

E. L. RANSOME.

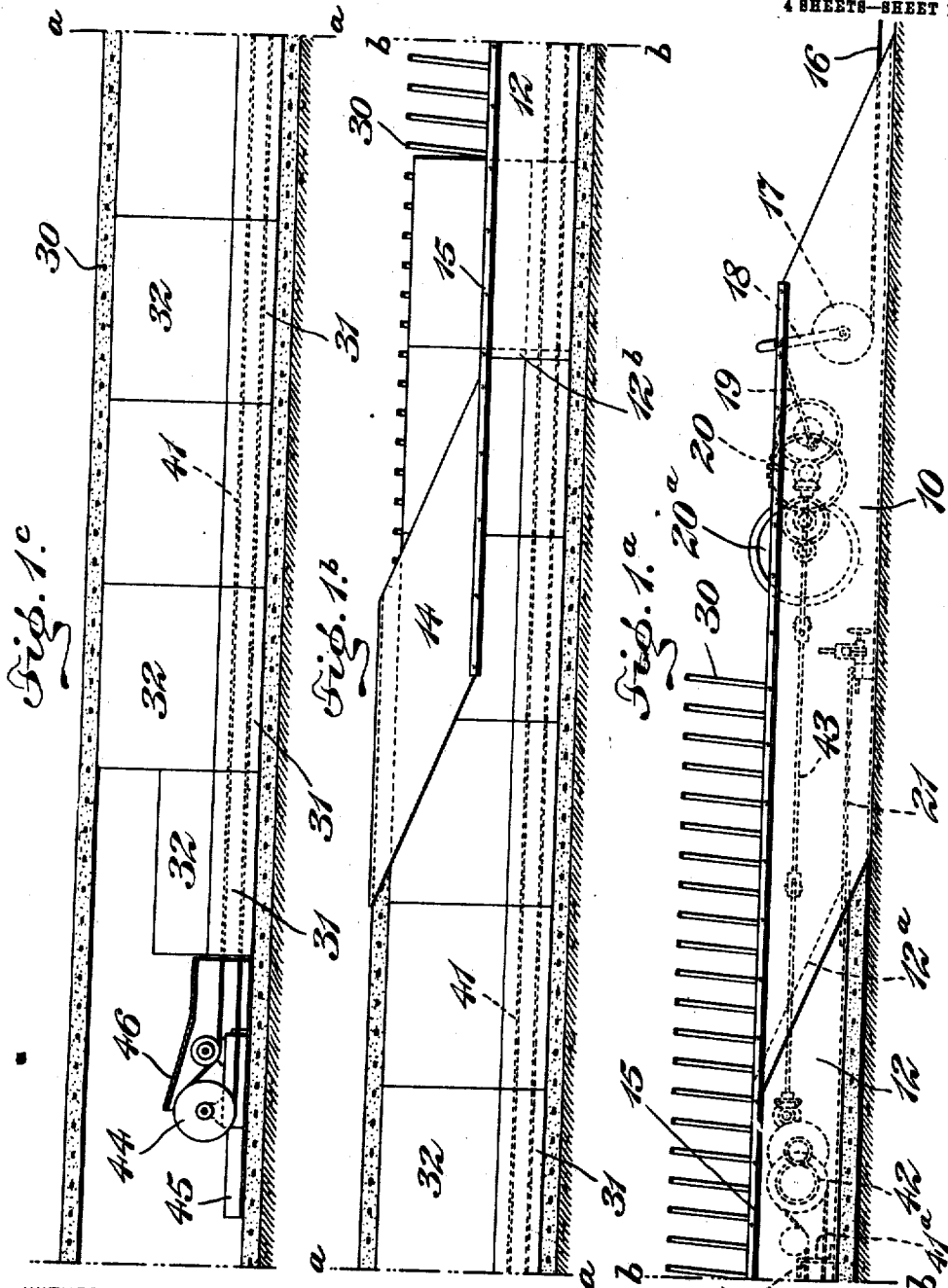
APPARATUS FOR LAYING CONCRETE PIPES.

APPLICATION FILED MAR. 30, 1907. RENEWED NOV. 16, 1908.

910,578.

Patented Jan. 26, 1909.

4 SHEETS—SHEET 1.



WITNESSES

W. C. Abbott
E. J. McLaughlin

BY

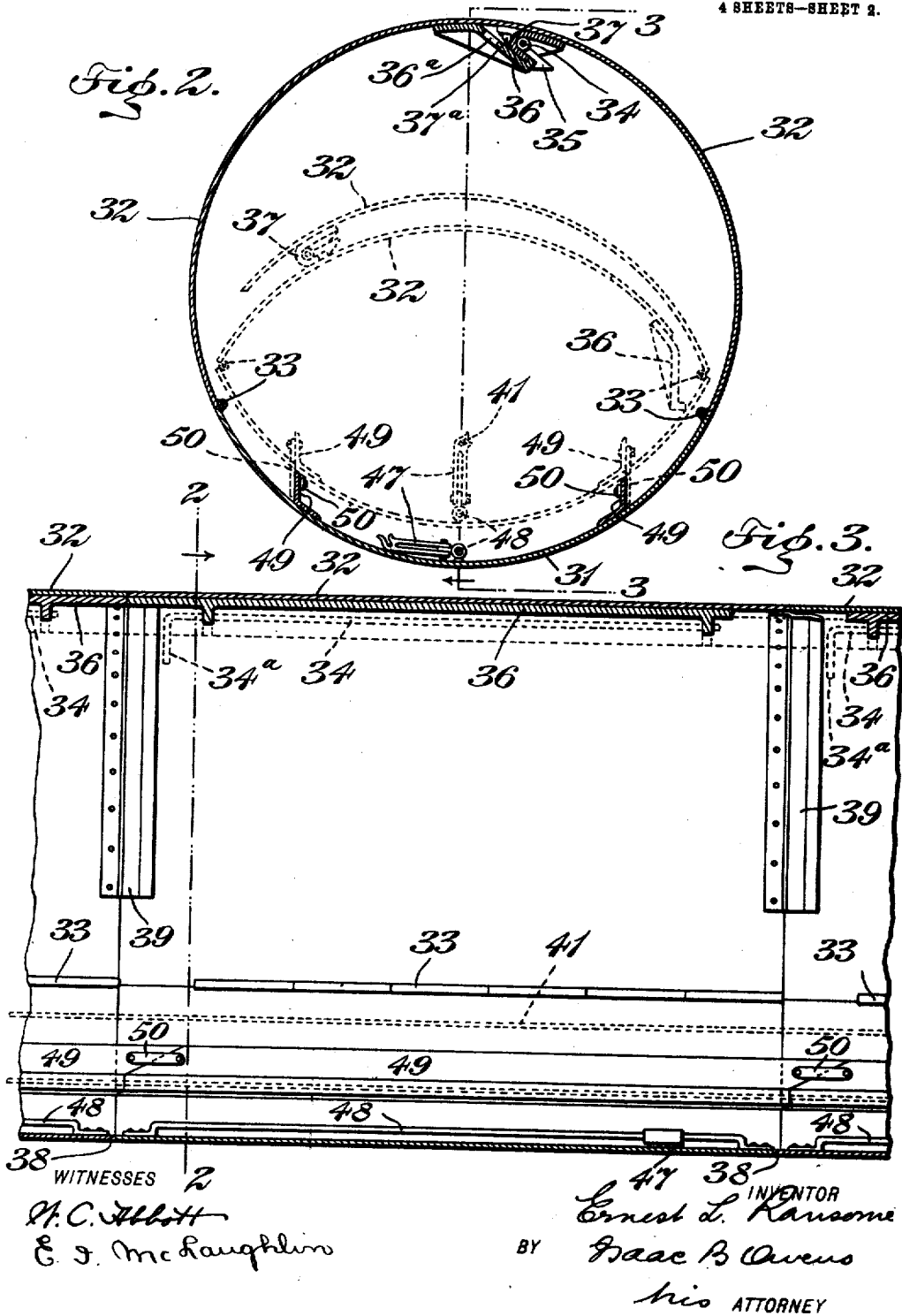
INVENTOR
Ernest L. Ransome
Isaac B. Owens
his ATTORNEY

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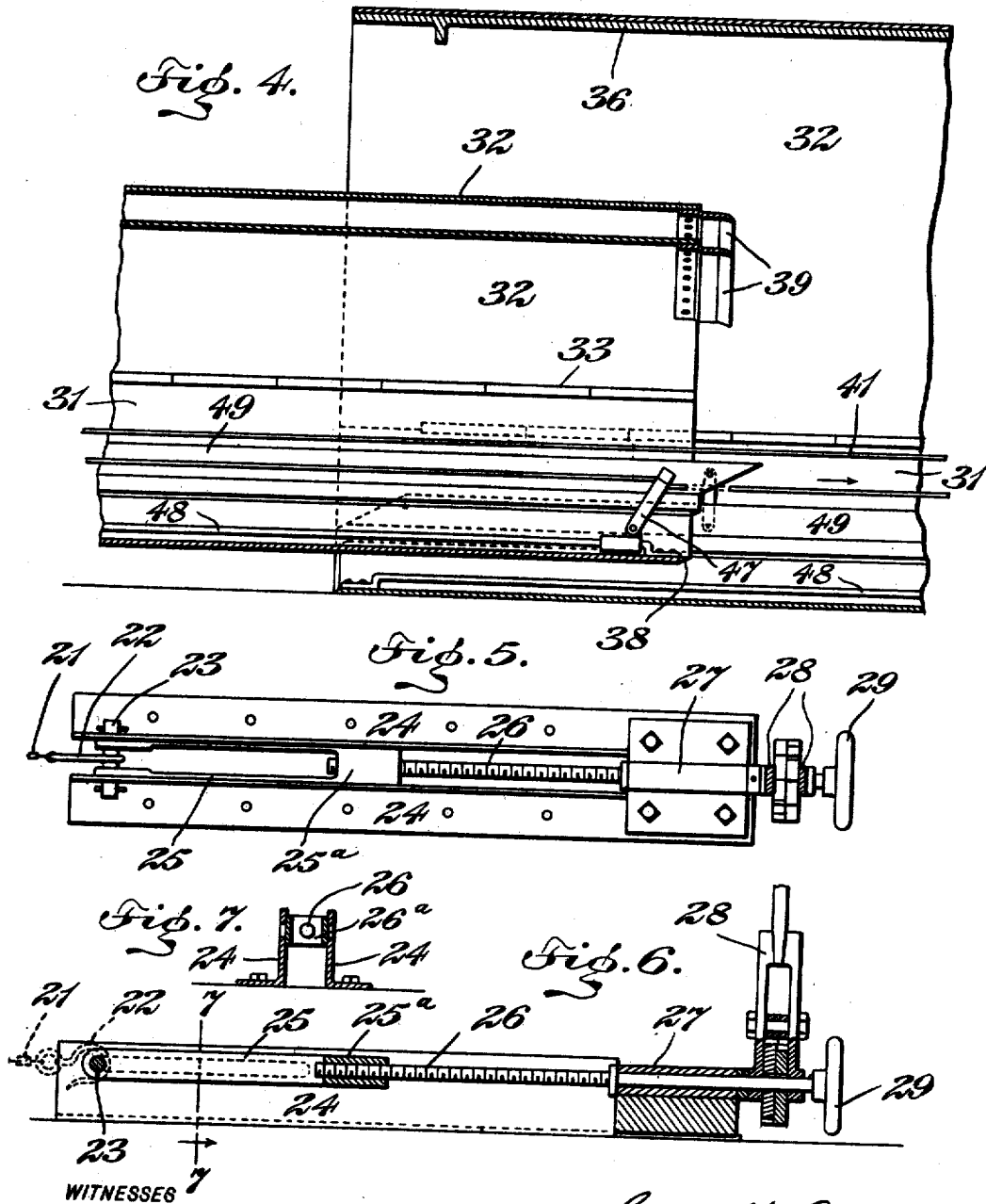
4 SHEETS—SHEET 2.



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 4 SHEETS—SHEET 3.



WITNESSES
 M. C. Allen
 E. J. McLaughlin

INVENTOR
 Ernest L. Ransome
 BY Isaac B. Owens
 his ATTORNEY

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Fig. 9.

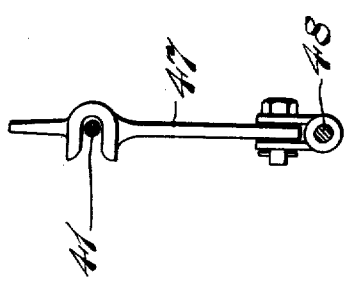
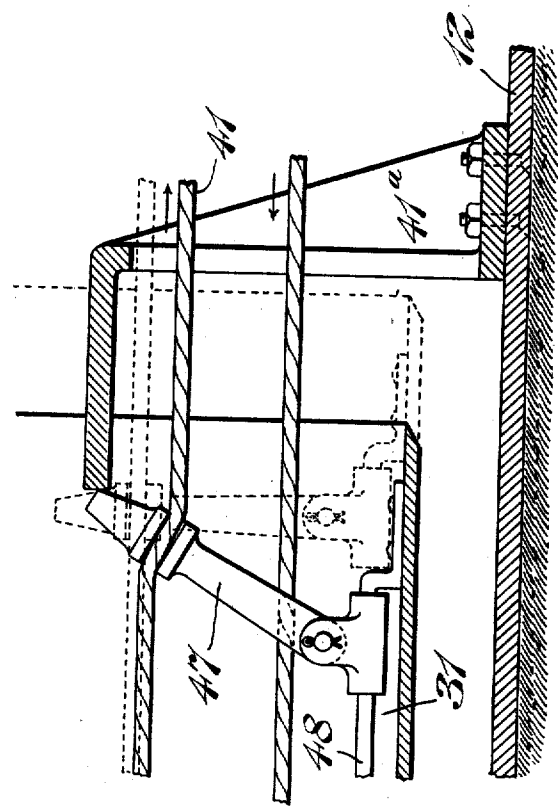


Fig. 8.



WITNESSES

W. C. Abbott
 E. J. McLaughlin.

INVENTOR
 Ernest L. Ransome
 BY Isaac B. Owens
 his ATTORNEY

UNITED STATES PATENT OFFICE.

ERNEST LESLIE RANSOME, OF NEW YORK, N. Y.

APPARATUS FOR LAYING CONCRETE PIPES.

No. 910,578.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed March 20, 1907, Serial No. 345,517. Renewed November 16, 1908. Serial No. 462,916.

To all whom it may concern:

Be it known that I, ERNEST LESLIE RANSOME, of the borough of Richmond, city of New York, and State of New York, have invented certain new and useful Improvements in Apparatus for Laying Concrete Pipes, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

The principal object of my present invention is to improve and render rapid and effective in operation apparatus for laying concrete pipes *in situ*.

The invention is applicable to pipe of various sizes, particularly to the construction of large pipes, conduits, subways and the like.

In carrying out my invention, the apparatus is caused to move automatically through the trench or over the surface on which the pipe is laid, by the action of an engine or motor mounted on the apparatus. Preferably this engine is connected to a winding mechanism to which is fastened a cable anchored in the trench ahead of the apparatus; and by these means the apparatus may be automatically advanced, continuously or intermittently through the trench, progressively with the formation of the pipe.

A further feature of my invention resides in the peculiar construction of the core molds of the apparatus and in the arrangement which enables them to be collapsed or otherwise reduced in size after the concrete has been set around them, so that the core sections may be carried forward automatically through the pipe or conduit to the head of the apparatus, where the core sections are readjusted for a second operation.

A further feature of the invention is the peculiar mechanism which I have devised for carrying the collapsed core sections forward, the distinguishing element of which is a cable or other similar traction means driven to move through the cores and adapted to have the collapsed cores connected therewith so that they may be carried forward at the proper periods in the operation of the apparatus.

Still a further feature of my invention resides in the peculiar relative arrangement of the shaper, inverted mold and cap, together with the devices for connecting them, these

parts moving the apparatus continuously along the trench, except in event that reinforce material is used, in which case the apparatus will be operated with a step-by-step movement, stopping at regular intervals to admit the introduction of the reinforce. This reinforce is preferably of the character disclosed in my copending application for patent on pipe molds, Serial No. 356,183, filed February 7, 1907, although a continuous spiral may be employed as in my prior patent No. 517,808, dated April 3, 1894 or various other methods may be resorted to, my invention being in no sense limited in this respect.

The invention involves various other features of major or minor importance, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is had to the accompanying drawings, which illustrate, as an example, of my invention, the preferred manner of practically embodying the same, in which drawings,

Figures 1^a, 1^b, and 1^c, represent a side elevation of the apparatus in operative adjustment, the three views being continuations of each other and divided respectively at the lines *a-a*, *a-a*, and *b-b*, *b-b*; Fig. 2 is a cross section of one of the cores, illustrating by broken lines the position of the core contracted and in the operation of being advanced through the other core sections to the head end of the machine; Fig. 3 is a longitudinal section through several connected cores; Fig. 4 is a sectional view showing the operation of the collapsed core in riding into and through the extended cores; Fig. 5 is a plan view of the adjustable connection between the shaper and the inverted mold; Fig. 6 is a longitudinal section thereof; Fig. 7 is a cross section on the line 7-7 of Fig. 6; Fig. 8 is a detail of the stop for releasing the cable grip, and Fig. 9 is a detail of the grip.

As shown best in Fig. 1^a, 10 indicates the earth shaper which is semi-circular in cross section for a circular pipe, and adapted to run through the correspondingly formed bottom of the trench in which the pipe is laid. Preferably this shoe has downwardly and forwardly sloping front and rear edges.

12 indicates the inverted mold which has a forward and downwardly sloping front edge, indicated by the broken line 12^a in Fig. 1^a,

and preferably a perpendicular rear edge indicated by the broken line 12^b in Fig. 1^b, although this is in no sense essential.

14 indicates the cap mold which is joined to the shaper by means of horizontal side beams 15, which may if desired, be flanged and set on earth benches at the side of the trench in the manner disclosed in my application, Serial Number 321,569, filed June 13, 1906. The cap 14 has a forwardly and downwardly sloping front edge and, preferably, a correspondingly formed rear edge. The parts 10, 12, and 14 are adapted, as will more fully appear hereinafter, to move as a unit progressively through the trench and the "invert" of the pipe i. e. the bottom half is formed by tamping the concrete on the edge 12^a of the invert mold 12, while the "cap" or top section of the pipe is formed by tamping the concrete on the diagonal forward edge of the cap 14. In this manner the pipe is shaped and by continuously supplying and tamping the concrete, the advance of the apparatus and the formation of the pipe may be made concurrent.

For advancing the apparatus, I prefer to employ an anchor (not shown) of any desired sort driven into the earth some distance ahead and to which a hauling cable 16 (see Fig. 1^a) is connected. This cable extends to the earth shaper and is wound over a drum 17 mounted on the forward portion thereof. The drum is driven by a ratchet motion 18 or the like connected by a link 19 with a system of gearing 20. Said gearing 20 is driven by a motor or engine mounted on the earth shaper. The motor or engine may be of any sort, for instance gasoline or electric and is indicated at 20^a in the drawings.

The earth shaper and cap are directly connected by the beams 15 but the inverted mold is connected to the shaper so that the relative position of these parts may be varied as the nature of the operation may require. This connection is in the form of a bar, chain or the like and is indicated by broken lines at 21 in Fig. 1^a. Figs. 5, 6, and 7 show the details of this mechanism from which it will be seen that the chain 21 is furnished with a hook 22 which is adapted to engage a bar 23 sliding in slotted angle plates 24 mounted on the bottom of the shaper, parallel to each other. The pin 23 is held adjustably in the angle plates by means of a yoke 25, the arms of which engage the pin and at their opposite ends are provided with a nut 25^a in which a threaded shaft 26 operates. This shaft is arranged to turn in a pillow block 27 fastened to the bottom of the earth shaper and the forward end of the shaft is furnished with a pawl and ratchet lever mechanism 28 and a hand wheel 29. These devices 28 and 29 represent alternative means for rotating the shaft, the hand wheel being used when no

great power is required and the ratchet lever mechanism being employed to put greater force on the shaft, for example at or toward the end of an adjusting operation. It will be seen that by thus rotating the shaft the position of the pin 23 may be changed at will, thus changing the length of the connection between the earth shaper and inverted mold to suit the peculiar conditions of the operation. It will be further seen that the hook 22 may be readily disconnected from the pin 23 to facilitate the introduction of the reinforcement, which is indicated in outline at 30 in Figs. 1^a, 1^b, and 1^c.

Since the pipe is formed of wet concrete it requires a certain internal support during the setting period to prevent collapse before the concrete becomes hard. This is effected by means of the core mold-sections. Great difficulty has heretofore been encountered in removing the cores from the pipe, because of the fact that the cores firmly engage the inner walls of the pipe, and when the pipe is hard the cores cannot be withdrawn except by the application of considerable power. To enable this disadvantage to be satisfactorily encountered, I form the cores collapsible, so that after the concrete has set around a particular core, that core may be collapsed, thus enabling it to be moved freely through the other cores to the front end of the machine, without contact with the cores, excepting such contact as may be incident to the sliding of the collapsed core through the other or extended cores. The details of this novel core are shown in Figs. 2, 3, and 4, from which it will be seen that each core is provided with a bottom section 31, arc-shaped in cross section, and having wings 32 hinged to each side edge thereof as indicated at the points 33, the arrangement being such that the wings may be extended as shown by full lines in Fig. 2, forming with the section 31, a cylindric core, or the wings may be thrown down as indicated by broken lines, thus collapsing the core and enabling it to be moved through the other cores which are still extended in operative adjustment. For the purpose of holding the wings 32 extended and at the same time allowing them to be readily collapsed when desired, I mount on one of said wings a rock shaft 34 and to this a latch or latches 35 are attached. The other wing is provided with an angle member 36 at its extreme edge which is adapted to engage a similar member 37 secured to the edge of the first named wing and when the parts are so engaged the latch 35 embraces the member 36 firmly holding the parts together. By rocking the shaft 35, the latch may be disengaged and the wings allowed to collapse. To facilitate thus rocking the shaft, the same is provided with a cranked end 34^a at the rear end of the core. In order to overcome the possibility of the parts becoming clogged

with cement and failing to collapse on releasing the latch, I form in the member 36 an opening 36^a which allows the introduction of a pinch bar so that the same may be worked against the ratchet edge 37^a of the member 37 thus enabling the operator to pry the two wings apart. The end edges of the body portions 31 of the core sections are beveled as indicated at 38 (Figs. 3 and 4) so that an even connection will be made between them and a uniform pipe constructed and also so that as one of the core sections is collapsed the same may ride up freely on the contiguous section as will be more fully set forth hereinafter. I also provide flanges 39 which as here shown are secured to the forward edges of the wings 32 of the core sections and may, if desired, extend completely around the core. These flange plates are adapted to project into the contiguous core sections and insure correct alignment of the same. The core sections are constructed of sheet metal or other suitable material.

According to my present invention an endless, driven cable 41 runs continuously through the apparatus and is employed to carry the collapsed cores forward. At the front end of the apparatus, the cable runs around a driving drum 42 which is actuated by a universally jointed shaft 43 from the above mentioned gearing 20, or by a separate motor as desired. This shaft 43 is disconnectible so that the reinforce if used, may be inserted in position. At the rear end of the apparatus, the cable runs around a drum 44 which is mounted on a trailer 45. This trailer is located within the pipe at the rear end of the apparatus and is caused to move along with the same through the medium of the cable which connects it with the inverted mold 12 on which the drum 42 is mounted.

46 indicates a saddle which is mounted over the cable abreast or ahead of the trailer, furnishing a seat for the operator who works in the pipe at the rear end of the apparatus and whose duty is to collapse the sections and connect them with the cable. For the purpose of so connecting the sections with the cable, I provide a grip link 47 which is arranged to slide on a bar 48 having its ends secured to the bottom of the section 31 of the core. Each core is provided with a grip and these are hinged so that they may be thrown down as indicated by the full lines in Fig. 2 or raised as shown by the broken lines in Fig. 2 and the full lines in Fig. 4. The grips are mounted to slide on the bar 48 so that when the core sections are being moved ahead, the grips will be free to move up to the front ends of the core sections and when the grips are to be engaged with the cable they may be moved backward by the operator within convenient reach.

Each core is provided at its lower portion

with internal angle plates 49 which form tracks or rails on which the collapsed core sections run from end to end of the apparatus. The extremities of these angle plates are inclined as shown in Figs. 3 and 4 and match together snugly.

50 indicates links which are removably connected to the inner sides of the angle plates. These links serve normally to hold the several cores firmly together, but when one of the cores is to be sent forward, the operator disconnects the bolts holding the links in active position at the inner sides of the angle plates (see Figs. 2 and 3) and moves the links over to the outer sides of the angle plates of the collapsed section, fastening one end of each link to the corresponding angle plate, so that the links hang down at the front ends of the collapsed core and run along the outer sides of the angle plates of the extended cores in the manner shown by the broken lines in Fig. 2 and the full and broken lines in Fig. 4. In this adjustment the links serve to guide the collapsed core and prevent the same from turning or rocking as it moves through the apparatus. These links 50, it will thus be seen, serve two distinct functions, first, to connect the core sections when in operative adjustment and, second to run against the outer sides of the angle plates 49 of said core sections to prevent rolling of the collapsed section. To disengage the grip from the cable as the collapsed section approaches the drum 42, a stop bar 41^a (shown by broken lines in Fig. 1^a and full lines in Fig. 8) is provided. The grip, when in operation, is inclined forward as shown in Figs. 4 and 8 and when the drum 42 is approached the extended upper end of the grip strikes the stop 41^a and is moved up to perpendicular position, thus releasing the cable and stopping the core.

In the organized operation of the apparatus, as the construction of the pipe is started, the extended cores are introduced into the machine and when the operation becomes normal, the parts assume the relative positions shown in Figs. 1^a, 1^b, and 1^c. The operator, stationed on the trailer 45, at certain prearranged intervals, or upon receiving a signal from the front end of the machine, disconnects the links 50 from the inner sides, and attaches them to the outer sides of the angle plates 49. The latches 35 are then released and the wings 32 allowed to fall into collapsed position. Finally the operator should lift the grip 47 into engagement with the forwardly moving run of the cable. The collapsed core will then take up the forward movement of the cable. The slanting edges of the bottom section 31 of the collapsed core and of the angle plates 49, will ride up on the adjacent edges of the corresponding parts of the next adjacent core and the collapsed core will pass into the other cores in

the manner shown in Fig. 4, running with the cable through all of the extended cores and being carried by said cable into the inverted mold at or directly behind the drum

5 42. At this point the grip is rendered inactive by the stop 41^a. This collapsed core is then extended and adjusted into proper position with respect to the forwardmost core, the links 50 are again connected at the inner
10 sides of the angle plates 49 and the pipe as it is formed gradually envelops the core which has just been moved to its new position. The cores it will be observed, do not move in the pipe excepting when one is collapsed
15 and sent forward, while the shaper, invert mold, cap mold and trailer are moved continuously forward under the action of the cable 16 and the mechanism for winding the same. By employing a sufficient number of
20 cores, the pipe may be allowed to harden before the support of the core is taken from it and by collapsing the core and providing for its free movement through the other cores, I am enabled to construct the parts lightly
25 and to carry on the operation of the machine with considerably less expense and difficulty than heretofore. The saddle 46 may be rested either on the bottom of the pipe just ahead of the trailer or if desired on the trailer
30 and may be advanced either by the operator or by the trailer as desired. The trailer is arranged to move a sufficient distance behind the core sections to avoid danger of collision therewith, the positions of the parts
35 being such that the trailer never comes up into contact with the core sections.

Having thus described the preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent
40 of the United States is:

1. An apparatus for molding concrete pipe *in situ*, having a series of collapsible core sections capable when collapsed of resting on and moving through each other and automatic devices for dragging the collapsed sections through the other sections when the collapsed sections are resting on the other sections.

2. An apparatus for molding concrete
50 pipes *in situ* having a series of collapsible core sections, means carried by said sections whereby they are adapted to slide on and through each other, from the rear to the front of the apparatus, a driven cable running through the core sections and grips for
55 connecting the cable with the sections whereby they may be advanced as aforesaid.

3. An apparatus for molding concrete pipes *in situ* having a series of collapsible
60 core sections capable of being moved through each other and a driven cable running through the core sections to move them one through the other.

4. An apparatus for molding concrete

pipes *in situ* having a series of collapsible
65 core sections capable of being moved through each other, an endless cable operating in the core sections and means for releasably connecting the core sections with the cable.

5. An apparatus for molding concrete pipes *in situ*, having a series of core-sections each with collapsible wings at its upper portion, allowing the core sections to be collapsed without disturbing the regular form
75 of the lower portions thereof, whereby the core-sections when collapsed may be caused to slide on their said lower portions the one through the others.

6. An apparatus for molding concrete
80 pipes *in situ* having a series of core-sections, each with collapsible wings at its upper portion, allowing the core sections to be collapsed without disturbing the regular form of the lower portions thereof, whereby the
85 core sections when collapsed may be caused to slide on their said lower portions the one through the others, and means attached to and carried by the lower portion of each core section at the inner side thereof to support
90 the core sections when sliding through each other.

7. An apparatus for molding concrete pipes *in situ*, having a series of core-sections, each with collapsible wings at its upper portion, allowing the core-sections to be collapsed without disturbing the regular form of the lower portions thereof, whereby the core-sections when collapsed may be caused to slide on their said lower portions the one
100 through the others, latches for releasably securing said wings in extended position and a member extending longitudinally of each core section within the same for operating said latches.

8. An apparatus for molding concrete pipe *in situ* having a series of core-sections with collapsible wings, angle members secured to the meeting edges of the wings and adapted to engage each other when the wings are extended, and a releasable latch carried by one section and adapted to engage and hold the angle members in connection with each other.

9. An apparatus for molding concrete pipe
115 *in situ*, having a series of core-sections with collapsible wings, angle members secured to the meeting edges of the wings and adapted to engage each other when the wings are extended, a releasable latch carried by one section and adapted to engage and hold the angle members in connection with each other, and one of the angle members having an opening therein permitting the introduction of a tool from the interior of the core
120 section, by which to force the disengagement of the angle members.

10. An apparatus for molding concrete

pipes comprising collapsible core sections, movable one through the other, a cable adapted to run through the core sections and a cable grip slidably mounted on each core section.

11. An apparatus for molding concrete pipes comprising a plurality of collapsible core sections adapted to move through each other, a cable running through the core sections, a bar attached to each core section and a cable grip slidably carried on each bar.

12. An apparatus for molding concrete pipes comprising core sections movable through each other, means in said sections forming a track adapted to be engaged by the core sections and on which the core sections are adapted to move, and means on the core sections preventing them from rolling on the track.

13. An apparatus for molding concrete pipes comprising core sections movable through each other and rails extending longitudinally in the core sections and having beveled engaging ends for the purpose specified.

14. An apparatus for molding concrete pipes comprising core sections movable through each other, rails extending longitudinally in the core sections and having beveled engaging ends for the purpose specified, and means for releasably connecting the contiguous rails to fasten the core sections together in alinement.

15. An apparatus for molding concrete pipes comprising core sections movable through each other, means in the core sections forming a track on which the core sections move and guides carried by the core sections to prevent them from rocking on the track.

16. An apparatus for molding concrete pipes comprising core sections movable through each other, rails secured in the core sections and connecting links adapted to join the contiguous rails, said links being also capable of depending from the rails to guide the core sections in their movement.

17. An apparatus for molding concrete pipes comprising a number of core sections capable of being moved one through the other, a cable running through the core sections, means for releasably connecting the cable with the core sections, a trailer running behind the apparatus and having a sheave over which the cable runs, a member at the head of the core sections also having a sheave over which the cable runs and means for advancing said member as the core sections are sent forward.

18. An apparatus for forming concrete pipes, comprising an earth shaper, a cap mold, an inverted mold, means for advancing said parts, a sheave on one of said parts, an endless cable running over the same, a trailer having a sheave over which the endless cable

also runs, and a number of core sections operating intermediate the trailer and the shaper, and capable of being drawn by the cable one section through the other.

19. An apparatus for forming concrete pipe, comprising an earth shaper, a cap mold, an inverted mold, the inverted and cap molds having connection with the shaper, a motor mounted on the shaper, means driven by the motor for advancing the apparatus, a number of core mold sections capable of moving one through the other, a trailer, a cable extending between the trailer and inverted mold, and adapted to draw the core sections through each other and means for driving said cable.

20. An apparatus for forming concrete pipe, comprising an earth shaper, a cap mold, an inverted mold, the inverted and cap molds having connection with the shaper, a motor mounted on the shaper, means driven by the motor for advancing the apparatus, a number of core mold sections capable of moving one through another, a trailer, a cable extending between the trailer and inverted mold, and adapted to draw the core sections through each other and means for driving said cable from the motor on the shaper.

21. An apparatus for molding concrete pipe having a shaper, an inverted mold, a releasable connection between them and means for adjusting said connection.

22. An apparatus for molding concrete pipe having a shaper, an inverted mold, a releasable connection between them and means for adjusting said connection, comprising a threaded shaft and nut and devices for rotating the shaft in either direction.

23. An apparatus for molding concrete pipe having a shaper, an inverted mold, a releasable connection between them and means for adjusting said connection comprising a threaded shaft and nut, a hand wheel in connection with the shaft and a ratchet mechanism also in connection with the shaft.

24. An apparatus for forming concrete pipe having a number of core sections, capable of being moved through each other, a member at the front end of the apparatus, a trailer at the tail of the apparatus and a driven cable connecting said member and trailer, and adapted to draw the core sections from one end to the other.

25. An apparatus for forming concrete pipe having a number of core sections capable of being moved through each other, a member at the head of the apparatus, a trailer at the tail of the apparatus and a driven cable connecting said member and trailer, and adapted to draw the core sections from one end to the other, and means for advancing said member at the head of the apparatus with the formation of the pipe and the cable also serving to draw the trailer along.

26. An apparatus for forming concrete pipes having a number of core sections movable through each other, a member at the head of the apparatus, a trailer adapted to follow the apparatus, an endless cable running through the core sections and connecting said member and trailer means for driving the cable, and means for releasably connecting the core sections with the cable at will.

27. An apparatus for forming concrete pipes having a number of core sections, capable of being moved through each other, an earth shaper at the front end of the apparatus, a trailer at the tail of the apparatus and a driven cable connecting said earth shaper and trailer, and adapted to draw the core sections from one end to the other.

28. An apparatus for molding concrete pipes *in situ* having a series of core sections capable of sliding on and through each other, from the rear to the front of the apparatus, means for so moving the core sections, comprising a driven cable running through the core sections grips for connecting the cable with the sections and means for automatically disengaging the grips from the cable at the end of the movement of the core sections.

29. An apparatus for molding concrete pipes *in situ* having a series of core sections capable of sliding on and through each other, from the rear to the front of the apparatus, means for so moving the core sections comprising a cable running through the core sections and grips for connecting the cable with the sections.

30. An apparatus for molding concrete pipes *in situ* having a series of core sections capable of sliding on and through each other, from the rear to the front of the apparatus, means for so moving the core sections, comprising a cable running through the core sections, grips for connecting the cable with the sections and means for advancing the apparatus with the formation of the pipe.

31. An apparatus for molding concrete pipes *in situ* having a series of core sections capable of being moved through each other, an endless cable operating in the core sections, means for releasably connecting the core sections with the cable and means for automatically breaking such connection at the end of movement of the core sections.

32. An apparatus for molding concrete pipes comprising a number of core sections capable of being moved through each other, a cable extending through the core sections and adapted to haul the core sections forward, a trailer behind the apparatus and connected with the cable, and a member at the head of the apparatus with which the cable is also connected.

33. An apparatus for molding concrete pipes comprising a number of core sections

capable of being moved through each other, a cable extending through the core sections and adapted to haul the core sections forward, a trailer behind the apparatus and connected with the cable, a member at the head of the apparatus with which the cable is also connected and means for advancing said member as the core sections are hauled forward.

34. An apparatus for forming concrete pipes comprising an earth shaper, a cap mold, an inverted mold, means for advancing said parts with the formation of the pipe a cable connected to one of the said parts, a trailer with which the cable is also connected, and a number of core mold sections located intermediate the trailer and shaper and through which the cable extends, such core sections being adapted to be hauled by the cable through each other.

35. An apparatus for forming concrete pipes having a number of core sections, capable of being moved through each other, a member at the front end of the apparatus a trailer at the tail of the apparatus and a cable connecting said member and trailer, and adapted to draw the core sections from one end to the other.

36. An apparatus for forming concrete pipe having a number of core sections capable of being moved through each other, a member at the head of the apparatus, a trailer at the tail of the apparatus and a cable connecting said member and trailer, and adapted to draw the core sections from one end to the other, and means for advancing said member at the head of the apparatus with the formation of the pipe and the cable also serving to draw the trailer along.

37. An apparatus for forming concrete pipes having a number of core sections movable through each other, a member at the head of the apparatus, a trailer adapted to follow the apparatus, and an endless cable connected with said member and said trailer and adapted to haul the core sections ahead as the pipe is formed.

38. An apparatus for forming concrete pipes having a number of core sections, capable of being moved through each other, an earth shaper at the front end of the apparatus, a trailer at the tail of the apparatus and a cable connecting said earth shaper and trailer, and adapted to draw the core sections from one end to the other.

39. An apparatus for forming concrete pipes having a number of core sections, a member at the head of the apparatus, a trailer adapted to follow the apparatus, and an endless cable connected with said member and said trailer and adapted to haul the core sections ahead as the pipe is formed.

40. An apparatus for forming concrete pipes having a number of core sections, a

member at the head of the apparatus, a trailer adapted to follow the apparatus, an endless cable connected with said member and said trailer and adapted to haul the core sections ahead as the pipe is formed and means for advancing the said member with the formation of the pipe.

41. An apparatus for forming concrete pipes having a number of core sections, a member at the head of the apparatus, a trailer adapted to follow the apparatus and a cable connected with said member and said trailer and adapted to haul the core sections ahead as the pipe is formed.

42. An apparatus for forming concrete pipes having a number of core sections, a member at the head of the apparatus, a trailer adapted to follow the apparatus, and a means connected with said member and said trailer and adapted to haul the core sections ahead as the pipe is formed.

43. An apparatus for forming concrete pipe having a molding means at the head of

the apparatus adapted to advance with the formation of the pipe, a trailer, a number of core mold sections intermediate the molding means and trailer and a device connected to said molding means and trailer and adapted to advance the core sections successively from the rear to the front as the pipe is formed.

44. An apparatus for molding concrete pipes *in situ*, having a series of collapsible core sections adapted when collapsed to move on and through each other, a driven means moving continuously through the apparatus and means for releasably connecting the core sections with such means, whereby to move the core sections.

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

ERNEST LESLIE RANSOME.

Witnesses:

EDITH J. FULLER,
ISAAC B. OWENS.