

D. N. TRULLINGER AND L. A. GRANGER.
 APPARATUS FOR FORMING CONCRETE PIPES.

APPLICATION FILED AUG. 19, 1920.

Patented July 11, 1922.

3 SHEETS—SHEET 1.

1,422,150.

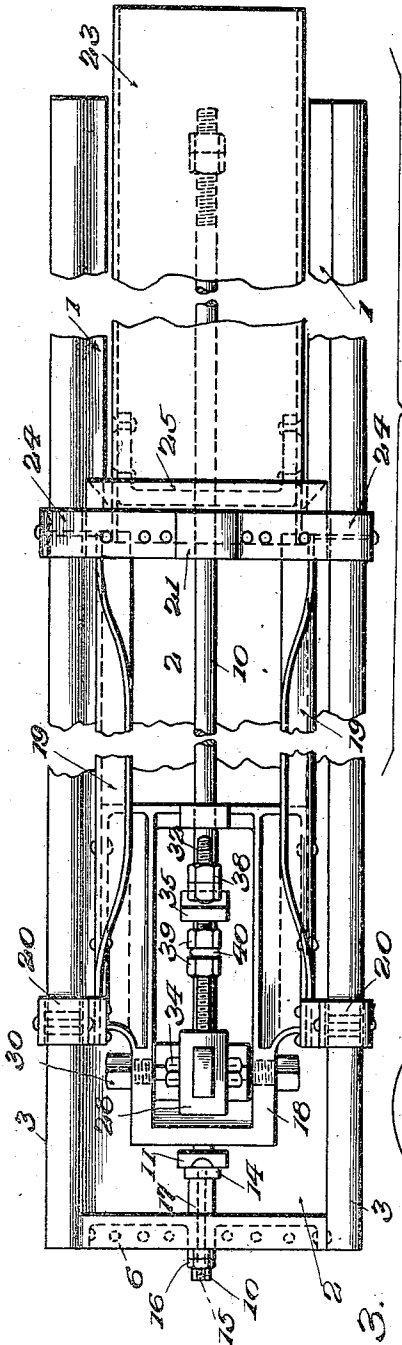


Fig. 1.

Fig. 5.

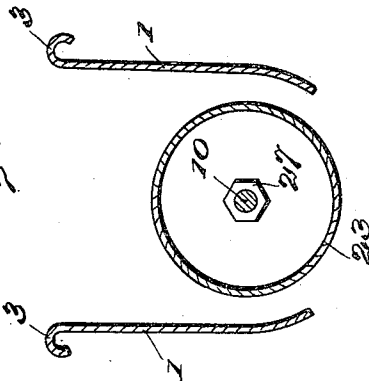


Fig. 4.

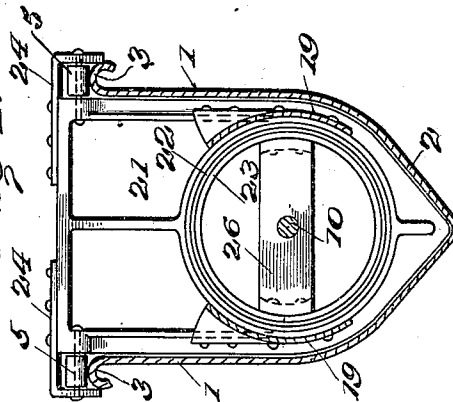
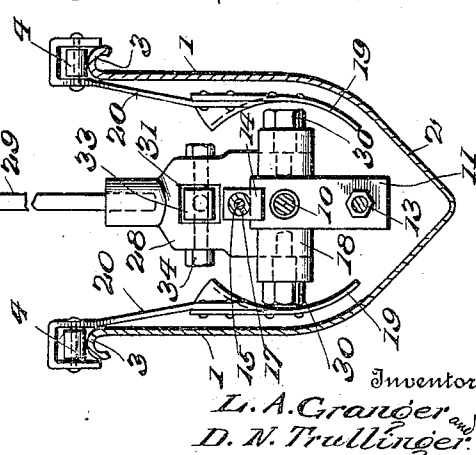


Fig. 3.



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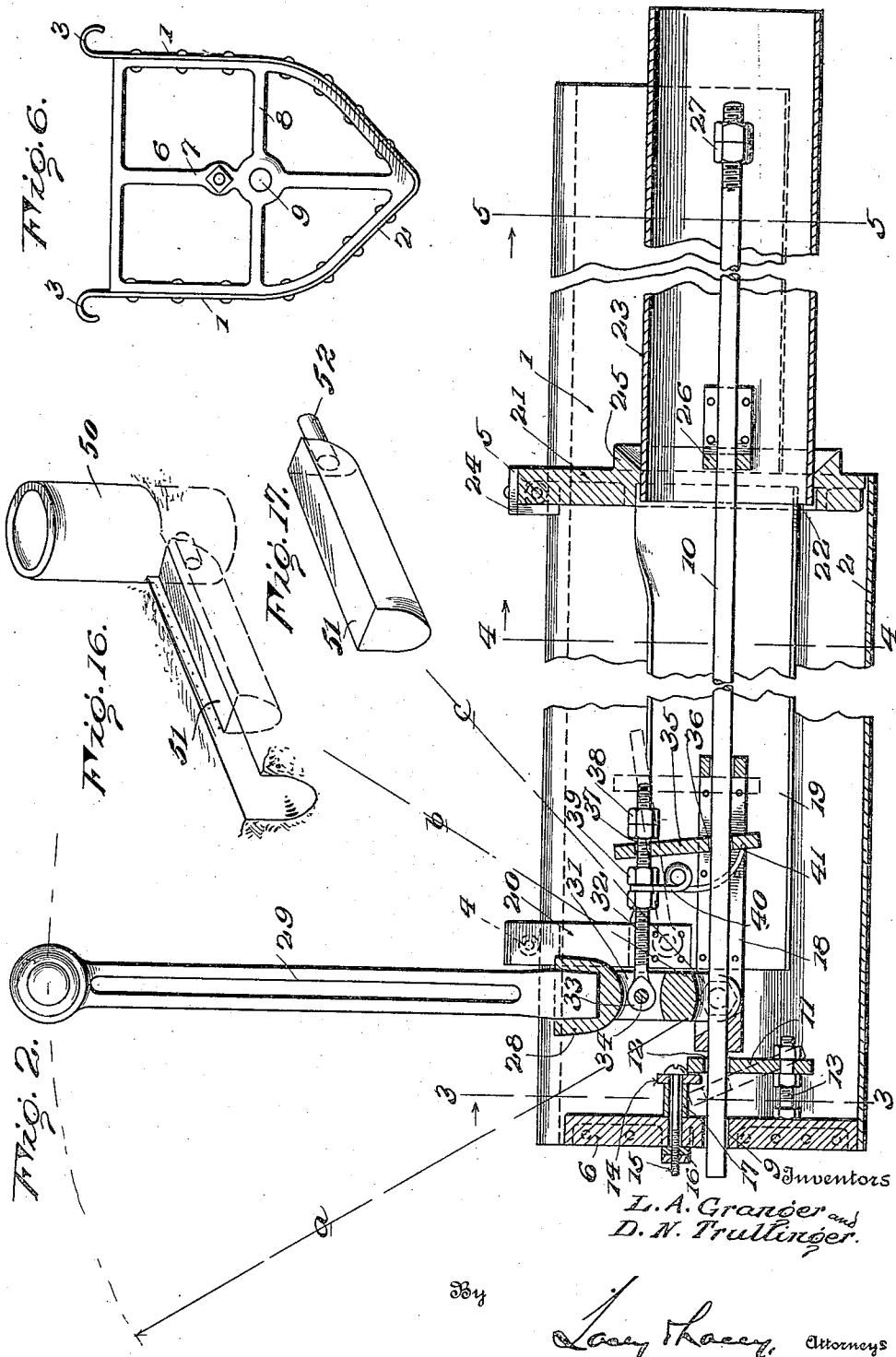
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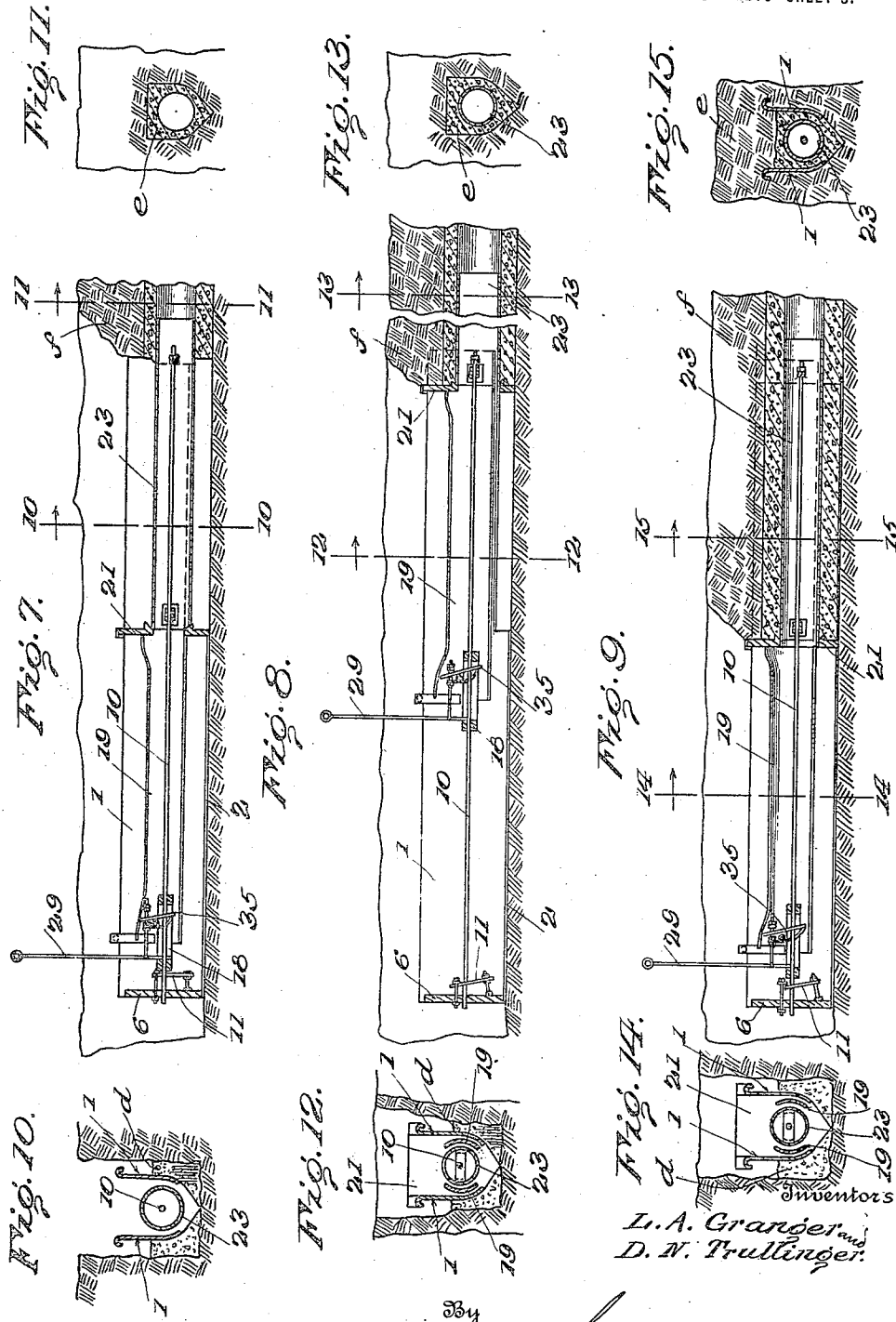
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3 SHEETS—SHEET 3.

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APPARATUS FOR FORMING CONCRETE PIPES.

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Specification of Letters Patent.

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Application filed August 19, 1920. Serial No. 404,544.

To all whom it may concern:

Be it known that we, DANIEL N. TRULLINGER and LEO A. GRANGER, citizens of the United States, residing at Fresno, in the county of Fresno and State of California, have invented certain new and useful Improvements in Apparatus for Forming Concrete Pipes, of which the following is a specification.

Our invention relates to apparatus for use in forming continuous concrete pipes or conduits and one object of the invention is to provide means which will firmly support the green concrete in a trench while a further object of the invention is to provide easily manipulated means for adjusting the device along the trench as the work progresses. Other incidental objects of the invention will appear as the description of the same proceeds.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of an apparatus embodying our invention, some of the parts being broken away in order that the illustration may be on a larger scale and the parts more clearly shown;

Fig. 2 is a central longitudinal vertical section of the same;

Fig. 3 is a transverse section on the line 3—3 of Fig. 2;

Fig. 4 is a similar section on the line 4—4 of Fig. 2;

Fig. 5 is a section on the line 5—5 of Fig. 2;

Fig. 6 is an end elevation;

Fig. 7 is a diagrammatic longitudinal section of the apparatus showing the parts in position to permit the pouring of a new section immediately adjacent and adjoining the concrete conduit;

Fig. 8 is a view similar to Fig. 7, but showing the form withdrawn from the completed work and the core in position to be withdrawn;

Fig. 9 is a view similar to Figs. 7 and 8 but showing the parts in the position assumed when a section of the conduit has been completed and before the outer form and the core have been withdrawn;

Figs. 10 and 11 are transverse diagrammatic sections on the lines 10—10 and 11—11 respectively of Fig. 7;

Figs. 12 and 13 are transverse sections on the lines 12—12 and 13—13 respectively of Fig. 8;

Figs. 14 and 15 are transverse sections on the lines 14—15, respectively, of Fig. 9.

Figs. 16 and 17 are detail views of the form used in starting the work.

In carrying out our invention, we employ an outer form or shell which may be constructed of sheet metal rolled into the desired shape and presenting a forward trough-like section comprising side plates 1 and a V-shaped bottom 2, as clearly shown in Figs. 3 and 4. The side plates 1 are extended rearwardly beyond the bottom 2 as will be readily understood upon reference to Figs. 2 and 5 so that the rear portion of the shell or outer form will be bottomless to permit the concrete poured into the same to find an outlet and seek a level in the bottom of the trench as will be hereinafter fully set forth. The upper longitudinal edges of the side plates 1 are rolled or doubled upon themselves, as shown at 3, presenting beads which constitute tracks upon which the rollers 4 and 5 supporting the operating mechanism may run. In the front end of the shell, we secure a head 6 which may be a solid block but will preferably be a spider, as shown in Fig. 6, having its side members conforming to and secured rigidly against the inner faces of the sides of the shell and the bottom thereof and connected by cross braces. At the junction of the central vertical brace 7 and, the cross brace 8, we provide an opening 9 through which a central longitudinal rod 10 may slide. A pawl or dog 11 is fitted upon the rod 10 and consists of a plate having an opening 12 near its upper end, the diameter of which is slightly greater than the diameter of the rod 10 which passes therethrough. This pawl or dog is provided at its lower end with an abutment bolt or pin 13 which normally bears against the inner face of the head 6 below the opening 9 therein and permits the dog to be tilted or rocked so that when it is

in the vertical position, shown in full lines in Fig. 2, the plunger rod 10 may move through the dog, but if the dog be set in the position shown in dotted lines in said Fig. 2, the edges of the opening 12 will bind upon the rod and thereby prevent relative movement of the parts. To hold the dog in either of its positions, we provide a latch or button 14 which is pivotally mounted upon the inner end of the bolt 15 inserted through the head just above the opening 9 and held in position by nuts 16 having threaded engagement with the bolt and bearing against the outer face of the head. A spacer sleeve 17 fitted around the bolt between the latch 14 and the head 6 serves to hold the latch against movement endwise of the bolt. When it is desired to hold the dog 11 in the vertical position, the latch is engaged in front of the same, as shown, whereas when it is desired to set the dog in the inclined position the button or latch is swung pivotally about the bolt 15 and the dog may then be swung forwardly, after which the button is returned to its former position as will be readily understood.

Fitted slidably upon the plunger rod 10 is a horizontally disposed yoke or frame 18 to the sides of which are rigidly secured the struts 19 and to the upper front corners of the said struts are secured the hangers 20 carrying the rollers 4 which run upon the beads or tracks 3, as clearly shown. The struts 19 extend rearwardly from the yoke or frame 18 and have their rear ends rigidly secured to a die or rear head 21 which is a solid block or plate having a central opening 22 to accommodate the front end of the core 23, the outline of this die or rear head being such that it will fit closely within the forward portion of the shell, as shown clearly in Fig. 4. It will also be noted upon reference to Fig. 4 that hangers or brackets 24 carrying the rollers 5 are secured to the upper edge of the die 21 so that the die may move freely upon the shell. Upon the rear face of the die is formed a circular rib or bead 25 which will produce a circular groove in the end of the formed section of the conduit and thereby facilitate the bonding of the successive adjoining sections so that weak joints in the completed pipe will be avoided. It will be readily noted that the struts 19 form connecting links between the yoke or frame 18 and the die 21 so that these parts will be caused to always move together. The core 23 is preferably a cylindrical shell disposed concentric with the plunger rod 10 and having a yoke or bracket 26 secured in its front end through which the said plunger rod may slide. The rear end of the plunger rod is equipped with nuts 27 or some other convenient form of abutment so that when the mechanism has been manipulated to draw the plunger rod

10 forward and bring the said abutment into contact with the bracket or yoke 26 further forward movement of the plunger rod will withdraw the core from the formed pipe.

In the front end of the yoke or frame 18, we mount a rocker 28 which is provided with a socket in its upper end to receive the operating lever or handle 29. The lower end of this rocker 28 spans the plunger rod 10 and is pivotally supported in the yoke or frame 18 by shoulder bolts 30 threaded through the sides of the said yoke or frame and having smooth extremities which engage sockets or openings provided therefor in the lower extremity of the rocker as will be readily understood. Intermediate the height of the rocker, there is an opening 31 therethrough in which is pivotally fitted the front end of a screw or threaded rod 32, the said screw or rod being constructed with an eye 33 through which the pin or bolt 34 is inserted, the said pin or bolt being carried by the sides of the rocker as will be readily understood. Carried by the threaded rod 32 is a dog or pawl 35 which is provided near its lower end with an opening 36 through which the plunger rod 10 may pass and near its upper end is provided with an opening 37 through which the screw or threaded rod 32 passes, as clearly shown. Nuts 38 and 39 are fitted upon the threaded rod at the opposite sides of the dog 35 to prevent the dog being accidentally removed from the rod or becoming inoperatively disposed in relation thereto, and the forward nuts 39 secure a spring 40 which has its lower end fitted to the dog 35 below the plunger rod 10, as shown at 41. If the lever 39 be swung forwardly, a pull will be exerted through the threaded rod 32 upon the nuts 38 which will cause the dog 35 to be swung into binding engagement with the plunger rod 10 and when the lever is swung rearwardly the threaded rod 32 will be pushed rearwardly and the dog 35 will move with the same over the plunger rod inasmuch as the lower end of the dog will be held yieldably by the spring 40 and, consequently, be caused to move over or along the plunger rod. Normally, the handle or lever 29 is swung between the positions *a* and *b*. If, however, it be desired to release the dog 35 from the plunger rod, the lever is swung rearwardly to the limit of its movement, as indicated at *c*, whereupon the rod 32 will be caused to assume the position shown in dotted lines in Fig. 2 and the dog 35 will be carried against the rear end of the frame or yoke 18 and brought into the vertical position shown in dotted lines in said figure whereupon relative movement of the dog and the plunger rod will be permitted.

In the use of our apparatus, a trench is dug along the line which it is desired to

have followed by the completed pipe. The trench is usually started from an existing pipe or a stand pipe or reservoir 50 (see Fig. 16) having an outlet opening in its side. A starting form 51 having a blind core 52 at one end is placed in the trench with the blind core fitting in the end of the pipe or the opening in the stand pipe, as the case may be, and dirt is tamped firmly around the form to give the trench the same cross sectional outline as the shell or wings 1. The starting form is then removed and the pipe making apparatus is then set in the bottom of the trench with the core projecting into the end of the pipe or the opening in the stand pipe, as the case may be, the shell fitting snugly in the trench with the ends of the wings abutting the stand pipe or pipe. Loose dirt is then deposited in the trench at the sides of the shell or form and tamped to the level indicated by the line *d* in Fig. 10 to hold the shell in position for its full length. Concrete is now poured around the exposed core 23, the bottom portion of the concrete being rather wet and thoroughly spaded or tamped, while the upper portion is quite wet but drier than the bottom portion to guard against caving in of the mass when the core is pulled. Dirt is then filled in over the concrete and firmly tamped to the surface of the ground. The rod 10 is then pushed by hand to its rearmost position with its front end just showing through the head 6, as shown in Fig. 6, after which the dog 11 is set in the position shown in Figs. 8 and 9 and indicated by dotted lines in Fig. 2 so that relative movement of the dog and the plunger rod 10 will be prevented. The lever 29 is then oscillated so that the dog 35 will feed the plunger rod 10 and the shell forward. When the operating lever 29 is swung rearwardly, the dog 35 will be moved rearwardly along the plunger rod 10, being pushed to the rear by the spring 40, and when the lever is again swung forwardly the said dog will again bite upon the plunger rod and this time will feed the said rod forwardly and inasmuch as the abutment 13 carried by the latch or dog 11 is in contact with the front head 6 and said dog is held in engagement with the plunger rod by the latch 14 the said head and the shell or outer form will be moved forwardly and withdrawn from the dirt which has been packed around the core and behind the head 21, the parts being caused to assume the relative positions indicated in Fig. 8. When the lever is swung forwardly, the struts 19 are placed under compression with the die or head 21 held firmly against the completed pipe and the earth tamped over the same so that the forward movement of the lever will be transmitted to the plunger rod and the shell while the operating mechanism remains in a fixed location. The movement of the shell and the plunger rod will eventually bring the nuts 27 on the plunger rod into contact with the bracket 26 in the front end of the core as shown in Fig. 8. Dirt is then tamped around the shell, as before, to hold it in position for the succeeding section of the pipe. The dog 11 is then shifted to the position shown in Fig. 7 and in full lines in Fig. 2, the oscillation of the lever then feeding the plunger rod forward through the head 6 and, by reason of the engagement of the abutment 27 with the yoke or stop 26, pulling the core from the completed pipe to the position shown in Fig. 7. If the dog 35 be then shifted to the position shown in dotted lines in Fig. 2, the operating mechanism may be manually slid forward to the positions shown in Figs. 2, 7 and 9 so that the head 21 and the core will be again in their initial positions shown in Fig. 7 and the apparatus will be ready for the formation of another section of pipe. The concrete which has been previously prepared may now be poured in the trench around the core and between the same and the outer shell or form and thoroughly tamped down so as to be compressed and fill the ditch, as shown at *e* in Figs. 11, 13 and 15, it being understood that the pouring of the concrete will begin at the rear end of the trench or immediately adjacent the previously filled portion thereof so that the green concrete will be poured in initially immediately adjacent the previously finished work and no open spaces will be left to be subsequently filled with resulting poor joints. By observing this progression in the work, the concrete will be permitted to set more advantageously also and the removal of the head 21 from the end of the completed section will be less apt to result in injury to the end of said section. While the head 21 is in its position at the front end of the core, loose dirt, indicated at *f*, is filled in above the concrete and packed so that the trench will be filled while the partly green concrete is still supported by the core and the shell. After the section has been completed, the operating mechanism is manipulated, as previously described, to first withdraw the shell or outer form from the filled trench into position to permit the formation of a new section which position is illustrated in Fig. 8. The core is then drawn forward after which the rear head and operating mechanism are brought forward so that the parts will be in the position shown in Figs. 7 and 9 and the operation of pouring the concrete and filling in the trench above the same repeated. In Fig. 7, we show the position of the parts ready to permit the formation of a new section and in Fig. 9 the same position of the parts is shown but the new section has been completed.

Our improved apparatus is compact in its

arrangement and simple in construction and will be found highly efficient in use for producing a perfectly formed continuous concrete conduit or pipe of any desired length which will be free of leaky joints. By its use, a conduit or pipe may be formed in a previously dug trench more expeditiously than with loose separate forms heretofore frequently used and at less expense than is involved in the use of complicated automatic mixing and pouring traveling machines.

Having thus described the invention, what is claimed as new is:

1. An apparatus for the purpose set forth comprising a shell, a core disposed longitudinally within the shell, a head supported upon the shell and adapted to travel longitudinally thereof and normally fitting around the front end of the core, and means whereby the shell, the head and the core may each be shifted longitudinally relative to the others.

2. An apparatus for the purpose set forth comprising a shell, a core disposed longitudinally within the shell, a head supported by the shell and fitting around the front end of the core, a plunger rod extending longitudinally through the shell and the core, means for effecting engagement of said rod with the core, and means supported by the said rod and the shell for effecting relative longitudinal movement of the shell, the head and the core.

3. An apparatus for the purpose set forth comprising a shell consisting of side plates and a bottom connecting said side plates, the side plates being extended rearwardly beyond the bottom, a core supported normally between the rear extensions of the side plates, a head supported on said side plates for relative longitudinal movement and normally fitting around the front end of the core, and means supported in the front end of the shell for effecting relative longitudinal movement of the shell, the head and the core.

4. An apparatus for the purpose set forth comprising a shell, a core disposed longitudinally within the shell, a head supported upon the shell and arranged to travel longitudinally thereof and normally fitting around the front end of the core, and a projection upon the rear face of said head around the core adapted to form a groove in the conduit produced within the shell.

5. An apparatus for the purpose set forth comprising a shell, a head fixed in the front end of the shell, a plunger rod slidable through said head and extending longitudinally within the shell, a core disposed concentric with said plunger rod, means for effecting engagement between said rod and the core, a dog hung upon said plunger rod adjacent the head in the front end of the

shell and provided with an abutment at its lower end adapted to impinge against said head, means mounted on said head to hold the dog in or out of engagement with the plunger rod, and means supported in the shell and acting upon the plunger rod to effect relative longitudinal movement between the shell and the core.

6. An apparatus for the purpose set forth comprising a shell, a plunger rod disposed longitudinally within the shell, a core disposed concentrically about said plunger rod, means for effecting engagement between the plunger rod and the core, a head normally fitting about the front end of the core and supported for travel upon the shell, a frame disposed about the plunger rod and supported for travel upon the shell, rigid connections between said frame and the said head, and means carried by said frame to engage the plunger rod to effect relative longitudinal movement of the shell and the rod, the said mechanism when released from the plunger rod permitting relative longitudinal movement of the frame, the head and the shell.

7. An apparatus for the purpose set forth comprising a shell, a core disposed longitudinally of the shell, a head supported for travel upon the shell and normally fitting around the front end of the core, a frame supported for travel upon the shell, struts rigidly secured at their front ends to said frame and at their rear ends to said head, a plunger rod extending slidably through the said frame and disposed concentric with the core and the shell, means for locking said rod against movement relative to the shell, and means mounted in said frame to engage said rod whereby to effect relative longitudinal movement of the shell and the core.

8. An apparatus for the purpose set forth comprising a shell, a core disposed longitudinally within the shell and concentric therewith, a frame supported for travel within the shell, a plunger rod extending slidably through said frame, means for effecting engagement between said rod and the core, a lever pivotally mounted within said frame, a vibratory dog encircling said plunger rod, and means operatively connecting the lever and said dog whereby to cause the same to engage the rod or move free thereof.

9. An apparatus for the purpose set forth comprising a shell, a core mounted thereon, a plunger rod disposed concentric with the core and the shell, means for effecting engagement between the plunger rod and the core, a frame through which the plunger rod may slide, said frame being supported for travel upon the shell, a rocker mounted in said frame, a rod extending rearwardly from and pivoted to said rocker, a dog hung

loosely upon said rod and fitting loosely around the plunger rod, and a spring carried by said rod and connected to the lower free end of said dog whereby movement of the rocker in one direction will cause the dog to bind upon the plunger rod and movement of the rocker in the opposite direction will release the dog and effect movement of the same along the rod.

In testimony whereof we affix our signatures. 10

DANIEL N. TRULLINGER. [L. s.]

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