No. 803,680. PATENTED NOV. 7, 1905.

R. R. EVANS.

DEVICE FOR FORMING CONCRETE SEWERS.

APPLICATION FILED MAR. 24, 1905.

2 SHEETS—SHEET 1.

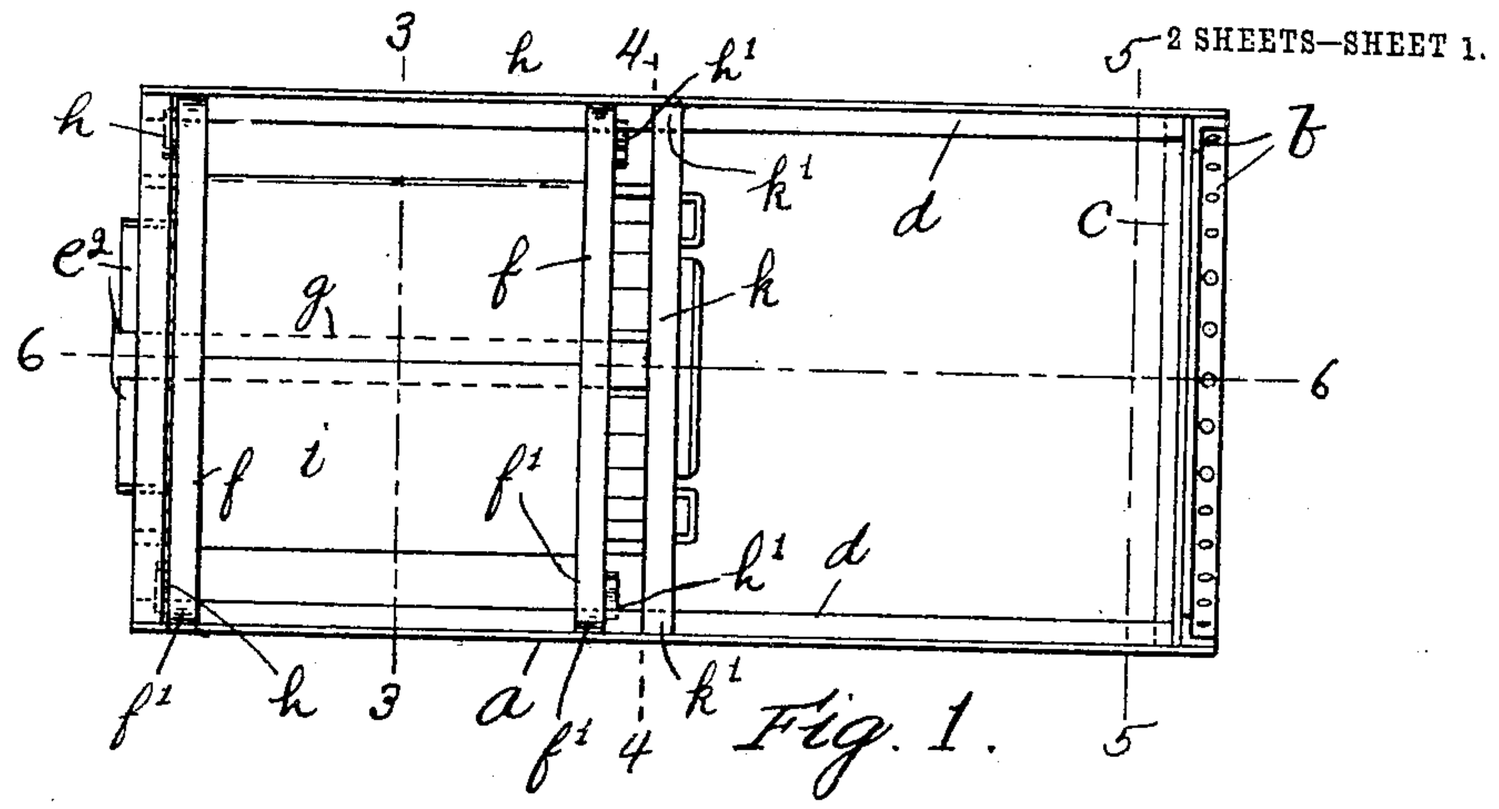

Fig. 1.

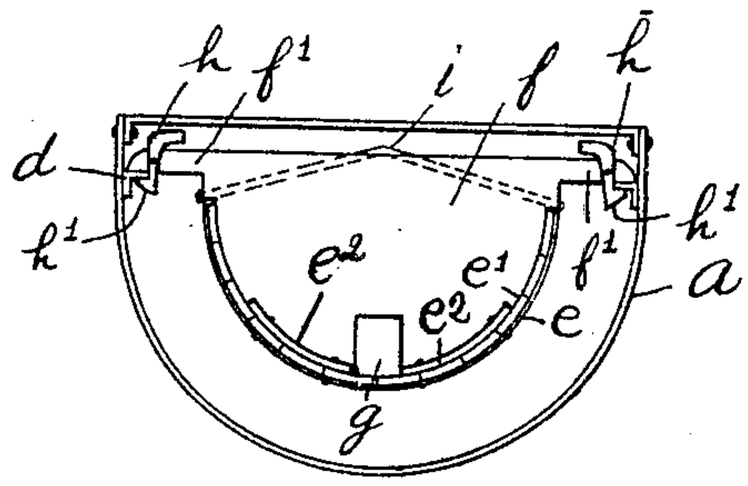

Fig. 2.

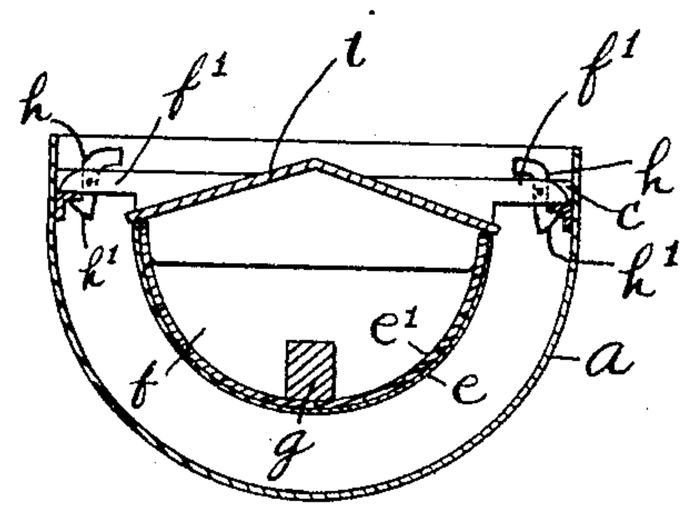

Fig. 3.

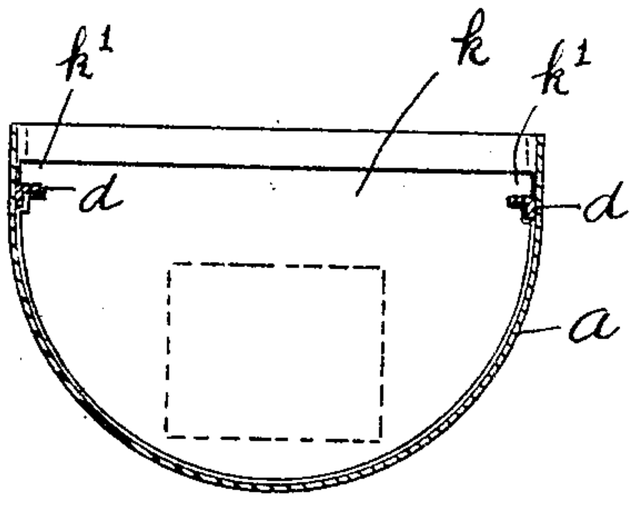

Fig. 4.

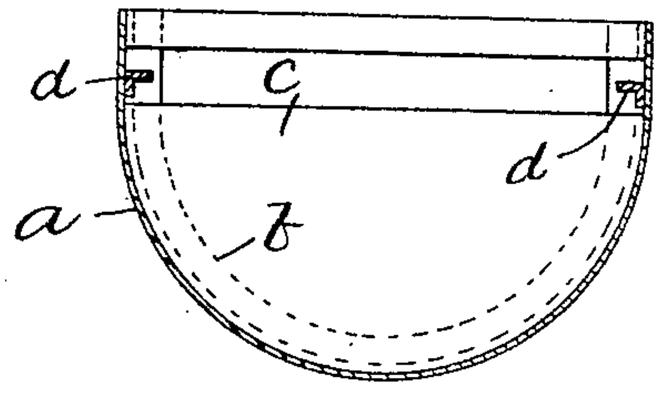

Fig. 5.

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2 SHEETS—SHEET 2.

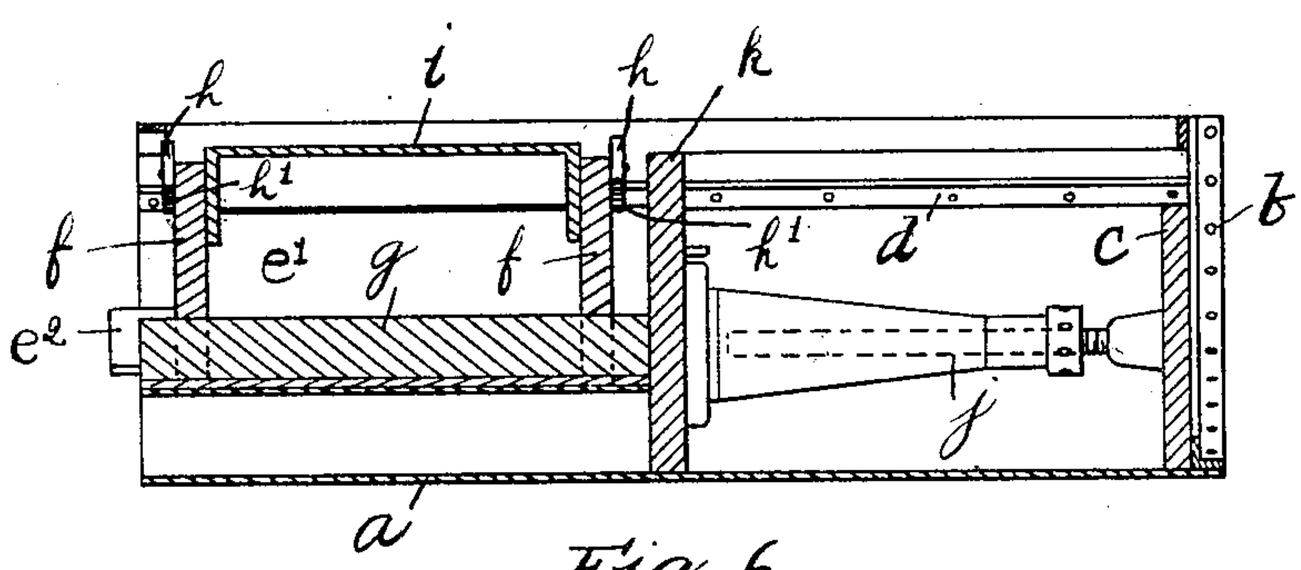

Fig. 6.

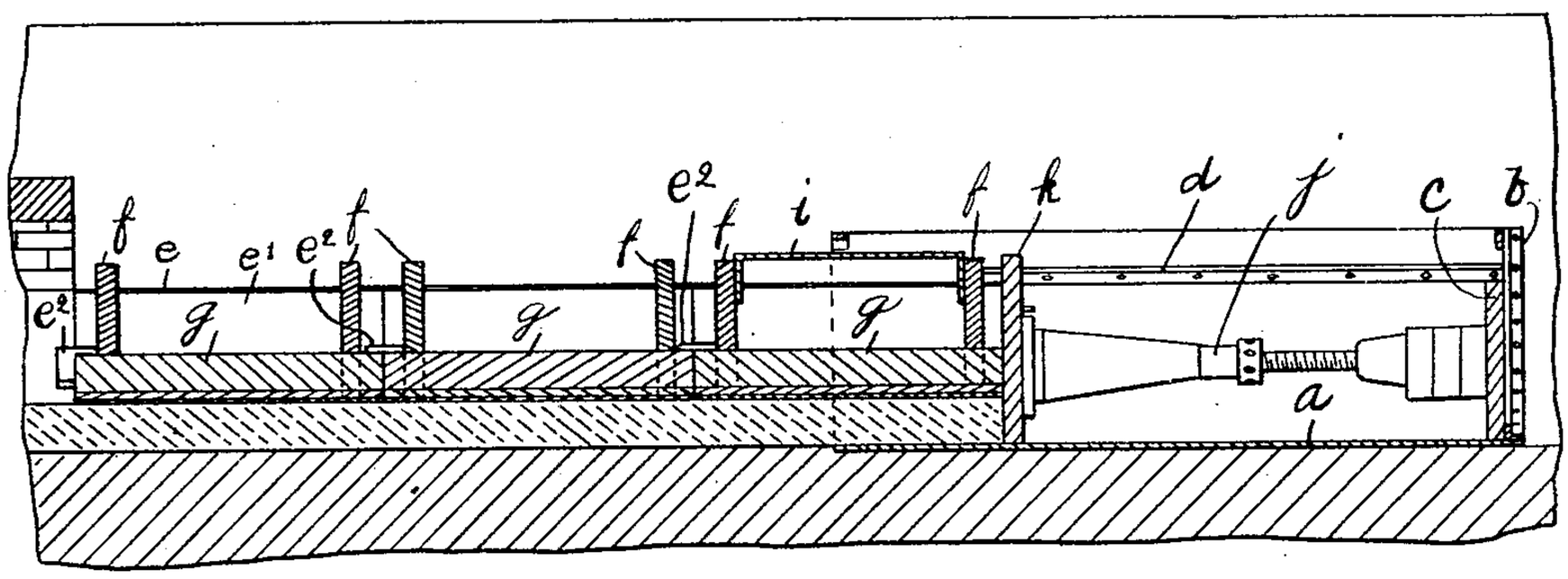

Fig. 7.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR FORMING CONCRETE SEWERS.

No. 803,680 Specification of Letters Patent. Patented Nov. 7, 1905.

Application filed March 24, 1905. Serial No. 251,797.

To all whom it may concern:

Be it known that I, ROBERT R. EVANS, of Haverhill, county of Essex, State of Massachusetts, have invented an Improvement in Devices for Forming Concrete Sewers, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to that class of molding devices which are employed in forming continuous sewers or conduits of concrete, and more particularly it relates to molding devices which are especially adapted to form a ditch or canal or the inverted or lower portion of a conduit, the upper portion of which is to be formed of the same or other material. These devices usually comprise an outer and an inner mold, between which the concrete is packed, the molds being drawn forward step by step after each filling operation. I have found in practice that the inner mold as it slides on the surface of the freshly-laid concrete while being drawn or forced forwardly is liable to cause pieces of broken stone or gravel, forming the aggregate of the concrete, to roll forward therein. This action causes roughness of the inner surface of the concrete pipe, a result which is very objectionable for obvious reasons. As the concrete does not harden as rapidly as it may be laid, the freshly-laid conduit is often injured before it has time to harden.

The object of my invention is to provide a simple apparatus of the above-named character with which a conduit may be rapidly and conveniently molded in concrete without injury to the inner surface thereof as the apparatus is advanced and which will at the same time afford complete protection for the concrete until it becomes as hard as desired. I accomplish these objects by the means shown in the accompanying drawings, in which—

Figure 1 is a plan view of my apparatus. Fig. 2 is a view of the rear end thereof. Figs. 3, 4, and 5 are respectively cross-sectional views on line 3 3, 4 4, and 5 5 of Fig. 1. Fig. 6 is a central longitudinal view on the line 6 6 of Fig. 1. Fig. 7 is a similar view showing the parts as they are ordinarily used.

In carrying out my invention I provide an outer mold *a*, which is preferably of heavy sheet metal bent into the required shape of the outer surface of the conduit to be constructed. In the drawings this mold is shown as semicylindrical in form with parallel sides which project a suitable distance above and perpendicular to the horizontal central plane of the cylinder. A rib or angle-iron *b* is riveted to the inner side of the outer mold adjacent its front end, and an abutment *c* of suitable rigid material is securely fastened to the rear side of said rib *b*. The opposite or rear end of the mold is open, and angle-irons *d*, forming tracks, are riveted to the inner opposite sides of mold *a*. Said tracks *d* extend horizontally from abutment *c* to the open rear end of the mold and being located at a short distance above the upper edge of the concrete section to be formed. The inner mold preferably comprises a form *e*, of sheet metal, of the shape of the inner surface of the proposed conduit, the inner side of which may be reinforced with wood strips *e'* and braced with two heads *f*, which are disposed adjacent the ends of said form and at right angles thereto and the edges of which fit against the surface of the reinforcement *e'*, said parts being rigidly secured together. A bar *g* is arranged in the middle of the mold *e* on the reinforcement *e'*, said bar extending from one end to the other thereof and passing through the heads *f* so that its ends are flush with the ends of the mold *e*. Rearwardly-projecting lips e^2 are secured to the surface of reinforcement *e'* at the rear end of the mold *e* and at each side of bar *g*. The frames *f* are each provided with two oppositely-extending arms *f'*, which project horizontally beyond the surface of the inner mold and are adapted to rest upon the tracks *d*, so that the inner mold may be suspended thereon in the desired position with relation to the outer mold *a*, providing therebetween a filling-space the distance across which is the same as the desired thickness of the walls of the sewer to be constructed. The inner mold is necessarily somewhat shorter than the outer mold.

Locking-dogs *h*, each having a beveled hook *h'* at its end, are pivoted to each arm *f'* in such positions that they automatically engage the under sides of the tracks *d* when the inner molds are supported thereon by arms *f'*.

A V-shaped deflector *i* is preferably provided which is adapted to be supported on the inner mold so that its edges are flush with the sides of the mold. A movable partition *k* is also provided which is adapted to fit

loosely the interior of the outer mold transversely while suspended on the tracks *d* by means of arms *k'* thereon. Said partition is of heavy wooden planks or other material capable of withstanding a heavy strain.

In practice I provide a series of inner molds similar in every respect to the mold *e*, already described.

In using the device the outer mold *a* is first placed in the trench, with its rear end at the end of the trench. An inner mold is then suspended on the tracks of the outer mold and locked thereon by dogs *h*, with its rear end flush with the rear end of the outer mold and in the manner shown in Figs. 2 and 3. The partition *k* is placed in position against the forward end of the inner mold, and a jack *j* of any suitable form is interposed between the abutment *c* and said partition *k*, as shown in Fig. 6, the jack members being forced far enough to press the partition *k* firmly against the front end of the inner mold. The deflector *i* is then placed in position on the inner mold and the concrete is forced down with an iron rammer between the two molds, so as to fill all the intervening filling-space. The deflector *i* aids in directing the concrete into this space, as will be obvious. After this space has been filled and the concrete compacted as much as possible the jack is operated to separate the partition *k* and head *c*, and as the partition *k* is pressed against one end of the mass of concrete which has been laid, the opposite end of which engages the end of the trench, it follows that any backward movement of the partition will compress the concrete. This movement will be practically inappreciable in distance, although such compressing action at this time is highly advantageous, as any unfilled spaces existing between the molds will thus be filled. The action of the jack, however, will push the head *b* and outer mold *a* forwardly, the latter being withdrawn from beneath the inner mold and the newly-laid concrete, the tracks *d* of the outer mold being drawn from beneath the arms *f'* of the inner mold, leaving the latter behind, resting on the freshly-laid concrete. Further compression of the concrete after it has been left by the outer mold will fill the spaces between the inner mold and the surface of the trench. The outer mold is moved forwardly in this manner a distance equal the length of the inner mold, and then the partition *k* is drawn forward and another inner mold is lowered into the outer mold until it is supported on the tracks and is locked thereon by dogs *h*, the rear end of the inner mold thus introduced being placed against the forward end of the previously-placed inner mold while the latter still overlaps the outer mold to some extent. The partition *k* is then pressed against the forward end of the newly-positioned inner mold, and the jack is brought into engagement therewith and with the abutment *b* to clamp the same in place. The previously-described operation is then proceeded with, the outer mold being forced forward, leaving the inner molds in the freshly-laid concrete, the locking-dogs *h* thereof becoming disengaged from the tracks *d* as they are drawn from beneath arms *f'*. In practice a sufficient number of inner molds are provided to enable the concrete to harden sufficiently before it becomes necessary to lift out the rearmost mold and place it in the outer mold again; but the number of inner molds necessary varies according to their length and other conditions. As the concrete is protected by these molds while it is becoming hard, the danger thereto is minimized.

As rearward movement of the inner molds is permitted only to the extent to which the concrete yields under compression, it follows that this movement is inappreciable, especially if the concrete is well packed into the filling-space, and as the concrete moves, to an extent, with the inner mold, if at all, it follows that the inner surface of the concrete will not be roughened or marred by the rolling of hard substances on the outer surface of the inner molds. The bars *g* serve as abutments for the inner molds as they are pressed together and receive practically all the strain of longitudinal compression thereon, and the projections e^2 prevent an inner mold, which is engaged by another inner mold still held down by the tracks *d*, from being lifted from the bottom of the ditch.

Before an inner mold is placed in the outer mold the outer mold may be partly filled with the concrete, and if reinforcing-rods or similar appliances are to be embedded in the concrete they may be then placed therein without difficulty.

The above-described apparatus is simple in construction and may be operated by comparatively unskilled labor.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for the purpose described comprising an outer mold, an inner mold, and longitudinal supports on said outer mold for holding the inner mold in a position therein to provide an intervening filling-space, the rear end of said outer mold being open to permit the outer mold to be moved longitudinally out of engagement with the inner mold, substantially as described.

2. An apparatus for the purpose described comprising an outer mold, an inner mold, and longitudinal supports on said outer mold for holding the inner mold in a position therein to provide an intervening filling-space, the rear end of said outer mold being open to permit the outer mold to be moved longitudinally out of engagement with the inner mold, a movable partition for closing the forward

end of said filling-space, and means acting against said partition for moving the outer mold forwardly, substantially as described.

3. An apparatus for the purpose described comprising an outer mold having longitudinal tracks, an inner mold adapted to be supported on said tracks in different longitudinal positions to provide an intervening filling-space, the rear end of said outer mold being open to permit the same to be moved longitudinally to carry said tracks out of engagement with the inner mold, substantially as described.

4. An apparatus for the purpose described comprising an outer mold, an inner mold, and longitudinal supports on said outer mold for holding the inner mold in a position therein to provide an intervening filling-space, the rear end of said outer mold being open to permit the outer mold to be moved longitudinally out of engagement with the inner mold, a movable partition adapted to engage the forward end of said inner mold and to close the forward end of said filling-space simultaneously, and means for simultaneously pressing said partition rearwardly and said outer mold forwardly, substantially as described.

5. An apparatus for the purpose described comprising an outer mold and an inner mold, said outer mold being open at its upper side to permit introduction of the inner mold therein vertically, and open at its rear end to permit it to be withdrawn from beneath the inner mold while the latter is stationary, supports on said outer mold for holding the inner mold in different longitudinal positions therein, to provide an intervening filling-space, a movable partition for closing the forward end of said space, and means acting against said partition for moving the outer mold forwardly, substantially as described.

6. An apparatus for the purpose described comprising an outer mold having longitudinal tracks, an inner mold adapted to be supported on said tracks in different longitudinal positions to provide an intervening filling-space, and locking means for holding the inner mold from vertical movement with relation to the outer mold while in such position, said locking means permitting relative longitudinal movement of said molds, substantially as described.

7. An apparatus for the purpose described comprising an outer mold and an inner mold, said outer mold being open at its rear end and having an abutment-head secured to its forward end and a pair of longitudinally-extending tracks on its inner sides, transversely-extending arms on said inner mold adapted to rest on said tracks and to support the same in a position to provide a filling-space between said molds, means for holding the inner mold from vertical movement while in said position, a transverse partition adapted to engage the forward end of the inner mold and to close the forward end of said space, said partition being movable longitudinally of the outer mold, and a jack for simultaneously engaging said partition and said abutment-head, substantially as described.

8. An apparatus for the purpose described comprising an outer mold, a series of inner molds, each of materially less length than said outer mold, and having abutting ends, said outer mold being open at its upper side to permit introduction of the inner molds therein vertically and open at its rear end to permit it to be withdrawn from beneath the inner molds, means for supporting one or more of the inner molds within the outer mold in a position to provide an intervening filling-space, a movable partition engaging the forward end of the foremost inner mold, and closing the adjacent end of said space, and means, simultaneously engaging said partition and said outer mold, for moving the latter forwardly, substantially as described.

9. An apparatus for the purpose described comprising an outer mold and a series of inner molds of materially less length than said outer mold, longitudinal tracks at each side of said outer mold for supporting the inner molds therein to provide an intervening filling-space, said outer mold being open at its upper side to permit the inner molds to be lowered therein to rest on said tracks, and open at its rear end to permit it to be withdrawn from beneath the inner molds, movable locking devices for holding the inner molds from vertical movement with relation to the outer mold, and means for moving the outer mold forwardly, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT R. EVANS.

Witnesses:
L. H. HARRIMAN,
H. B. DAVIS.