

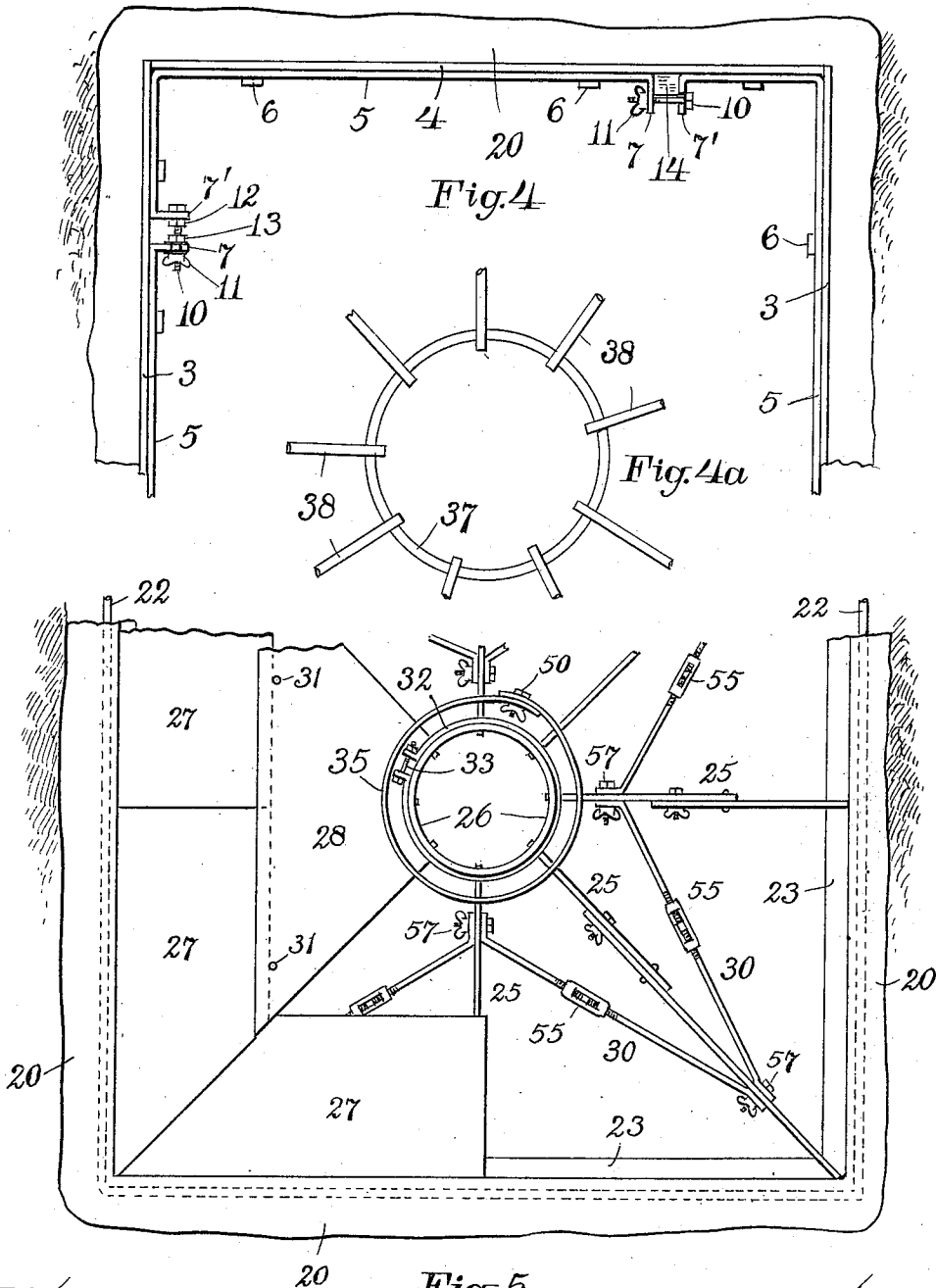


P. G. HARSHBARGER.  
FORM FOR MANHOLES.  
APPLICATION FILED APR. 8, 1909.

975,525.

Patented Nov. 15, 1910.

3 SHEETS—SHEET 2.



Witnesses;

*Wm. D. Rich.*  
*M. G. Knight*

Fig. 5

Inventor,

*Parroll G. Harshbarger;*

By *A. B. Blupham*  
Attorney.

P. G. HARSHBARGER.  
FORM FOR MANHOLES.  
APPLICATION FILED APR. 8, 1909.

975,525.

Patented Nov. 15, 1910.

3 SHEETS-SHEET 3.

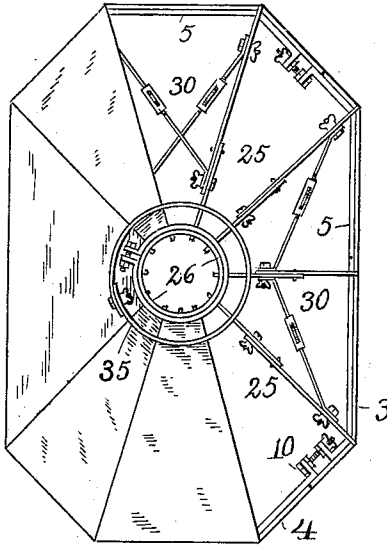


Fig. 11

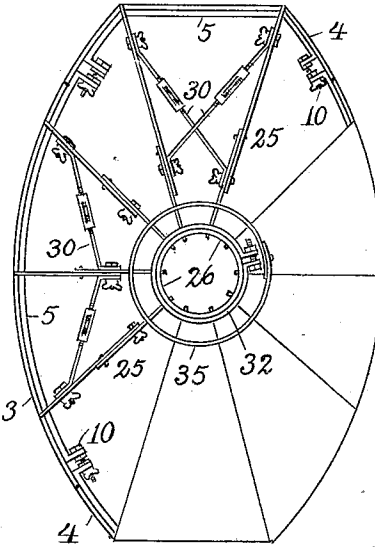


Fig. 12

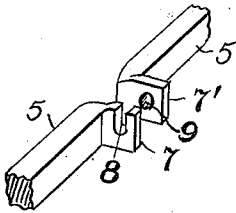


Fig. 7

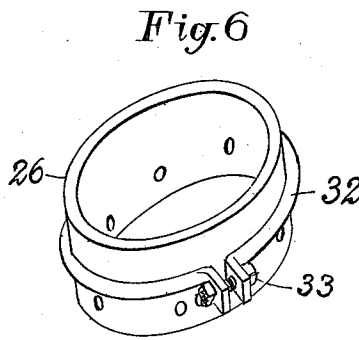


Fig. 6

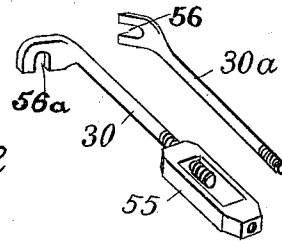


Fig. 8

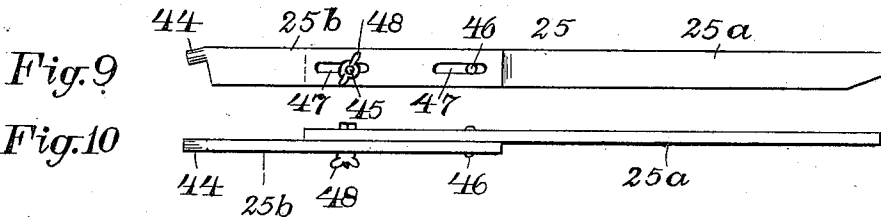


Fig. 9

Fig. 10

Witnesses;  
Melfred D. Rich.  
M. G. Knight

Inventor,  
Parrott G. Harshbarger,  
By A. B. Blapham,  
Attorney.

# UNITED STATES PATENT-OFFICE.

PARROTT G. HARSHBARGER, OF HYDE PARK, MASSACHUSETTS.

## FORM FOR MANHOLES.

975,525.

Specification of Letters Patent.

Patented Nov. 15, 1910.

Application filed April 8, 1909. Serial No. 488,549.

*To all whom it may concern:*

Be it known that I, PARROTT G. HARSHBARGER, a citizen of the United States, and residing at Hyde Park, in the county of Norfolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Forms for Manholes, of which the following is a specification.

This invention relates to forms for aiding in the construction of concrete manholes for electric conduits, sewers, catch-basins and the like; and it consists in the effecting of certain improvements in details of construction hereinafter set forth.

Referring to the drawings forming part of this specification, Figure 1 is a central vertical section of a concrete manhole in the process of construction, showing the side-walls thereof being held by the steel form plates constituting a part of my invention. Fig. 2 is a similar view showing said form plates removed, and the rafters laid for the support of the roof plates. Fig. 3 is a similar section, but on a larger scale, showing the completed roof, and a cast iron manhole neck in place, said form plates being here represented as not yet having been removed. Fig. 4 is a plan view of a part of the side walls and form plates. Fig. 4<sup>a</sup> is a plan view of one of the reinforcing rings. Fig. 5 is a plan view of portions of the rafters, lateral braces and roof plates. Fig. 6 is a perspective view of the rafter-ring and its adjustable shoulder. Fig. 7 is a perspective view of adjacent ends of two locking bars. Fig. 8 is a perspective view of one of the lateral braces. Fig. 9 is a side view of one of the rafters. Fig. 10 is a top or edge view of the same. Fig. 11 is a plan view of a modified shape of the manhole and forms. Fig. 12 is a plan view of another modification of the same.

In the construction of the manholes, a concrete floor 1 is first laid at the bottom of the excavation; forming it with conduits 2 in the usual manner, if the manhole is to be for a sewer; while if it is designed for electric conduits, the floor is but slightly depressed toward its center to enable any dirt or water to be more conveniently scooped up. See Figs. 1 and 2. Two form plates 3 are then stood at opposite sides of the excavation, resting against the conduit-ends C as shown in Fig. 2, when the manhole is for electric conduits, and two other plates 4 are

stood between the vertical edges of the plates 3; all four being secured together by the locking bars 5 seated in the pockets 6 riveted or otherwise fixed to the inner surfaces of the form plates. Said locking bars are preferably L-shaped, as shown in Fig. 4, with their ends turned inward to form elbows 7, 7'; the elbows 7 being each given a notch 8, and the elbow 7' formed with a hole 9, as in Fig. 7. Through such hole and notch is put a bolt 10 having a thumb-nut 11 thereon, and also two nuts and washers 12, 13. By means of the thumb-nuts and the nuts 12, 13, the locking bars are adjusted to hold the form plates 3 snugly against the edges of the plates 4, and also to brace the two plates 4 against being pressed inward toward each other by the concrete to be later introduced. It is evident that the thumb-nuts 11, acting in conjunction with the bolts, draw the locking bars toward each other, while the nuts 12, 13 press said rods apart.

Wedges 14, shown in Figs. 1 and 4, may be driven in between adjacent elbows 7, 7', either additional to, or in place of, the nuts 12, 13. The purpose of the notches 8 is to permit the locking bars to be taken apart without requiring the thumb-nuts to be more than loosened on the bolts. After said form plates have been strongly braced together as above described, the concrete is dumped, or otherwise put, into the space between them and the sides of the excavation, and properly tamped, until the manhole-walls have been brought to the height desired. If the height is to be less than that of the form plates, as in Fig. 1, said walls 20 are brought to a uniform level, and then bars 21, preferably square, are laid in the concrete against the form-plates, in order to provide seats for the rafter-ends. Additional concrete follows, together with reinforcement rods 22, until the side-walls are level with the top surface of said bars, as in Fig. 1.

After the concrete has sufficiently set, which it will do in a day or so, the form plates 3, 4 are to be removed. This is done by unloosening the thumb-nuts 11 and the nuts 12 and 13 to enable the locking bars 5 to be separated from each other and said plates. These plates having been taken out of the manhole, and the bars 21 as well, the next step is the placing of the roof supports. Such supports consist of the rafters

25, the rafter-ring or center-ring 26, and the roof plates 27, 28. If it is desired to have the manhole comparatively shallow, then its roof must be correspondingly flat. In such case, it is well to support the center ring 26 upon temporary timber-work, as joists 29 in Fig. 2; but if the roof can be steeper and more sharply arched, such joists will not be required, as said parts will support themselves. Adjusting bolts 29<sup>a</sup> may be provided at the upper ends of said joists for bringing the center ring to a proper level.

The inner end of each rafter 25 is provided with a means for engaging the center ring; the same being preferably a finger 44 adapted to enter a suitable hole in the ring, as shown in Figs. 3 and 5. Where the manhole is square, as thus far described, eight of these rafters are enough. As the holes for said fingers need to be reasonably large to enable the parts to be quickly put together, it is desirable to provide adjustable lateral braces 30, by means of which not only to hold the rafters securely, but to center the ring 26. This centering is done by means of the turn buckles 55 by which the brace-sections 30, 30<sup>a</sup> are united, and which enable the same to be longitudinally adjusted. Upon said rafters are placed the roof plates 27, 28, each of which must be narrow enough to be passed up through the manhole-neck after the cement roof has been placed and set. The plates 27 abut at their outer edges against the uprights of the seats 23, and at their inner edges against the pins 31 projecting from beneath the plates 28 which overlap the plates 27; and contact with the center ring 26 at their inner edges. The adjustable shoulder 32 being pressed snugly down against the edges of the plates 28, and made fast by the bolt 33, said plates are held securely against displacement. Finally the collapsible drum 35 is placed upon said plates and about the center ring, and concrete dumped upon said plates to a proper thickness to form the roof 36.

In case the manhole roof is to be comparatively flat, or considerable heavy traffic is to pass over the street, it is important to locate the reinforcement ring 37 in the concrete not far from the said drum and plates, as shown in Fig. 3. This will add greatly to the strength of the manhole roof. If further strength is desired, a number of radially arranged rods 38 can be placed in the concrete, with their inner ends supported by said ring 37 and their outer ends near the walls 20. Additional strength is obtained by a second reinforcement ring 39 located in the concrete nearer its upper surface, and preferably connected with the ring 37, as by means of the hooks 40.

After the concrete roof has been brought to the desired level about the drum 35, it is desirable to lay one or more courses of brick

42 thereon for the support of the cast-iron manhole neck 43. Brick is thus employed only when the grade of the street has not been established, and is liable to be raised or lowered. It is far easier to lower the manhole neck by removing one or more of such layers of brick, than to break away the concrete.

The roof having sufficiently set, the rafters are first removed. To permit this, each rafter is made in two parts 25<sup>a</sup>, 25<sup>b</sup>, as shown most clearly in Figs. 9 and 10, adjustably united by a bolt 45, a thumb-nut 48 thereon, and a pin 46 projecting from one section through slots 47 in the other. By unloosening said thumb-nuts, the rafters can be shortened enough to enable their fingers 44 to be withdrawn from the holes in the center ring 26, and said ring and rafters removed. The said parts and the plates 27, 28 are then passed up through the manhole neck to the street. After this, the collapsible drum 35 is reduced in diameter, and it also withdrawn. To thus withdraw it, it is made collapsible by having its edges overlap, and held together by bolts 50 passing through slots 51, and thumb-nuts 52 on said bolts. The loosening of said thumb-nuts permits such overlapping edges to slip along each other, and the drum to be released from the concrete.

In addition to having the lateral braces 30 in two sections adjustably held together by a turn-buckle 55, I prefer to have their extremities formed with either a claw as 56, or a fork as 56<sup>a</sup>, in order that they may be readily engaged with or separated from the bolts and thumb-nuts 57 carried by the rafters. See Fig. 8.

It should be noted that the rafters are always supported by the side walls and not by the form plates; the showing in Fig. 3 not being strictly accurate in its illustration of the form plates being flush with the floor of the seats 23, for the reason that it is necessary to have the said plates rise high enough to hold the bars 21 against the pressure of the concrete put in behind them.

If the manhole side walls are to be higher than the form plates 3, 4, such walls are first laid to substantially the height of said plates, and then, after the concrete has sufficiently set, said plates are removed and fixed at a higher elevation; the pressure effected by the nuts 12, 13 or by the wedges 14, in the lowermost locking bar, serving to hold said form plates from slipping downward. Additional concrete is now put in until the side-walls are brought to the desired height. Of course this can be repeated, and the side walls made any height which may be required.

The square manhole illustrated in Fig. 5 is desirable for streets having large numbers of ducts in the conduits, and where

there are intersecting conduits; but where the ducts are fewer and the conduits correspondingly narrower, the manholes may be made narrow. Two types of such narrow  
 5 manholes are illustrated. The one shown in Fig. 11 has its corners cut away, while that of Fig. 12 has curved sides. The general arrangement of parts is substantially the same as that above described; the main  
 10 difference being that the roof plates are each continuous from the center ring to the seats 23, eight being employed for the octagonal manhole, and ten for the one with curved sides.

15 I have shown the collapsible drum 35 and the manhole neck as circular, but it is evident that they may be made square without materially altering the construction and arrangement of the parts.

20 What I claim as my invention and for which I desire Letters Patent is as follows, to wit;—

1. A form for walls, comprising vertical form plates, L-shaped locking bars therefor  
 25 each having an elbow at each end, in one of which elbows of each locking bar is a bolt hole and in the other of which is a bolt-receiving notch, a bolt in each bolt hole engaging the notch in the adjacent elbow of  
 30 the next locking bar, and a nut on each bolt; whereby said locking bars can be instantly detached and removed after slightly loosening said nuts and without disconnecting the bolts from the bolt holes.

35 2. A means for locking up form plates, comprising L-shaped locking bars each having an elbow at each end, in one of which elbows is a bolt hole and in the other is a bolt-receiving notch, a bolt having a nut thereon in  
 40 each said bolt hole engaging the notch in an adjacent elbow of the next locking-bar whereby the locking-bars can be tightened, and a wedge for receiving pressure between each two adjacent elbows.

45 3. A roof supporting form comprising radially arranged rafters, and lateral braces connecting said rafters, each of said lateral braces being capable of forcible longitudinal  
 50 adjustment, and each detachably fastened at one end to the inner end of one rafter and at its other end to the outer end of an adjacent rafter.

55 4. A roof supporting form comprising radially arranged rafters, plates located upon the same, and lateral braces connecting said rafters; each of the lateral braces being ca-

pable of forcible longitudinal adjustment and formed with terminal notches, and detachably fastened at one end to the inner end of one rafter and at its other end to the  
 60 outer end of an adjacent rafter, the fastening means comprising bolts penetrating said rafters and entering said terminal notches, and thumb nuts on said bolts.

5. A roof supporting form comprising a  
 65 cylindrical center ring and an adjustable shoulder ring on its outer surface, plates pressing at their inner edges against said center ring beneath said shoulder ring, and abutments for the outer edges of said plates,  
 70 said outer edges being substantially lower than the inner edges.

6. A roof supporting form comprising radially arranged rafters upheld at their outer ends, lateral braces therefor, a cylindrical  
 75 center ring engaged by the inner ends of said rafters, a shoulder ring on said center ring adjustable vertically thereon, plates above said rafters having their inner edges pressing beneath said shoulder ring, and  
 80 abutments for the outer edges of said plates, said abutments being substantially lower than said center ring.

7. A roof supporting form comprising a center ring, a shoulder ring thereon, radial  
 85 rafters engaging said rings at their inner ends and suitably supported at their outer ends, plates resting upon said rafters, abutments for the outer edges of certain of said plates, the others of said plates overlapping  
 90 those just named and contacting at their inner edges with said rings, and projections from the upper plates engaged by the inner edges of the under plates.

8. A collapsible shoulder ring consisting  
 95 of a metallic bar bent into a circular form and having a bolt for drawing its ends toward each other, in combination with a cylindrical center ring tightly about which said shoulder ring is clamped by the action  
 100 of said bolt, whereby the shoulder ring may be adjusted in position upon the center ring and serve as a means for holding the roof plates in position.

In testimony that I claim the foregoing  
 105 invention, I have hereunto set my hand this 6th day of April, 1909.

PARROTT G. HARSHBARGER.

Witnesses:

A. B. UPHAM,  
 ARTHUR P. CROSBY.