

April 20, 1954

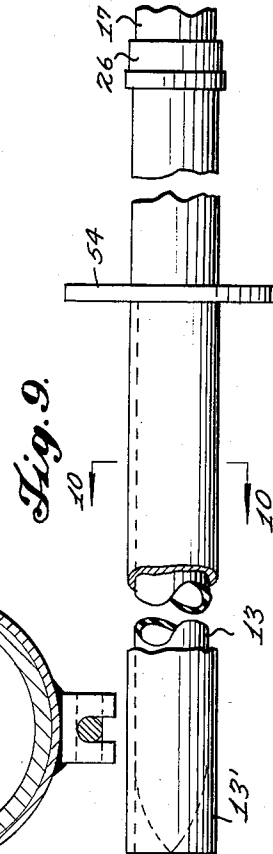
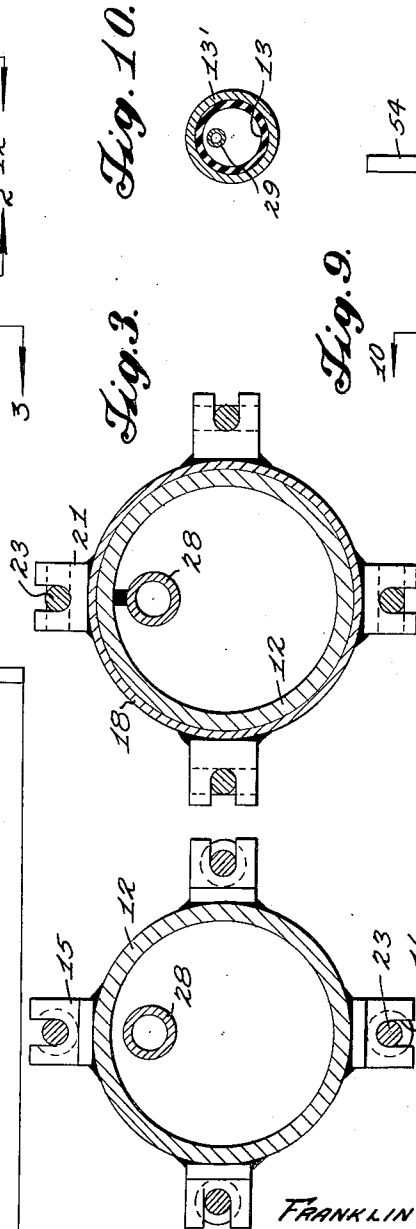
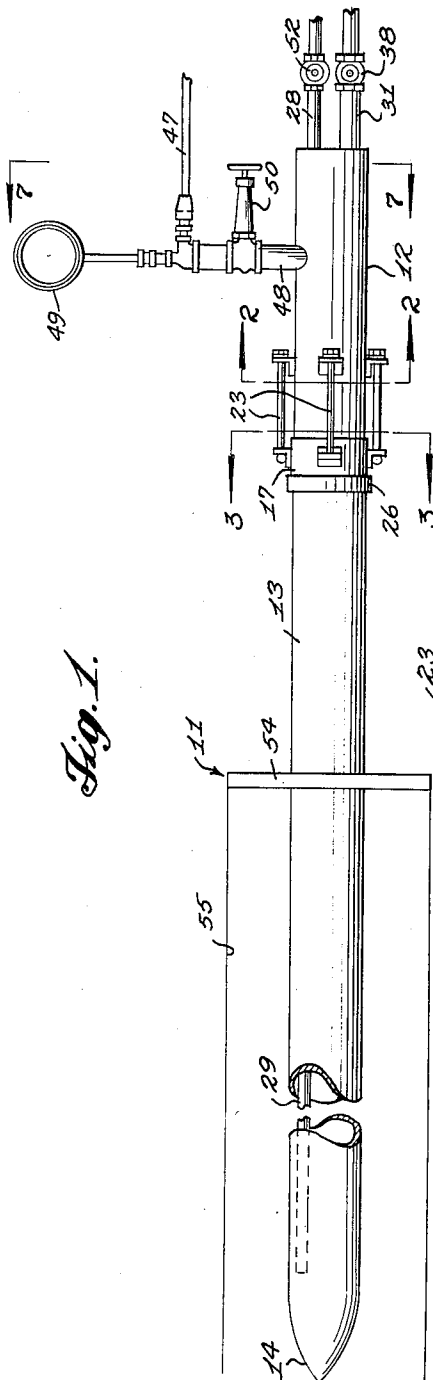
F. L. MILLER

2,675,598

APPARATUS FOR FORMING CONCRETE CONDUITS

Filed July 20, 1951

2 Sheets-Sheet 1



INVENTOR

FRANKLIN L. MILLER

BY

McMorrow, Perlman + Davidson
ATTORNEYS

UNITED STATES PATENT OFFICE

2,675,598

APPARATUS FOR FORMING CONCRETE CONDUITS

Franklin L. Miller, Lake Charles, La.

Application July 20, 1951, Serial No. 237,742.

2 Claims. (Cl. 25—128)

1

This invention relates to apparatus for forming continuous monolithic concrete, and more particularly constructing continuous elongated concrete conduits.

A main object of the invention is to provide a novel and improved apparatus for forming continuous concrete conduits in a rapid and economical manner, the apparatus of the present invention being simple in construction, being easy to operate, and being suitable for the installation of concrete pipe or conduit of any desired diameter.

A further object of the invention is to provide an improved apparatus for forming continuous concrete conduit, the apparatus being of the type employing an inflatable core arranged to be positioned in the trench or form employed for the laying of the conduit, the apparatus of the present invention including means for inflating the core when the concrete is to be poured, removing the air in the inflated core and substituting liquid therefor, providing means for maintaining the liquid at constant pressure until the concrete has hardened, and including means for creating a vacuum in the core when the liquid is to be removed therefrom, whereby the core may be collapsed and removed from the hardened conduit section.

A still further object of the invention is to provide an improved apparatus for forming continuous lengths of concrete conduit, said apparatus being of the type employing an inflatable core which may be filled with liquid which is held at constant pressure while the concrete is hardening around the core, the improved apparatus being provided with means for the removal of the inflatable core without damage thereto after the concrete has hardened.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a side elevational view of an improved apparatus for use in forming continuous concrete conduit in accordance with the present invention;

Figure 2 is an enlarged cross-sectional view taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged cross-sectional view taken on the line 3—3 of Figure 1;

Figure 4 is an enlarged, vertical, longitudinal, cross-sectional view taken through the casing portion of the apparatus of Figure 1;

Figure 5 is a schematic diagram of the fluid system employed in the improved apparatus of the present invention;

2

Figure 6 is a fragmentary elevational view, partly in vertical cross-section, of the rear end portion of the collapsible envelope employed in the apparatus of Figures 1 to 4, showing the envelope in a contracted condition;

Figure 7 is an enlarged cross-sectional view taken on the line 7—7 of Figure 1;

Figure 8 is a series of vertical cross-sectional views taken through the mold and through the collapsible envelope during various stages of formation of the concrete conduit, illustrating the inflation and subsequent collapse of the inflatable envelope, and the final removal of the envelope after the concrete section has hardened;

Figure 9 is a fragmentary top plan view of a modified form of apparatus for use in forming continuous concrete conduit according to the present invention;

Figure 10 is a cross-sectional view taken on the line 10—10 of Figure 9;

Figure 11 is a series of cross-sectional views similar to Figure 8, but showing the use of the modified form of the apparatus of Figures 9 and 10, and illustrating the different shapes of the inflatable core of the apparatus during the process of forming a concrete conduit section.

Referring to the drawings, and more particularly to Figures 1 to 8, one form of apparatus for forming continuous concrete conduit according to the present invention is designated generally at 11. The apparatus 11 comprises a rigid, tubular casing 12 to one end of which is secured an elongated, collapsible envelope 13 of tubular shape and which is closed at its end, as shown at 14. As shown in Figure 4, the casing 12 has secured thereon a plurality of angle brackets 15 formed with open-ended slots 16. As illustrated, the slots 16 are provided in the outwardly extending arms of the angle brackets 15. Designated at 17 is a collar member having a reduced end portion 18 engaging over the end of the casing 12 and sealingly coupled thereto, as by the interposition of an annular sealing gasket 19 between the end of casing 12 and the annular internal shoulder 20 of the collar 17. Secured to the collar 17 are a plurality of angle brackets 21 having slotted, outwardly directed arms 22 in which are engaged T-headed bolts 23 which engage also in the slots 16 of the angle brackets 15 and which have further engaged on their ends the nuts 24, which, when tightened, tightly clamp the collar 17 to the end of the casing 12. Designated at 25 is a flanged fitting which is coupled to the end of the collar 17, as

by a union nut 26, the connection between the fitting 25 and collar 17 being sealed by the interposition of an annular sealing gasket 27 between the flanged end of the fitting 25 and the collar 17, as shown in Figure 4. Secured to the fitting 25 is the collapsible envelope 13, which may be formed of any suitable flexible material, such as rubber or fabric hose material. As shown in Figure 6, the envelope 13 has a substantially smaller diameter when in a collapsed condition than the maximum outside diameter of the portion thereof engaged on the fitting 25.

Secured in the casing 12 is a longitudinally extending rigid tubular conduit 28. Connected to the end of conduit 28 adjacent the envelope 13 is a flexible hose section 29 which extends into the envelope 13, as shown in Figure 1. Designated at 30 is a transverse partition wall secured in the end of the casing 12 opposite the envelope 13, the rigid conduit 28 passing through the partition 30. Connected to said partition 30 is a second conduit 31, which in turn is connected to respective third and fourth conduits 32 and 33 leading to the high pressure outlet of a pump 34. Designated at 35 is a liquid reservoir connected through respective conduits 36 and 37 constituting a fifth conduit to the low pressure inlet of the pump 34. Conduit 31 includes a manually controlled valve 38, conduit 32 includes a manually controlled second valve 39, and the fifth conduit includes a manually controlled fifth valve 40. Designated at 41 is a sixth conduit connecting the second conduit 31 and the fifth conduit and including a manually controlled fourth valve 42. Designated at 43 is a conduit which connects the other end of the third conduit 32 to the top end of the liquid reservoir 35 and including a manually controlled third valve 44. Pump 34 is driven by an electric motor 45 which is connected to a suitable source of electric power through a pressure-controlled switch 46. The switch 46 is conventional in construction, and its pressure responsive element is connected by a seventh conduit 47 to a tube 48 connected to and communicating with the casing 12. Connected to the tube 48 is a conventional pressure gauge 49. Tube 48 is also provided with a manually-controlled valve 50. Conduit 47 is likewise provided with a manually-controlled sixth valve 51.

The tube 28 extends outside the casing 12 and is provided with a manually-operated first valve 52.

In using the apparatus, the envelope 13, in a deflated condition, is inserted through an apertured, transverse wall element 54 into the form 55 in which the conduit is to be cast, the casing 12 and the envelope being arranged to extend longitudinally and axially of the form 55, as shown in Figure 1. Valves 42 and 44 are closed, and the remaining valves are open. The motor 45 is energized and the pump 34 forces liquid from reservoir 35 into the casing 12 through conduits 36, 37, 33, 32, and 31. The liquid enters the envelope 13 and forces the air in said envelope out of the envelope through the hose 29 and tubes 28, allowing the air to escape freely to the atmosphere. When all the air has been removed, the valve 52 is closed, and liquid is pumped into the casing until the casing has been completely inflated. A predetermined pressure of liquid is maintained in the envelope 13 by the operation of the pressure switch 46, which governs the actuation of the motor 45. The parts are in the positions illustrated in the

second diagrammatic figure in Figure 8 at this point. The concrete is then poured into the form 55 around the core defined by the inflated envelope 13, and is then allowed to harden. After the concrete has hardened, valves 42 and 44 are opened, and valves 40 and 39 are closed. The motor 45 is again started, causing the liquid to be exhausted from the casing 12 through conduits 31, 41, 37, pump 34, conduits 33 and 43 into the reservoir 35. This causes the envelope 13 to collapse, as shown in the fourth figure of the group of figures of Figure 8, disengaging the envelope from the internal wall of the conduit section previously formed, and allowing the envelope to be withdrawn from said formed section. It will be understood that a subsequent section of concrete conduit can then be poured, since the apparatus is moved longitudinally along the form, the end wall 54 being moved along with the apparatus to a succeeding position in the form and the parts having the relative positions shown in Figure 1, whereby the next section of conduit may be poured in the same manner as that previously described. It will be understood that air is allowed to leave the casing 12 at the beginning of the inflation of the envelope 13 by opening the valve 52, and that said valve 52 is closed as soon as all of the air is expelled from the casing.

Referring now to Figures 9, 10 and 11, a modification of the apparatus is disclosed, wherein an outer tube 13' of flexible material, such as paper, cloth, fabric, plastic, rubber, or other suitable material of sufficient tensile strength to withstand the pressure developed in the envelope 13, is provided around the envelope 13 to form a lining for the concrete conduit and to facilitate the removal of the deflated envelope 13 after the concrete conduit has hardened. The operation of the apparatus is the same as previously described, and the relative positions of the respective elements during the successive stages of pouring of the conduit section are illustrated in Figure 11. As shown in Figure 11, after the concrete has hardened around the outer tube 13', the inner envelope 13 is deflated and may be easily removed without damage thereto from the liner 13'.

While certain specific embodiments of an improved apparatus for use in forming continuous conduits have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. An apparatus for forming concrete conduits comprising a tubular casing, a collapsible envelope having one end open and the other end closed arranged so that the open end faces and is connected to one end of the casing, said envelope being adapted to be expanded to define a core around which concrete may be poured in forming a conduit, a partition wall transversely arranged within said casing adjacent the other end thereof and secured thereto, a rigid tubular conduit arranged longitudinally within and spaced from said casing and supported in said partition wall, one end of said conduit being exteriorly of the other end of said casing and in communication with the atmosphere, a first valve for opening and closing said one end of said conduit, a flexible hose positioned longitudi-

5

nally within said collapsible envelope and having one end positioned adjacent the closed end of said collapsible envelope and having the other end connected to the other end of said rigid conduit, a second conduit extending into the other end of said casing and having one end supported in said partition wall and in communication with the interior of said casing and having the other end exteriorly of said casing, a pump having an inlet and an outlet, a reservoir, a third conduit having one end connected to the other end of said second conduit and having the other end connected to said reservoir, a fourth conduit having one end connected to said third conduit intermediate the ends of the latter and having the other end connected to the pump outlet, a second valve in the portion of said third conduit intermediate said fourth conduit and said one end of said third conduit, a third valve in the portion of said third conduit intermediate said fourth conduit and the other end of said third conduit, a fifth conduit having one end connected to the pump inlet and having the other end connected to said reservoir, a sixth conduit having one end connected in communication with the other end of said second conduit and having the other end connected to said fifth conduit adjacent said one end of the fifth conduit, a fourth valve in the portion of said sixth conduit adjacent said one end of said fifth conduit, a fifth valve in the portion of said fifth conduit adjacent the other end of said fifth conduit, a pressure responsive switch operatively connected to said pump, a seventh conduit having one end operatively connected to said switch and having the other end connected in communication with the interior of said casing, inwardly of said partition wall, and a sixth valve positioned intermediate the ends of said seventh conduit.

2. An apparatus for forming concrete conduits comprising a tubular casing, a collapsible en-

6

velope having one end open and the other end closed arranged so that the open end faces and is connected to one end of the casing, said envelope being adapted to be expanded to define a core around which concrete may be poured in forming a conduit, a partition wall transversely arranged within said casing adjacent the other end thereof and secured thereto, a rigid tubular conduit arranged longitudinally within and spaced from said casing and supported in said partition wall, one end of said conduit being exteriorly of the other end of said casing and in communication with the atmosphere, a first valve for opening and closing said one end of said conduit, a flexible hose positioned longitudinally within said collapsible envelope and having one end positioned adjacent the closed end of said collapsible envelope and having the other end connected to the other end of said rigid conduit, a second conduit extending into the other end of said casing and having one end supported in said partition wall and in communication with the interior of said casing and having the other end exteriorly of said casing, a pump, a reservoir, conduit means operatively connecting the other end of said second conduit to said pump and reservoir, a pressure responsive switch operatively connected to said pump, and another conduit means connecting the interior of said casing to said switch.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
857,581	Boyle	June 25, 1907
1,142,341	McNeil	June 8, 1915
1,600,353	Nose	Sept. 21, 1926
2,167,623	Britter	Aug. 1, 1939
2,302,754	Eakin	Nov. 24, 1942
2,389,164	Payne	Nov. 20, 1945
2,530,055	Green	Nov. 14, 1950