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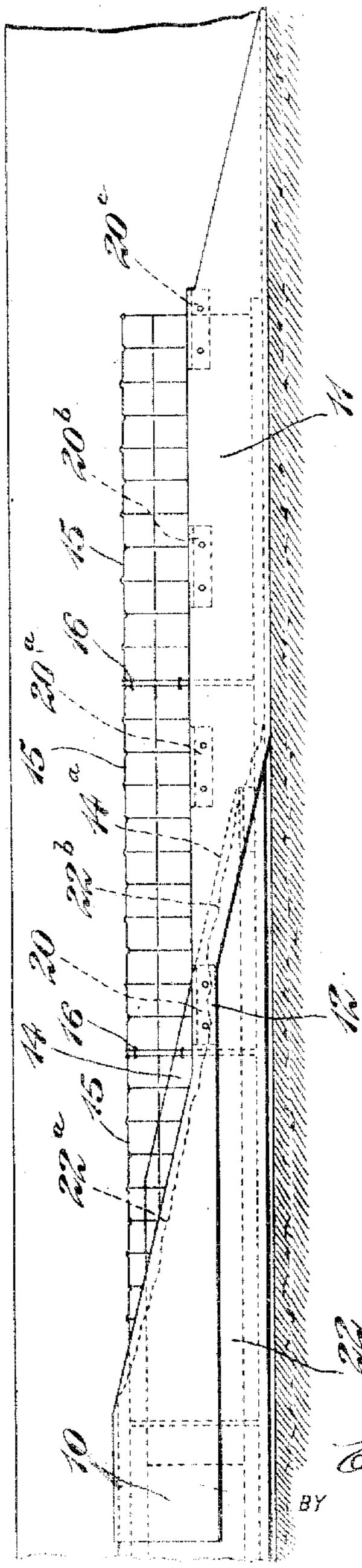
METHOD AND APPARATUS FOR MOLDING CONCRETE PIPES.

APPLICATION FILED FEB. 7, 1907. RENEWED NOV. 16, 1908.

910,577. Patented Jan. 26, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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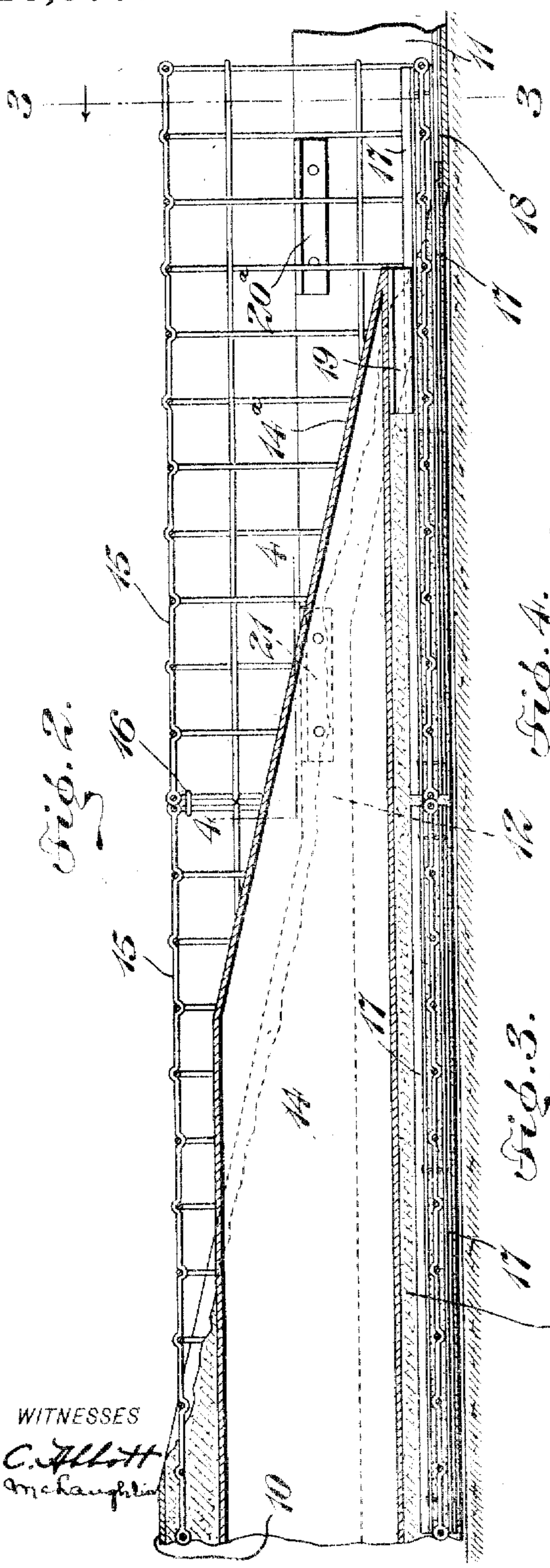


Fig. 6.

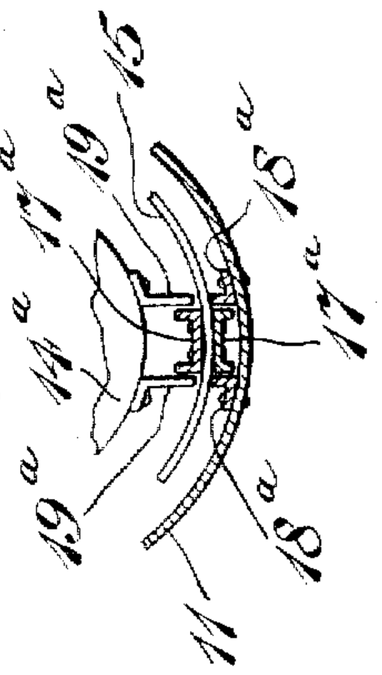


Fig. 4.

Fig. 5.

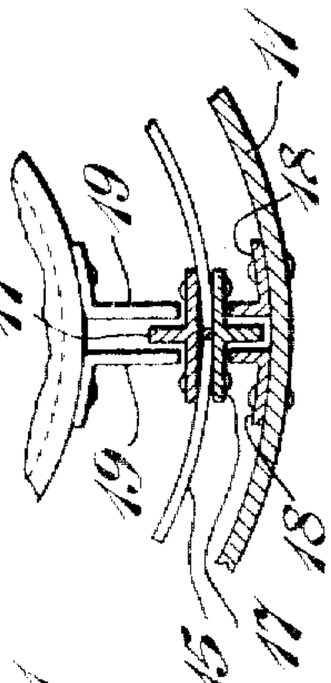
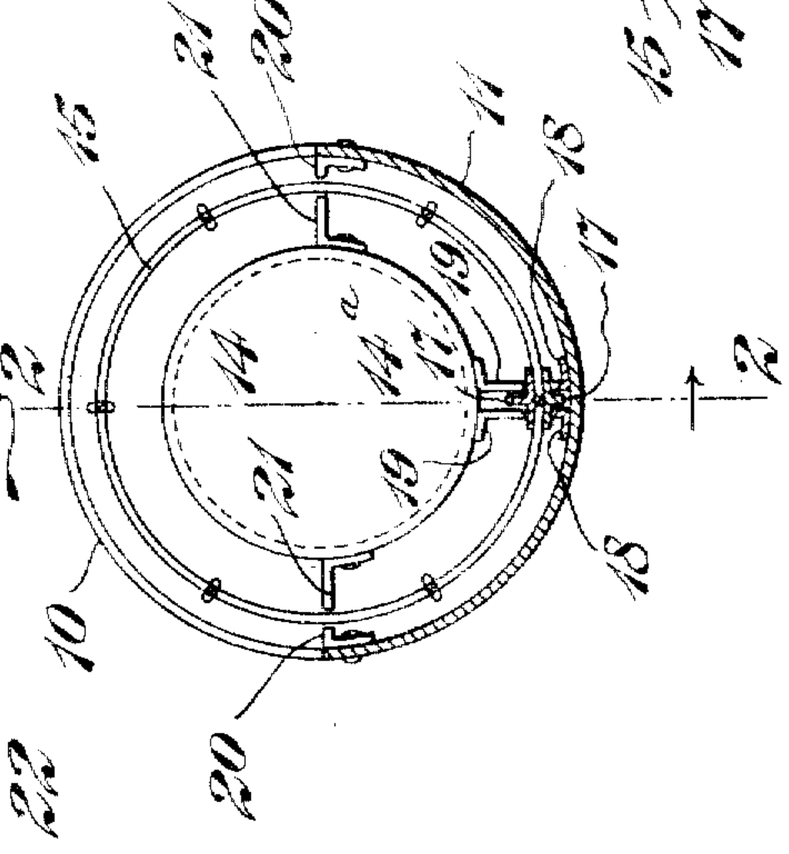


Fig. 3.



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METHOD AND APPARATUS FOR MOLDING CONCRETE PIPES.

No. 910,577. Specification of Letters Patent. Patented Jan. 26, 1909.

Application filed February 7, 1907, Serial No. 356,183. Renewed November 16, 1908. Serial No. 462,915.

To all whom it may concern:

Be it known that I, ERNEST LESLIE RANSOME, of the borough of Richmond, city and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Molding 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.

My invention relates especially to molding monolithic concrete pipes *in situ*, such for example as is disclosed in my prior patent No. 517,808, granted April 3, 1894. These pipes are usually laid with a metallic reinforcing member or material embedded therein. In the apparatus of my prior patent above referred to, this reinforcing member is in the form of a wire laid in the pipe during the formation thereof, in a continuous spiral by the unwinding action of a reel on which the reinforcing wire is primarily carried. This arrangement in some classes of work is inconvenient and an important object of my present invention is to simplify the work of placing the reinforcing member, thereby adapting the invention to effective and advantageous use in the construction of the smaller classes of pipe. In attaining this end, I dispense with the reel and construct the reinforce in the form of cylindric cages of reinforce metal, which cages are made in convenient lengths, and placed in the trench end to end and suitably fastened together. The pipe is laid *in situ* in a monolithic course enveloping the reinforce members forming a practically indestructible structure. Further, in the construction of those monolithic pipes to which my invention relates, it is customary to employ a molding apparatus comprising an outer mold section or sections and an inner section or core. In the operation of such apparatus difficulty is experienced in retaining the core in position to insure the formation of a pipe the walls of which are of uniform thickness. With the reinforce members formed in separate cage-like sections, a similar difficulty would be experienced. It is, therefore, a further object of my invention to insure that the core and reinforce members are held in proper position relative to the outer mold section or sections so that the walls of the pipe will be of uniform thickness and the reinforce member or material will lie in the proper position in the walls of the pipe. Preferably in my invention, the devices for effecting this end consist in guiding means acting between the core, the reinforcement and the outer mold section and insuring that all of the parts retain their proper position and also preventing relative rotation of said parts during the tamping of the concrete. This preferred arrangement, however, is not essential, and if desired, the means for retaining the core and the means for retaining the reinforcement may be separate and independent agencies.

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

For the purpose of a specific disclosure of my invention, reference is now had to the accompanying drawings which illustrate, as an example, the details of the preferred manner of practicing the invention, in which drawings,

Figure 1 is a side elevation of the apparatus showing it in operation in a trench and forming a continuous monolithic pipe therein; Fig. 2 is an enlarged longitudinal section showing part of the core and the intermediate portion of the outer mold, this view also illustrating the reinforce cages and the devices for retaining the same and the core in place; Fig. 3 is a cross section on the line 3—3 of Fig. 2 showing the bottom mold section or shoe and the forwardmost reinforce cage in section and illustrating the core and side guiding or retaining devices in elevation; Fig. 4 is a fragmentary sectional plan on the line 4—4 of Fig. 2, showing the relation of the guiding devices to the outer mold section, the reinforce and the shoe; Fig. 5 is an enlarged detail section of the devices for sustaining the reinforce cage on the shoe of the outer mold section and for preventing rotative movement of said cage and of the core; and Fig. 6 is a sectional view similar to Fig. 5, but showing a slightly modified arrangement.

As shown best in Fig. 1, the apparatus is formed with a top mold section or cage 10, and a bottom section or shoe 11, connected, if desired at each side by a horizontal member 12. The mold sections 10 and 11 are usually semi-circular in cross section and are arranged oppositely to each other, each having a front edge sloping downwardly and forwardly. The apparatus is also provided with a core 14 which is usually of the same cross sectional form as the outer mold sec-

tion and is provided with a downwardly and forwardly inclined front end 14^a. These parts 10, 11, 12, and 14 are essentially of the same construction and function as the corresponding parts in my prior patent before referred to, excepting that in the present case I prefer to elongate the shoe 11 for the purpose of receiving the reinforce cages as will fully appear hereinafter. Said parts are moved through the trench progressively with the formation of the pipe, the core and mold section being connected by means which may, if desired be the same as that shown in my prior patent modified slightly to suit the new form of reinforcement.

The reinforce is made up of a number of cages 15 of a form corresponding to that of the pipe. These are constructed in convenient lengths and are composed of longitudinal and circumferential metallic ligaments of any suitable form. Said reinforce sections or cages are laid *in situ* as the construction of the pipe advances, and are preferably connected together end to end by clips or other joining means indicated at 16, so that a monolithic pipe will be formed enveloping the reinforce and a durable structure secured. By this method of construction, the reinforce cages will be quickly placed in position and by the devices to be hereinafter described I insure the correct positioning of the reinforce with respect to the walls of the pipe; a condition which heretofore has not always been attained.

The cage sections 15 of the reinforce are as shown best in Figs. 2 and 3 provided at their under sides with longitudinally extending angle or T-irons 17. These are arranged respectively at the inner and outer sides of the cage sections and are secured in place by rivets or other fastenings extending between the opposing irons, said angle or other irons 17 serve the double purpose of strengthening the cage and of furnishing a means for supporting and preventing the rotation thereof. Adapted to coact with the beams or irons 17 are angle irons 18 arranged in pairs parallel to each other at the inner side of the bottom of the shoe 11 and similar angle irons 19 secured to the underside of the forward extension 14^a of the core. These spaced irons or beams 18 and 19 form guide ways in which are respectively engaged the irons 17 of the reinforce cages. It will be observed particularly from Figs. 3 and 5 that these devices not only support the mold and reinforce on the shoe, but retain them at equal distances from each other insuring that the reinforce is properly inclosed by the concrete and these devices also prevent rotative movement of the reinforce and core which movement would, if allowed tend to disturb the proper relative positions of the elements in question. It will also be seen that these devices permit free sliding movement of the shoe and core relatively to the reinforce cages it being understood that the reinforce cages after being placed in position become stationary and are enveloped by the pipe, the construction of which is constantly advancing with a correspondingly constant advance of the mold and core.

The modification of the device shown in Fig. 5 is illustrated in Fig. 6 in which the tapering front end 14^a of the core and the shoe 11 have angle irons 18^a and 19^a similar to the elements 18 and 19 before described, excepting that the irons 18^a and 19^a are spaced from each other further than the irons 18 and 19. Instead of the T-irons 17 the reinforce cage 15 is provided with channel irons 17^a, these being riveted to the cage as indicated, said channel irons 17^a performing precisely the functions of the irons 17 as Fig. 6 illustrates. The construction shown in Fig. 6 is however, possibly preferable to that shown in Fig. 5 since the irons arranged as in Fig. 6 will run more easily and with less friction than in the first-described construction.

The inner sides of the shoe 11 adjacent to the upper edge thereof are provided as indicated by the broken line in Fig. 1 and the full lines in Figs. 2, 3, and 4 with a number of guiding flanges 20, 20^a 20^b, and 20^c. These guiding flanges are shown in Fig. 1 as four in number at each side, but the number is entirely inessential and in fact if desired, the shoe may be provided at each side with a single guiding flange extending continuously from end to end thereof. These guiding flanges 20, 20^a 20^b, and 20^c are of such width that they will engage the center of the reinforce cages in the mold preventing the cages from capsizing from one side to the other, and thus insuring proper envelopment of the cage by the concrete. The core 14 is provided at its front end as shown best in Figs. 3 and 4 with similar guiding flanges 21 arranged respectively at the sides of the core opposite the guiding flanges 20 and reaching outward to engage the inner walls of the cage 15. These guiding flanges 21, it will be seen lying opposite the flanges 20 assist the flanges 20 in their operation. Fig. 4 shows clearly the relative positions of the flanges and illustrates their arrangement which permits the mold and core sections to advance with the formation of the pipe, the guiding flanges sliding on the cage sections.

In the practical operation of the apparatus, the mold sections and core are constructed as described and are placed in the trench indicated in Fig. 1 or at any other surface on which the monolithic pipe is to be formed. The reinforce cages are then placed first in the shoe 11, the parts 17 being arranged with the parts 18 and 19 as described and the reinforce members move backward over the core and under the cap

10 of the mold. The concrete is then dumped in between the core and mold and is tamped firmly down after the usual method of operation. The reinforce cages being held firmly in proper position by the means before described are embedded in the concrete, lying at all points at the proper position with reference to the thickness of the pipe walls. The concrete pipe is indicated at 22 in the drawings and in the formation of the pipe, concrete is poured in and tamped along the broken lines 22^a and 22^b in the drawings, which lines correspond respectively with the line of the sloping front edge of the cap 10 and the sloping front edge of the forward extension 14^a of the core. As the pipe is formed, the mold and core are advanced continuously in the trench, the reinforce cages remaining with the pipe and one cage being placed in after the other and joined end to end by the clips 16 as the construction of the pipe advances.

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

1. The combination of a mold, a core, a reinforcing cage received between the mold and core, longitudinally extending guides on the mold and core and longitudinally extending beams fastened to the reinforcing cage and engaging said guides of the mold and core.

2. The combination of a mold, a core, a reinforcing cage received between them, parallel guide rails on the mold and core and beams secured to the reinforcing cage and extending longitudinally thereof between said guide rails of the mold and core.

3. The combination of a mold, a core therein, parallel guide beams on the mold and core, a reinforcing cage received between the mold and core and channel irons, the webs of which are fastened together on and longitudinally of the reinforcing cage, the flanges of such channel irons being adapted to run between the guide beams of the mold and core.

4. The combination of a mold, a core for forming monolithic pipe, both adapted to be advanced progressively with the formation thereof, a reinforcing cage between the mold and core to be enveloped by the pipe, and guiding means projecting from the mold and core into the space between them and slidably engaging opposite sides of the reinforce cage to hold the parts in place without obstructing the said movement of the mold and core.

5. The combination of a mold, and core, for forming monolithic pipe, both adapted to be advanced progressively with the formation thereof, a reinforcing cage between the mold and core to be enveloped by the pipe, and guiding means projecting from the mold and core and engaging opposite sides of the reinforce cage to hold the parts in place without obstructing the said movement of the mold and core, said guiding means consisting of longitudinally disposed flanges having sliding engagement with the reinforce cage.

6. The combination of a mold, comprising cap and shoe sections, the latter in advance of the former, a core within the mold under the cap section, both adapted to form monolithic pipe and to be advanced progressively with the formation of the pipe, a reinforce cage adapted to be enveloped by the pipe, a guiding means on the shoe section of the mold and engaging the reinforce cage, and a guiding means on the front portion of the core also adapted to engage the reinforce cage, said guiding means holding the parts in position without obstructing said movement of the core and mold.

7. The combination of a mold comprising cap and shoe sections, the latter in advance of the former, a core within the mold under the cap section, both adapted to form monolithic pipe and to be advanced progressively with the formation of the pipe, a reinforce cage adapted to be enveloped by the pipe, a guiding means on the shoe section of the mold and engaging the reinforce cage, a guiding means on the front portion of the core also adapted to engage the reinforce cage, said guiding means holding the parts in position without obstructing said movement of the core and mold, and consisting of longitudinally disposed flanges having sliding engagement with the reinforce cage.

8. The combination of a mold comprising cap and shoe sections, the latter in advance of the former, a core within the mold under the cap section, both adapted to form monolithic pipe and to be advanced progressively with the formation of the pipe, a guiding means on the shoe section of the mold and engaging the reinforce cage, a guiding means on the front portion of the core also adapted to engage the reinforce cage, said guiding means holding the parts in position without obstructing said movement of the core and mold, and located at the sides of the mold and core respectively and additional guiding means located at the bottom of the mold and core and serving to sustain the core in the mold.

9. The combination of a mold and core for forming monolithic concrete pipe *in situ*, both adapted to be advanced progressively with the formation of the pipe, a reinforce between the mold and core to be enveloped in and by the pipe as it is formed, and guiding means bearing between the mold and reinforce and between the core and reinforce to hold the parts properly positioned, said guiding means being attached to certain of the parts and slidably engaging the other part or parts.

10. The combination of a mold and core

for forming monolithic concrete pipe *in situ*, both adapted to be advanced progressively with the formation of the pipe, a reinforce between the mold and core to be enveloped in and by the pipe as it is formed, and guiding means bearing between the mold and reinforce and between the core and reinforce to hold the parts properly positioned, said guiding means being attached to certain of the parts and slidably engaging the other part or parts, and located at the bottom of the mold and core to sustain the core.

11. The combination of a mold and core for forming monolithic pipes *in situ*, both of said parts adapted to advance progressively with the formation of the pipe, a reinforce between the mold and core to be enveloped in and by the pipe and guiding means projecting from the mold and core at the bottom thereof into the space between them and slidably engaging opposing sides of the reinforce, whereby to hold the reinforce in position and sustain the core without interfering with the aforesaid progressive movement of the mold and core.

12. The combination of a molding apparatus for forming monolithic concrete pipe *in situ*, said apparatus adapted to advance progressively with the formation of the pipe, a reinforce past which the molding apparatus moves, the reinforce adapted to be enveloped in and by the pipe as it is formed, and a guiding means attached to one of said parts and having sliding engagement with the other, whereby to hold the reinforce in position without interfering with the said progressive movement of the molding apparatus.

ERNEST LESLIE RANSOME.

Witnesses:
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