond is shown at C, Fig. 31. An alternative form of wall construction is shown at H, the walls being in two separate half-brick leaves in stretching bond with a continuous ½-in. thick layer of waterproofed mortar between which serves as a watertight lining.

The drains are run in straight lines to the *internal* faces of the walls, and the channels to which they are connected are jointed and bedded in cement. The ends of the pipes through the walls may be either arched or concreted over as shown at C, Fig. 30 and C, Fig. 31, respectively; if roughly bricked round (a common practice) leaks may occur. The channels are usually of salt-glazed or white-glazed ware, but they may be formed in the concrete. Two alternative forms of branch connections at chambers are shown at B and G, Fig. 31. These show three branches delivering at the main drain. The construction at B consists of one double and one single half-round channel junction; the right-hand and lower left-hand branches are gradually curved in the direction of the flow by the provision of slow half-round channel bends (see also sketch C). The alternative plan G shows the application of three-quarter branch channel bends which provide gradual leads and prevent sewage overflowing and fouling the bottom of the chamber; they are particularly effective when the curvature is sharp; as shown, the inverts of these bends are above that of the half-round main channel, as their lower ends are supported on the top edges of the latter (see also sketch H). A selection of standard three-quarter branch channel bends, alternative to those at G and H, is shown at J. The spaces between the channels are filled in with concrete and this is sloped or *benched* up as shown at B and C, Fig. 30 and C, Fig. 31. The object of the benching is to prevent fouling of the base from discharges from the branch channels. Sometimes the benching is given a slope of 45°; this is rather excessive, as a workman can only stand upon it with difficulty. The form of benching recommended is that shown at C, Fig. 31, although that indicated at C, Fig. 30 is adequate when the chamber only accommodates the main channel.

The chamber must be watertight to prevent leakage of sewage in the event of the main drain below it becoming choked. For this reason it is usual to *render* the inside of the walls with a cement mixture composed of 1 part Portland cement and 2 parts sand; a 2 per cent. waterproofer is sometimes added to the mix. The thickness of this rendering should be from ½ to ¾-in., and it should be continued from the top and over the benching to the inner edges of the channels as shown; it should be trowelled smooth. Chambers over 3-ft. deep are sometimes rendered up to that height, above which the joints are neatly pointed with cement mortar. Rendering is not required when, as occasionally used in first-class work, salt-glazed or white-glazed or blue Staffordshire bricks are employed for the internal facing of a chamber.

Access to the chamber is provided by a *galvanized cast iron cover with frame*. These are of many different patterns and of various strengths and sizes. They must be large enough to allow a man to pass through, common sizes being 24-in. by 18-in. (see B and C, Fig. 30, and C, Fig. 31) and 27-in. square in the clear. The cover for this purpose must be airtight, and therefore the joint between the frame and cover has either a single, double or triple seal. A single seal joint is shown at Q, Fig. 30, the groove in the frame being filled with grease into which the lower rim of the cover projects; a band of solid rubber, known as a *rubber ring*, may be used instead of the grease to form a seating for the rim. Both of these materials may be used, thus a double seal cover may have the outer groove filled with grease or tallow, and the inner groove fitted with a rubber ring or tarred cord. If required, the cover may be locked, four gun-metal screws being used for this purpose. The top of the brickwork is corbelled over as shown, and the frame is bedded in cement mortar on it, the face of the cover being brought level with the surface of the ground or pavement. Unless the adjacent surface is paved, a 6-in. wide concrete curb, rendered smooth in neat cement, should be provided as a margin to the frame (see C, Fig. 31); this covers the flange of the frame and keeps it in position; a rebated hard stone curb serves the same purpose.

Chambers which exceed 3-ft. in depth should be provided with *step-* or *foot-irons*. These may be of galvanized cast iron, horse-shoe shaped, as shown at C and D, Fig. 31, and fixed at every fourth course, or they may simply consist of 1-in. by ⅜-in. flat wrought iron bars (dipped in hot bitumen to preserve them) fixed at vertical intervals across one of the corners. They should be well bedded in to make them secure and prevent leakage.

RODDING.—As implied, inspection chambers are provided as convenient means of inspecting, testing and cleansing drains. In the event of a drain becoming choked, the cause of the stoppage is removed by the application of *cleaning rods* (also known as *clearing rods* or *drain rods*). A rod consists of a bundle of malacca canes or Sarawak bambo canes (or ¼-in. diameter bronze rods) in 2 to 6-ft. lengths; these lengths are screwed together by means of locking joints. Several varieties of tools are available for screwing to the first length, such as screws, plungers, rollers, brushes and scrapers for the withdrawal of obstruc-