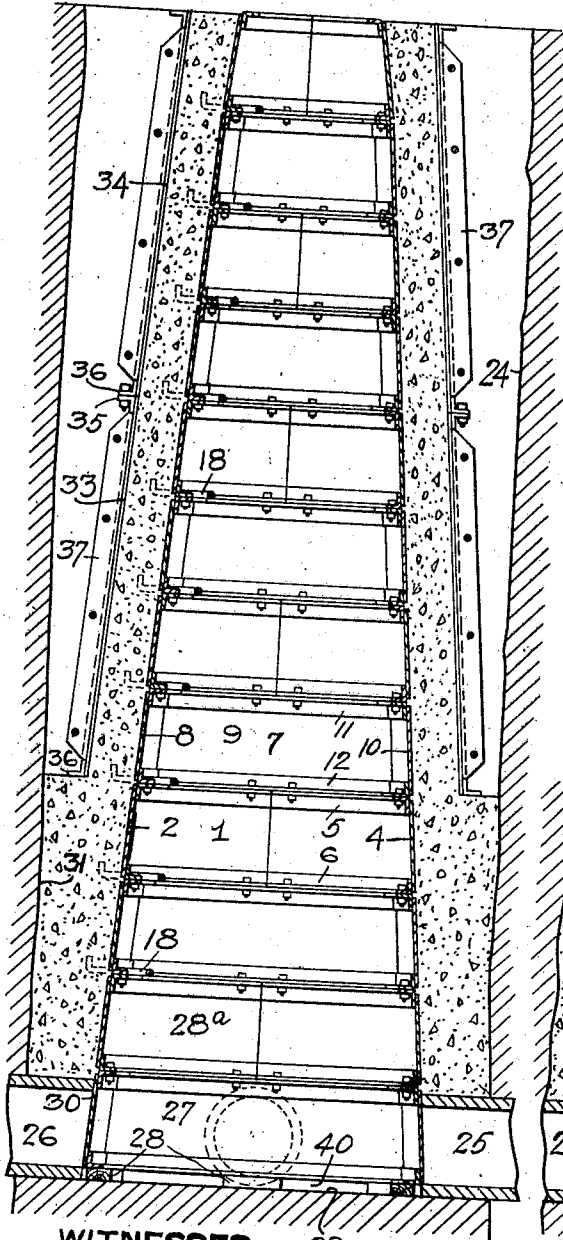


992,782.

Patented May 23, 1911.
2 SHEETS—SHEET 1.

FIG. 1



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FIG. 2

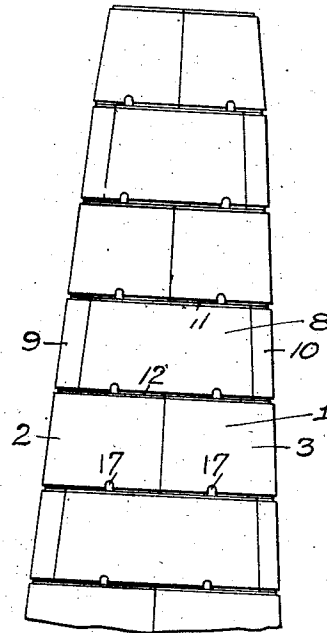
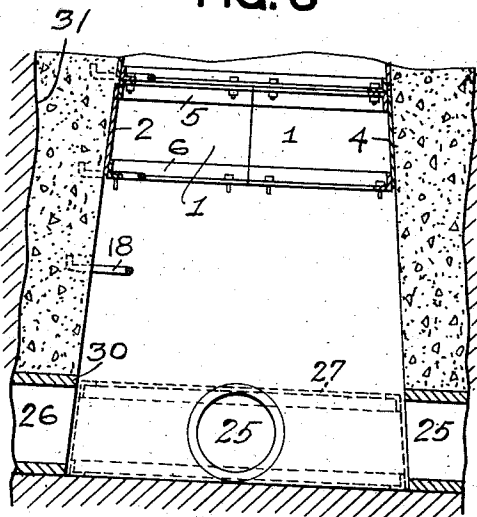


FIG. 3



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FIG. 4

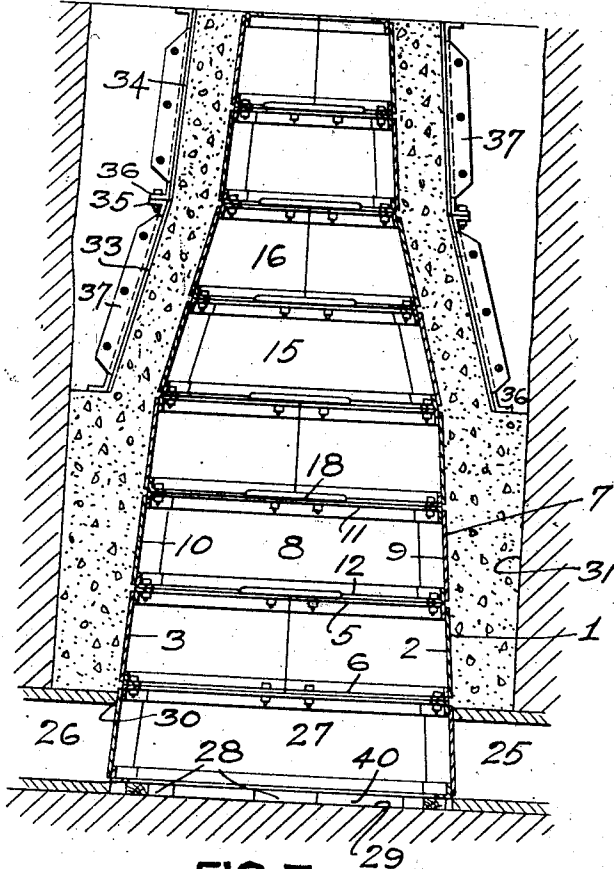


FIG. 5

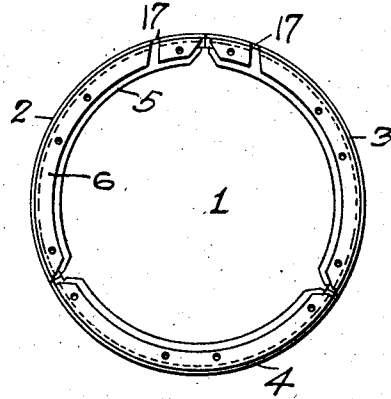


FIG. 6

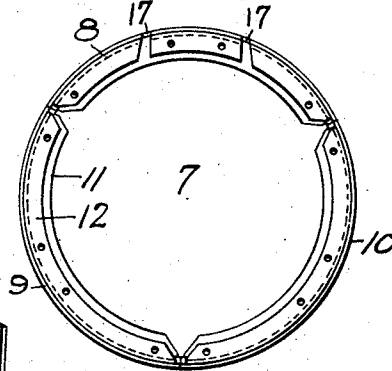


FIG. 7

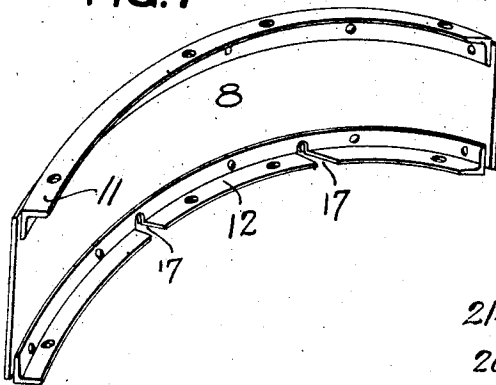
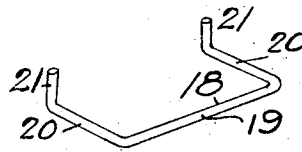


FIG. 8



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UNITED STATES PATENT OFFICE.

CHARLES S. LAMBIE, OF WILKINSBURG, PENNSYLVANIA.

FORMING CONCRETE MANHOLES.

992,782.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed July 14, 1910. Serial No. 572,026.

To all whom it may concern:

Be it known that I, CHARLES S. LAMBIE, a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Forming Concrete Manholes; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to forming man-holes for use in connection with sewer systems and the like. Its object is to construct such man-holes of concrete and the like, and to provide a suitable form for that purpose.

These man-holes are usually made downwardly flaring and they vary considerably in depth. For sewer purposes they are usually of a certain diameter at the top and a certain larger diameter at the bottom and any molds or forms for making the same should be arranged to provide for making these different sizes.

Man-holes are also usually provided with a suitable ladder arrangement for reaching the bottom of the man-hole.

These man-holes have heretofore usually been constructed of brickwork, but by my invention I am enabled to form them of concrete at a very much lower cost and provide a more perfect and durable man-hole.

It consists, generally stated, in supporting within the excavation a downwardly flaring sectional annular shell upon removable supports resting on the floor of the excavation, building thereon a series of like shells with the diameter of each corresponding to those above and below the same, molding the concrete around the shells and so form a man-hole, removing the support of and dropping the bottom shell, separating it into sections and removing these sections upwardly from the man-hole, and dropping and removing the other shells in the same way. It also consists in certain other improvements including certain improvements in the sectional forms or shells as hereinafter set forth and claimed.

In the accompanying drawing Figure 1 is a sectional view illustrating the man-hole form and its use; Fig. 2 is an outside view of the upper part of the man-hole; Fig. 3 is a sectional view of the lower part of the form illustrating the manner in which the different sections are withdrawn; Fig. 4 illustrates the use of the invention for the

erection of a shallow man-hole by means of shells of different flare; Figs. 5 and 6 are plan views of the man-hole shell; Fig. 7 is a perspective view of one section of a shell; and Fig. 8 is a perspective view of the ladder construction.

Each separate unit or form which when connected with others makes the actual man-hole form is an annular shell, downwardly tapering, formed of sheet or plate metal, and itself formed in sections, each section having a flange at the top and the bottom. For example, taking the shell 1 in the mid-portion of the man-hole, in Fig. 1, it is composed of three sections 2, 3 and 4. Each section has its separate top flange 5 and the bottom flange 6, said flanges being formed of angle iron secured to the individual sections and set on obtuse or acute angles to register with the adjoining sections and when the three sections 2, 3 and 4 are placed for bolting together they form the annular shell or "form", one of the units in building the mold. Above and below the shell 2 is a shell 7 which as illustrated in Fig. 6, is itself formed of three sections 8, 9 and 10, each individual section having its upper flange 11 and lower flange 12.

The several shells or individual forms are made of proper diameter and flare or taper so that the top edges, say, of one section are of the same diameter as the bottom edges of the one above it, and in this way a symmetrical downwardly flaring man-hole form is built. In building up the form the sections of one shell are out of line or break joint with the sections of the shells above and below, and as the horizontal flanges of the different shells are bolted together, I am enabled in this way to secure together all of the shells for the desired height of man-hole without the necessity of bolting the different sections in any one shell or individual form together. Under the general requirements for man-holes they are usually of a certain diameter at the top opening, say, for example, two feet, and approximately of a certain diameter at the sewer below, say, approximately four feet. For a deep sewer the shells can be provided for making a symmetrical downwardly flaring man-hole as shown in Fig. 1. However, where the man-hole is shallow, for example as in Fig. 4, where the sewer comes closer

to the surface, in order to obtain substantially the proper diameter of man-hole at the top and bottom respectively, I may provide some of the individual forms or shells of greater taper. For example, in said figure, the shells 15, 16 are made of a flare double that of the other shells, and when one of such shells is used a flare equal to two of the shells used in the other part of the man-hole can be obtained. Otherwise the shells are the same. In man-holes it is also desirable to provide a ladder for passing down into the same, and the custom has been where these have been built of brick to either insert bolts or ladder rungs in the brick work as it is developed, or to subsequently cut seats for the same and cement them in. To provide a ladder in concrete man-holes built by the employment of my improved form, I form in the edge of one or more of the man-hole shells, slots 17 extending through the flange, and up into the body of the shell, and in placing the forms in position I insert through such slots rungs such as 18, each rung as illustrated being formed of a round iron bar with the mid portion 19, the two arms 20 extending inwardly therefrom and the upwardly extending portions 21 bent at an angle to the arm so as to hold in the concrete. In building up the mold or form these rungs rest upon the flange of one shell and enter the slots 17 in the other shell and remain in that position during the filling in of the concrete around the general mold, while the shells can be removed therefrom in the manner hereafter described. In the shell illustrated in Fig. 5 the slots 17 are in two of the sections, while in that in Fig. 6 the slots are in one section.

In the use of the shells in the practice of the general invention as above described, after the completion of the sewer the pit 24 for the man-hole is dug in the usual way extending down to the sewer openings 25, 26. The man-hole 2 is then built up within the pit, and I prefer for that purpose to support the lowest section 27 of the man-hole form on blocks or bricks 28 raising it a short distance above the concrete or other floor or bottom 29 of the man-hole; any suitable means being employed for preventing the concrete from flowing under this lowest shell or section of the man-hole form. The different sections are then quickly lowered into place and built up one on top of the other and bolted together; and the sewer-pipe or wall fitted close to the man-hole form as at 30, when the man-hole is ready to receive the concrete. If it is but a shallow man-hole I may fill the entire pit with concrete, the sides of the pit forming the outer wall of the mold therefor; but if it is a deep man-hole as illustrated in Fig. 1, I generally utilize the outer wall of the lower part of

the pit to form the outer wall of the mold to receive the concrete as at 31, and for the upper part of the mold I provide the sectional shells 33, 34. After the concrete has been built up a certain distance these shells 33 and 34 are lowered down over the general man-hole form and extend up to the top of said form, the necessary number of sections for this purpose being employed. In this case, as the outer shells 33 and 34 confine the concrete, in addition to bolting through the flanges 35, 36 at the top and bottom of the shell, I provide the vertical flanges 37 in the different sections and bolt through such vertical flanges, so forming around the main man-hole form an annular pocket in which the concrete is packed in the usual way until the man-hole is completed.

During the molding of the concrete man-hole the rungs 18 forming the ladder are inserted through the shell at suitable distances apart, for example, one for each section or shell, and rest within the slots extending through the shells, being held in proper position by the shells, and the concrete is packed around the inner portions of the rungs 18 and when the concrete is properly set such rungs are firmly embedded therein.

In order to remove the man-hole form after the man-hole is built and set, the first operation is to drive out the blocks or supports 28 resting on the floor or bottom 29 of the man-hole, which leaves a space below the lowest shell and between it and the floor, providing space for the dropping of the lowest shell away from the inner wall of the concrete man-hole as formed. That shell is then unbolted from the shell above it and is dropped the distance of such space until it rests upon the floor 29 of the man-hole as illustrated in dotted lines in Fig. 3. The three sections forming the same can then be parted and can be separately lifted by a rope out of the man-hole. Then the next shell 27^a above the bottom section can be lowered and removed in like manner. When the rungs 18 are reached as the shells are unbolted the individual sections not containing the rungs can be separately dropped and the sections containing the rungs can then be swung out of place and withdrawn, there being sufficient play left in the slots 17 for this purpose. After the withdrawal of the main man-hole form in this way the outer shell 33, 34 can also be withdrawn and the pit filled up with ordinary earth filling, so completing the man-hole.

My invention thus provides for rapid and cheap building of such man-holes of concrete construction, providing for the rapid and easy erection of the forms, their proper support during the filling of the man-hole and their easy separation after the same,

while it also provides for the forming of man-holes of any desired depth and diameter.

What I claim is:

- 5 1. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 10 2. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a downwardly flaring sectional annular shell upon removable supports resting on the floor of the excavation, building up thereon a series of like downwardly flaring sectional shells, molding the concrete around the form thus provided, removing the support of the bottom shell and dropping it onto the floor, separating it into sections, removing the sections upwardly through the man-hole, and dropping and removing the other annular shells successively in the same way.
- 20 3. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a downwardly flaring sectional annular shell upon removable supports resting on the floor of the excavation, building up thereon a series of like downwardly flaring shells, inserting ladder rungs between the sections, molding the concrete around the form and the por-
- 25 34. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 30 35. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 35 36. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 40 37. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 45 38. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 50 39. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 55 40. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 60 41. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 65 42. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.
- 70 43. The herein described method of forming concrete man-holes, consisting in supporting within the excavation a form composed of downwardly flaring sectional annular shells by means of a removable support, molding the concrete around the form, removing the support and dropping the lowest sectional annular form into the space so provided, separating it into sections and removing the sections upwardly from the man-hole and dropping and removing the other annular shells in the same way.

tions of the rungs projecting beyond the form, removing the support from the lowest shell and dropping it onto the man-hole floor, separating it into sections and removing these sections upwardly through the man-hole, and dropping and removing the other annular shells downwardly from the several ladder rungs successively and removing the several shells from the man-hole in like manner.

4. Annular forms for man-holes, each comprising shells composed of sections and having flanges at the top and bottom for connecting to the adjoining section, said shells each having vertical joints out of line with those above and below, each shell being downwardly flaring, and the top of one shell being of substantially the same diameter as the bottom of the shell resting thereon.

5. Annular forms for man-holes, each comprising shells composed of sections and having flanges at the top and bottom for connecting to the adjoining section, said shells each having vertical joints out of line with those above and below, each shell being downwardly flaring, and the top of one shell being of substantially the same diameter as the bottom of the shell resting thereon, in combination with removable supports resting on the man-hole floor and on which the lowest shell is supported.

In testimony whereof, I the said CHARLES S. LAMBIE, have hereunto set my hand.

CHARLES S. LAMBIE.

Witnesses:

JAMES I. KAY,
ROBERT C. TOTTEN.