May 6, 1930. C. A. JAQUES 1,757,196

MANHOLE CONSTRUCTION

Filed April 30, 1927 3 Sheets-Sheet 1

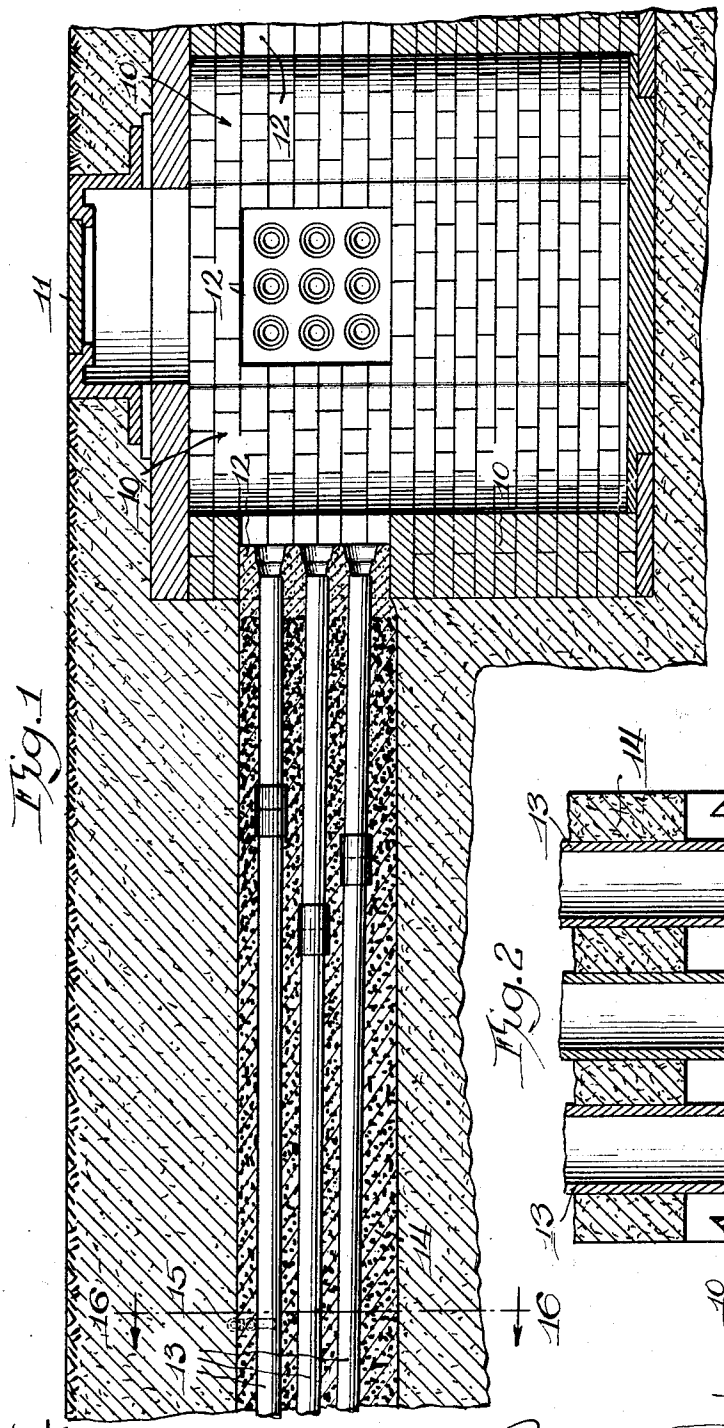


Fig. 1

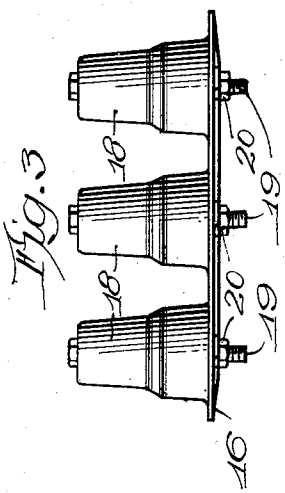


Fig. 3

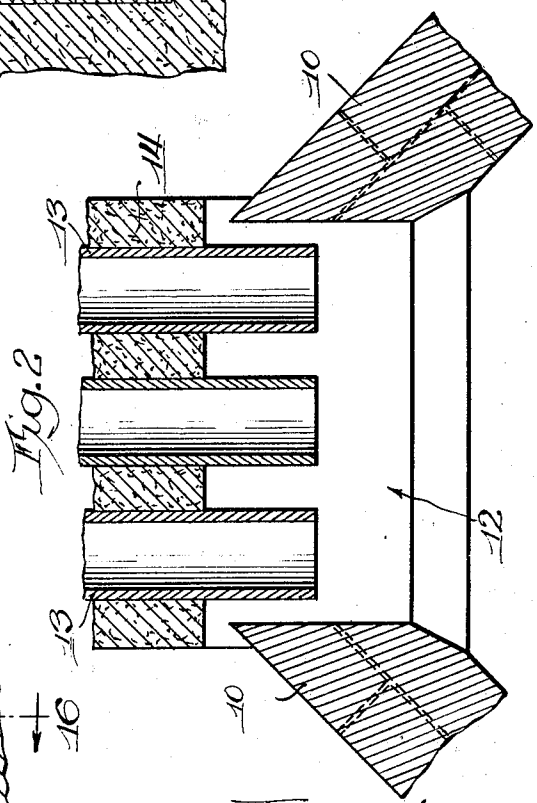


Fig. 2

Witness:
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Cloyce A. Jaques,
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May 6, 1930. C. A. JAQUES 1,757,196

MANHOLE CONSTRUCTION

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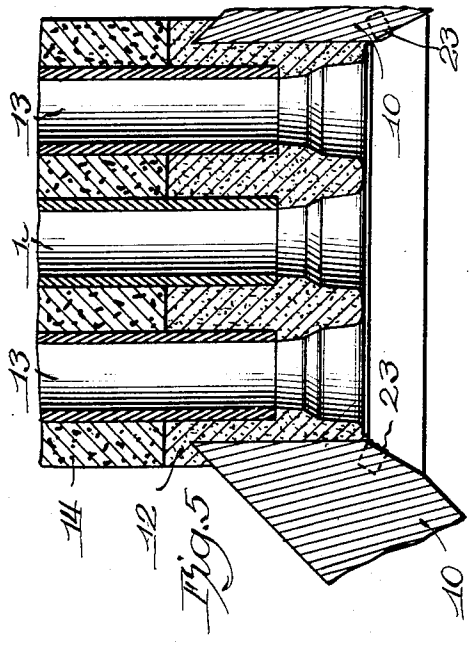


Fig. 5

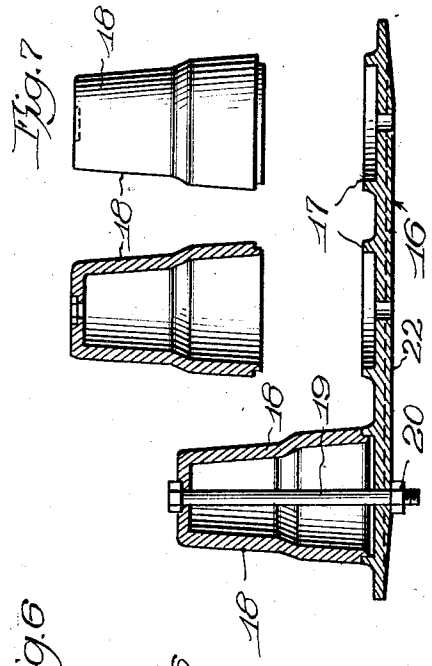


Fig. 7

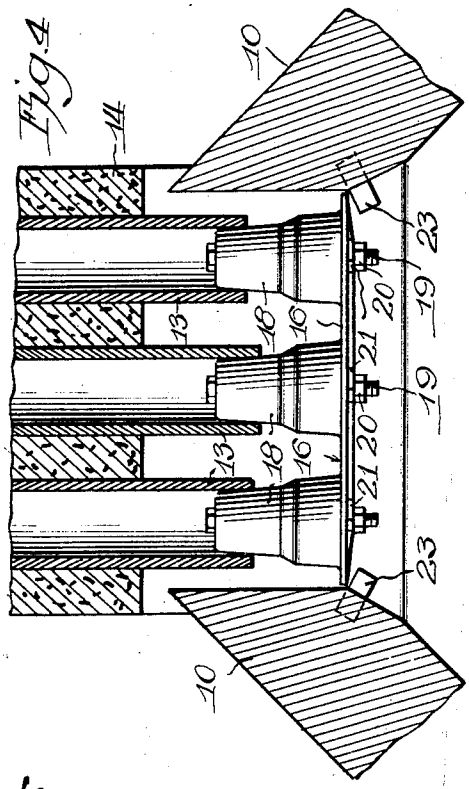


Fig. 4

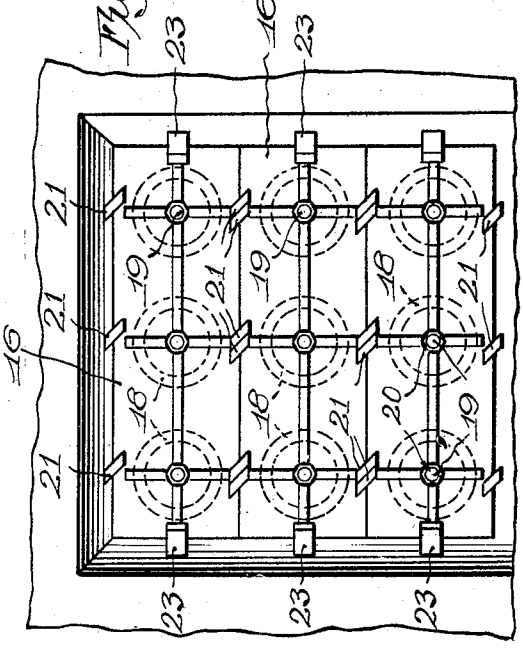


Fig. 6

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May 6, 1930. C. A. JAQUES 1,757,196

MANHOLE CONSTRUCTION

Filed April 30, 1927 3 Sheets-Sheet 3

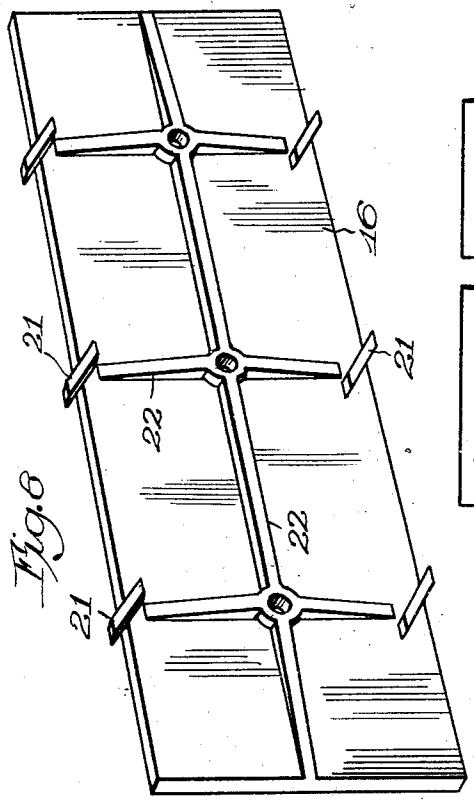


Fig. 6



Fig. 11

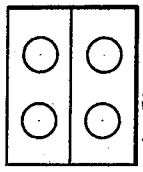


Fig. 13

Fig. 15



Fig. 12

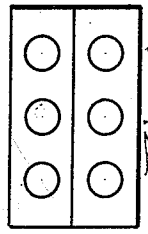
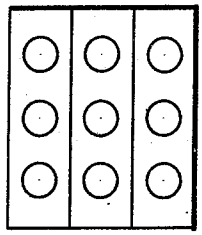


Fig. 14



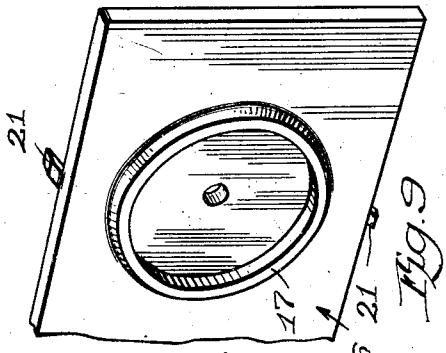


Fig. 9

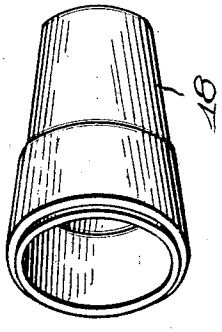


Fig. 10

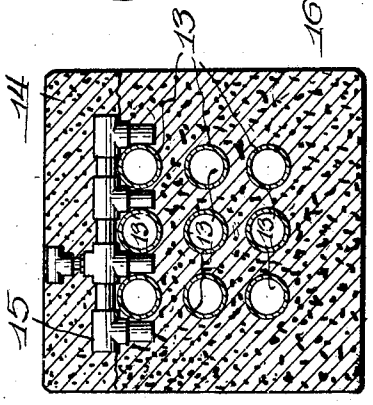


Fig. 16

Witness:
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Inventor,
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Patented May 6, 1930 1,757,196

UNITED STATES PATENT OFFICE

CLOYCE A. JAQUES, OF CHICAGO, ILLINOIS

MANHOLE CONSTRUCTION

Application filed April 30, 1927. Serial No. 187,766.

My invention relates to improvements in manhole construction and more particularly to methods of and apparatus for molding concrete bell ends for the conduits which terminate in the manholes.

It is desirable that each conduit have a fireproof enlarged end or preferably a flaring enlargement, although this has not always been attained in practice heretofore. In some cases, the conduits terminate in the plane of the vertical wall of the manhole, the conduit ends being surrounded by the concrete with no enlargement at the ends. In other cases, a coupling or sleeve has been slipped over the end of each conduit before pouring the concrete around the same, to provide an opening of slightly larger diameter. Where a flaring opening or bell is provided in the vertical wall of the manhole for the end of each conduit or duct, this has been accomplished in certain instances by fitting the end of each conduit into a rectangular concrete block having a flaring opening therethrough, the walls of the manhole being built of brick, except for one or more layers of these concrete blocks built into said brick wall at a convenient height and in such numbers as to provide one concrete outlet for each conduit, of which there may be, two, three, four, six or some multiple of two or three.

My invention contemplates using a bell form at the end of each conduit together with a supporting structure or plate to which all of said bell forms are secured, and pouring cement mortar or concrete around the ends of all of said conduits and bell forms, thereby providing the necessary fireproof flaring outlets for all of said conduits at the same time, instead of casting individual concrete blocks at a distant plant, transporting them to the manhole and laying them in courses, in mortar, or using some of the other special appliances heretofore available, which either do not provide a flaring outlet or are not fireproof or have other disadvantages.

One object of my invention therefore is to reduce the labor, expense and other disadvantages involved in this prior practice, by casting a single outlet panel as a permanent part of the manhole wall and having flaring openings connecting with each conduit, regardless of the number thereof.

Different requirements result in a wide variation in the number of conduits leading to a manhole. The minimum is usually two parallel conduits laid side by side in concrete and in the some horizontal plane. There are two, three or four conduits in the same horizontal plane, and there may be two, three or four superimposed groups of said conduits, necessitating two, four, six, nine, twelve, or a larger number of bell outlets, usually a multiple of two or three.

To avoid the manufacturing and handling of so large a number of supporting plates with bell forms secured thereto, as would be required for the number of outlets needed in different manholes, it is another object of my invention to provide a unit construction of plate and bell forms detachably secured thereto, so constructed that two or more plates may be assembled side by side in the same plane with the necessary bell forms temporarily attached, in order to build up a form for any desired number of outlets.

A further object is to provide a structure of this character in the use of which the bell forms may be readily withdrawn from the concrete after the same has set.

Other objects and advantages relate to the facility with which the manhole itself may be constructed, the laying and spacing of the conduits in the region of the manholes, and other constructional details.

In the accompanying drawings, I have illustrated one embodiment of the invention, although it will be understood that other embodiments are contemplated.

Figure 1 is a vertical section though a manhole showing parts of the adjacent conduits.

Fig. 2 is a horizontal section, on an enlarged scale, through the ends of certain conduits.

Fig. 3 is a plan view of the metal form used.

Fig. 4 is a sectional view, similar to Fig. 2, but with the form in position, and concrete poured around the conduits, except at the ends.

Fig. 5 is a similar section, but with the form removed after the concrete or cement has been poured around the projecting ends of the conduits.

Fig. 6 is an elevation of a form built up of three sections or units.

Fig. 7 is a central section through one of the units, showing some of the bell forms detached.

Fig. 8 is a perspective view of one of the unit supporting plates.

Fig. 9 is a perspective view of the other side thereof.

Fig. 10 is a perspective view of a detached bell form.

Figs. 11 to 15 are diagrams showing the number of conduits which may be used per unit, and various combinations which may be built up of such units.

Fig. 16 is a section on line 16—16, Fig. 1.

The manholes comprise side walls 10, usually built of brick, the horizontal cross-section being varied to meet the conditions imposed, an octagonal section being frequently used. Access to the manhole may be had through the usual manhole cover 11. Where the manhole is octagonal, the conduits usually communicate with the interior of four of the eight side walls, as suggested in Figs 1 and 2.

In the present invention, a concrete or cement panel 12 is formed in a suitable opening left for that purpose as the brickwork is being carried up. The conduits 13, of which there may be a variable number as hereinafter described, are made of any suitable material, fiber conduits, having certain advantages which recommend them. These conduits are laid in concrete 14.

The preferred method is to dig a trench in which a layer of concrete of suitable thickness is deposited, a series of two, three, or more parallel conduits being laid on this concrete and maintained temporarily in suitable spaced relation by any suitable form of spacer 15, as shown in Figs. 1 and 16. The form of spacer shown herein is made up of a series of standard pipe T's connected by short nipples arranged horizontally and other pipe nipples arranged vertically. After the conduits are covered with concrete, these spacers are withdrawn and used again with a second higher group of conduits, another layer of the concrete being poured over the second group of conduits after which a third group may be laid over the second, and so on. The concrete in which the conduits are embedded terminates short of the opening in the side wall of the manhole, leaving a sufficient length of each conduit to enable the same to be moved slightly for a purpose hereinafter described.

In order to provide a suitable flaring outlet for each conduit, I provide a form consisting preferably of a supporting plate 16 with a series of circular ribs 17 thereon and a series of detachable bell forms 18 which fit over said ribs and are secured to the supporting plate by bolts 19 having nuts 20 on the outside of the supporting plate where they are readily accessible. These plates and bell forms may be of any suitable material, cast iron for example being suitable for the purpose. If there are only three conduits terminating in the manhole opening, a single supporting plate and three attached bell forms, such as shown in Figs. 3 and 7, are inserted in the opening as the brickwork is being carried up, and are temporarily secured therein with the end lengths of the conduits fitted into the bell forms. Since a slight relative movement of the ends is possible the forms make a snug fit with said ends. This compensates for slight variation in the diameter of the conduits as they may be slipped over the flaring ends of the bell forms until they engage the same snugly, after which the other ends are suitably coupled to the next section of conduit, and concrete is poured around the conduits almost up to the manhole, as shown in Figs. 4 and 5, the remaining spaces being filled subsequently by pouring concrete, or preferably cement mortar, around the forms.

One of the important features of my invention consists in providing a unit construction of a supporting plate, whereby any number of bell forms may be temporarily secured in proper relative position so that they may fit into a corresponding end of the conduit, regardless of the number thereof. Diagrams 11 to 15 illustrate some of the commercial combinations in use. For example, there may be two conduits in a single horizontal group, as in Fig. 11; three conduits, as in Fig. 12; four conduits consisting of two superimposed groups of two conduits each as in Fig. 13; or six conduits as in Fig. 14; or nine conduits as in Fig. 15, the two latter being built up of units of three.

To illustrate the flexibility of the system, I have shown a nine-conduit panel in the drawings. Fig. 6, for example, shows an elevation of the form used in such case, which form comprises three supporting plates, each carrying three-bell forms, making a total of nine forms for the corresponding nine conduits. The plate 16 may be held in position temporarily by bricks 23 left projecting from the walls 10 as the latter is built, these bricks preferably overlapping the edges of one or two supporting plates, as shown in Figs. 4 and 6. In order to position the forms accurately and in vertical alignment, suitable interlocking devices are provided, such for example as shown in Figs. 6 and 8, wherein each plate 16 has a series of diagonally arranged lugs 21, near the top and bottom edges thereof. These lugs may be formed integrally by casting, or may be detachable and secured in any convenient manner. These lugs, as

shown, are so positioned that after the lowermost plate is positioned horizontally, another plate may be placed over the same as the brick work progresses, a third plate placed over the second, and so on, the lugs in each case engaging each other and thus insuring vertical alinement of the bell forms. As shown in Fig. 8, these lugs preferably taper down to the outer surface of the supporting plate, although this is not essential, said plate also being provided with re-inforcing ribs 22, the ends of which may taper down to the surface of the plate.

After the concrete or cement has set, the supporting plate or plates 16 may be removed by simply breaking off the projecting bricks 23 and prying the form, as a whole, away from the panel which has been formed. If the form, as a whole, cannot be withdrawn readily, the nuts 20 may be removed, and the plate or plates 16 thereafter readily pried loose, after which the individual bells may be pulled from their recesses by using a suitable spider with which the ends of the bolts may be engaged.

The concrete panel thus formed is a unitary structure fitting within the opening of the side wall of the manhole and having a flaring opening for each conduit terminating in said panel. After these panels have been formed the brickwork may be continued upwardly and the manhole completed.

It will be noted in Fig. 1, for example, that the inner vertical surface of the concrete panel 12 is set in considerably from the inner vertical surface of the brickwall 10, providing an increased effective width for the manhole between these panels;—that is to say, the cables which are later drawn through the conduits require a gradual bend at the end rather than a very abrupt bend and therefore necessarily project into the manhole a considerable distance, thus decreasing the space therein. It will be noted in Fig. 5 that the opening in the wall itself flares into the manhole, thereby facilitating bending of the cables. By beginning these bends several inches back from the inner face of the brickwalls of the manhole the distance between the conduit openings is materially increased, i. e., the effect is the same as through the walls of the manhole were spaced about a foot farther apart, but without incurring the increased expense of constructing such larger manholes.

As shown also in Fig. 1, the vertical spacing of the conduits is a required minimum throughout the greater length of the concrete bed in which they are laid, but in the vicinity of the manhole said conduits are gradually inclined away from each other so as to increase the vertical and horizontal spacing where they terminate in the manhole wall. The lower groups of conduits incline downwardly, somewhat as shown in the lefthand portion of Fig. 1, to provide the even spacing illustrated by the panel 12 shown in elevation in said figure near the righthand portion thereof.

It will be seen that the plate 16 may be constructed with two, three or more annular ribs 17 to which may be bolted a corresponding number of bell forms attached thereto and transported to a particular manhole under construction, whereby the form may be assembled for the particular work in progress and the parts thereafter transported to some other manhole or returned to storage. This structure being of unit design is very flexible so that a minimum number of bell forms may be kept in stock and also a minimum number of supporting plates of different lengths. Although the conduits themselves are preferably embedded in concrete, the plastic material used in forming the panels at the ends thereof is preferably cement mortar. Wherever the claims call for concrete, therefore, it is to be understood that cement mortar or other suitable plastic material is contemplated.

I claim:

1. A device of the class described comprising a plurality of similar plates, each having a series of circular ribs on the same face thereof, openings through said plates, each in the center of a circular rib, bell forms fitting each rib, a bolt passing through each bell form and one of said openings to support said bell forms wholly from said plate, and a series of lugs on opposite edges of each plate whereby two or more plates may be arranged in juxtaposition, with said lugs in engagement to position said plates and thus to insure a predetermined arrangement of said bell forms.

2. The combination with a conduit having an open end, of a plate adapted to be removably secured in spaced relation with respect to said end, and a tapering form secured at its large end to said plate and having its opposite end disposed in the open end of said conduit whereby when the end portion of the conduit and said form have been enclosed in hardened plastic material said form will define a flaring opening in said material, said opening terminating in the plane of the inner surface of the plate and having walls which merge into substantial registration with the inner surface of said conduit thereby protecting the conductor coverings from injury by the ends of said conduit when drawn through the open end of the same.

3. Forms for molding recesses extending inwardly from the surface of a concrete body in a preletermined arrangement comprising a series of metal plates having two, three or more holes therein in a row, a number of tapering forms, and means cooperating with said plates adjacent said holes for removably attaching as many forms thereto as there are

holes in a given plate, each plate having means on opposite edges thereof positioned to engage corresponding means on an adjacent plate whereby two or more of said plates equipped with said forms may be arranged in substantially the same plane to build up a form corresponding to the number of recesses desired and whereby said plates may be detached from said forms after the concrete hardens to permit removal of said plates first and said forms later.

4. Molding apparatus for enclosing the open end of a conduit in hardenable plastic material comprising a form adapted to be inserted in said conduit in sealing engagement therewith and extending forwardly from the end thereof, a plate against which said form bears at its outer end whereby when the end of said conduit and said form have been enclosed in such material the form will define an opening the walls of which will in effect be an uninterrupted extension of the inner walls of said conduit and which will terminate in the plane of the inner surface of said plate.

5. Molding apparatus for enclosing a variable number of conduits ends in hardenable plastic material comprising forms adapted to be inserted one in each of said conduits, said forms being arranged to provide a sealing engagement with said conduits and to extend forwardly from the ends thereof, a plate comprising cooperating sections arranged in accordance with the disposition of the conduits to be enclosed in such material and means for securing said plate against the forward ends of said forms whereby when the latter have been enclosed in said material the inner surface of said plate will define the forward wall of said material and said forms will define openings extending from said wall into substantial alignment with the inner surfaces of said conduits.

In testimony whereof, I have subscribed my name.

CLOYCE A. JAQUES.