Dec. 21, 1937. J. P. L. MOURRAILLE 2,102,639

APPARATUS FOR CONSTRUCTING MONOLITHIC CANALIZED STRUCTURES

Original Filed July 1, 1933 2 Sheets-Sheet 1

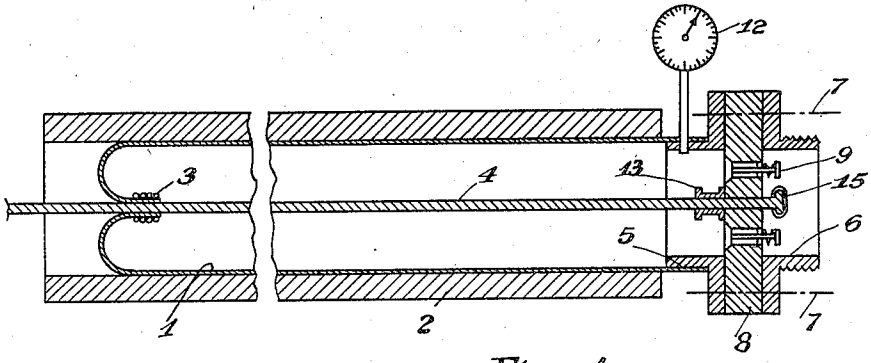


Fig. 1

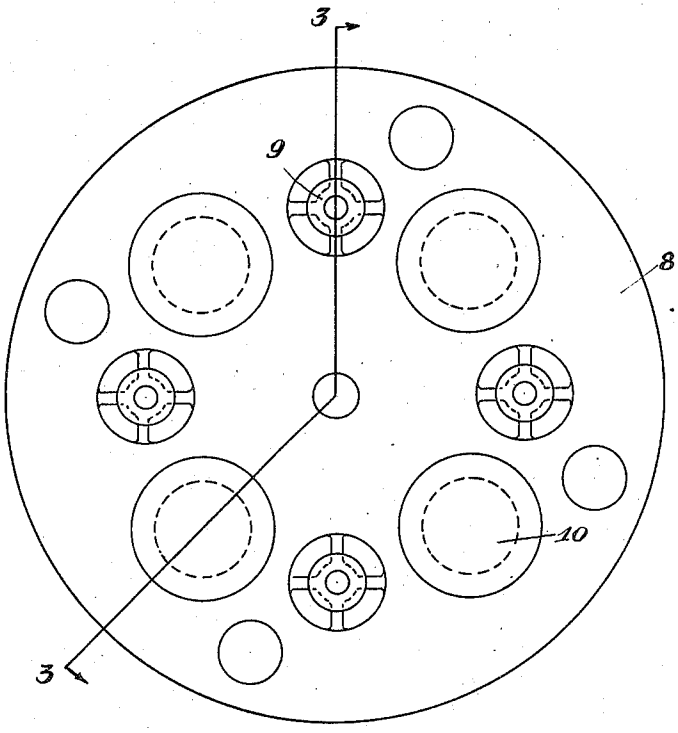


Fig. 2

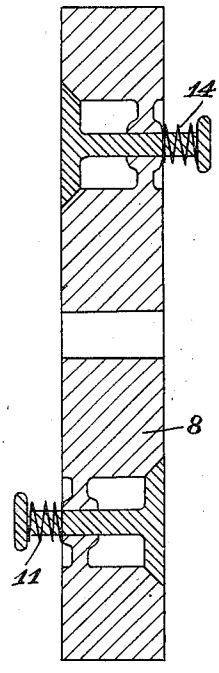


Fig. 3

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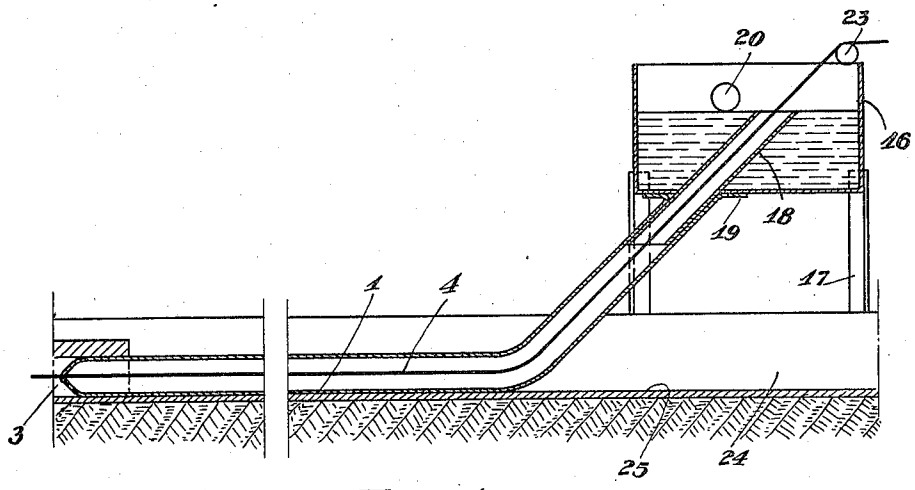


Fig. 4

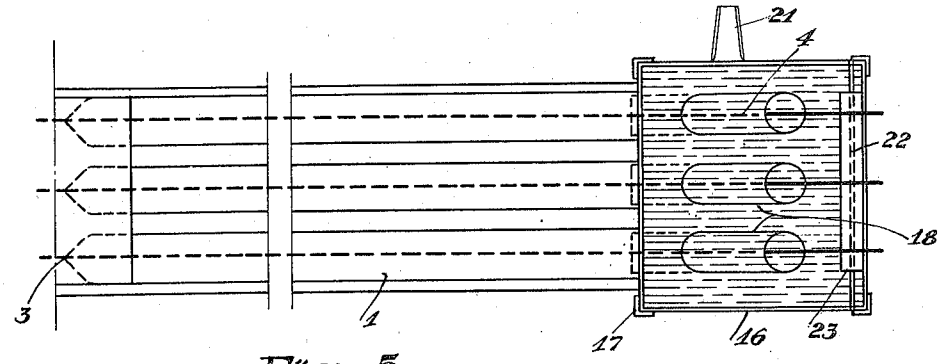


Fig. 5

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APPARATUS FOR CONSTRUCTING MONOLITHIC CANALIZED STRUCTURES

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Original application July 1, 1933, Serial No. 678,711. Divided and this application April 17, 1934, Serial No. 720,986. In France October 28, 1932

3 Claims. (Cl. 25—128)

This invention relates to monolithic canalized structures, such as cement or concrete sewer pipes, conduits, and the like, and more particularly refers to improvements in apparatus for producing such structures.

A method of constructing canalized structures, without joints, made of self-setting plastic material, whereby the material is poured around a core consisting of an inflated flexible tubular member and whereby said core is withdrawn after the material has set, in order to be advanced to the next position for pouring, has been suggested before. However, the methods heretofore known entail the necessity of either shifting the core bodily forward while in its inflated position, as shown, for instance, in the patent to J. M. Boyle, No. 857,587, or else they require that the core be deflated previous to its removal and be removed by being turned inside out by means of a cable secured to its inner end. In the first case, the shifting of the core is a practical impossibility, because the close adherence of the core surface to the surface of the conduit creates such a frictional resistance upon the core (which is generally made of canvas or rubberized fabric) that either the surface of the conduit or the core, or both, will be damaged during the operation. The other method whereby it is suggested that the core be deflated previous to its removal and then turned inside out has also been found unusable in practice, because it is impossible to remove the core in such a way as to leave undamaged the internal surface of the conduit and the core itself.

The difficulties entailed by the latter method have already been dealt with in my copending application, Serial No. 678,711, filed July 1, 1933, of which this is a division.

The present invention has for its primary object to provide a novel and improved apparatus, whereby the removal of a flexible core from a canalized structure of the character specified, can be effected without difficulty and without damage to either the structure or the core itself.

Another object is to provide in apparatus of the character specified, novel and improved arrangements whereby a flexible core can be removed from a conduit after setting, by gradually drawing it inside out, while maintaining within said core a pressure sufficient to maintain its unturned portion in an inflated condition while the removal of the core takes place.

A further object is to provide an exceedingly simple and reliable arrangement, whereby a uniform pressure can be maintained within the core during its removal, without the necessity of using pumps or other machines, and whereby the water employed for maintaining the core in an inflated condition, can be used over and over again, if desired.

Other objects and advantages of the present invention will more fully appear as the description proceeds and will be set forth and claimed in the appended claims.

My invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a longitudinal section of a form of device, embodying my invention;

Fig. 2 is a front view, in an enlarged scale, of the distributing tray;

Fig. 3 is a sectional view taken on line III—III of Fig. 2;

Fig. 4 is a vertical section showing another device, embodying my invention, in a preferred form; and

Fig. 5 is a plan view thereof.

From the premises it will be seen that my invention broadly resides in apparatus comprising a hollow, flexible, reversible core, means for reversing said core and means for applying fluid pressure within said core, both while the plastic material is poured around it and when said core is withdrawn after the material has set.

The apparatus shown in Figs. 1, 2, 3, comprises a hollow, collapsible core 1, consisting of a tube made from a flexible substance or material, such as, for instance, canvas or rubberized fabric, of a length and diameter corresponding to the dimensions of the canalized structure 2 to be produced.

The tube 1 is closed at one end by suitable fastening means 3, a cable 4 running through said closed end.

The fastening 3 must be such as to render the tube perfectly water tight, and cable 4 must be fixed in such a manner that it will not slip. Cable 4 should be preferably twice as long as tube 1, the portions of said cable 4 remaining inside and outside tube 1, respectively, being approximately of the same length.

The open end of tube 1 is fastened to a control device, shown in detail in Figs. 2 and 3. This device comprises two flanged bushings 5 and 6, which are to be fixed respectively to the core 1 and to a supply conduit containing a fluid under pressure, issuing either from a tank or a pump, or any other suitable source.

The two bushings 5 and 6 are coupled to each other by means of bolts or any other suitable means 7, a distributing tray 8 being interposed therebetween. Said tray is provided with two

series of valves 9 and 10, opening in opposite directions (see Figs. 3) and consequently referred to as inlet valves and exhaust valves.

The valves 9 and 10 are equal in number (four in example shown) and are evenly distributed on the tray. The springs 11 of the exhaust valves 10 are so arranged that they can only open when the pressure in the flexible tube 1 is above a predetermined maximum, controlled by a pressure gauge 12, fitted on bushing 5.

Cable 4 extends through the center of the distributing tray 8, which is provided with a suitable, absolutely water tight device 13, embracing said cable.

When a canalized structure without joints is to be constructed, a flexible tube 1, of a suitable length, is placed upon a bed of cement and bushing 6 is joined to the pipe supplying the fluid under pressure. Under the action of said fluid inlet valves 9 open and the fluid penetrates within the flexible tube 1. When the pressure in said flexible tube has reached the predetermined value indicated by the pressure gauge 12, the supply of fluid is turned off, or else bushing 6 is detached from the supply pipe. Inlet valves 9 are then maintained on their respective seats, on one side by their spring 14 and on the other side by the fluid contained in the flexible core 1. Said flexible core being made of water-tight material, the pressure within the same will remain constant. Cement or concrete is then poured in the usual manner around the flexible core 1.

Unless it has already been done, bushing 6 is then disconnected from the supply pipe of the fluid under pressure, preparatory to the removal of the core. Cable 4 is then pulled outwardly through tray 8 by means of a handle 15. When this is done the increased pressure within the flexible core 1 will cause exhaust valves 10 to open, the fluid under pressure contained within the core being forced out therefrom, while at the same time the flexible core is turned inside out, as shown in Fig. 1. The pull on cable 4 is maintained until the end of the fastening of the tube 1 reaches the device 13. At this stage, bushing 5 is disconnected and the fluid retaining apparatus is replaced by a suitable coupling, permitting the fluid contained within the core to be slowly ejected as the operation of turning said core inside out is completed.

A preferred and simpler form of apparatus, also embodying my invention, is shown in Figs. 4 and 5. This apparatus comprises a tank 16, resting upon the ground by means of supports 17, the height of these being such that the pressure within core 1, which extends from the bottom of said tank, will be sufficient to maintain said core fully expanded when the cement or other plastic material is poured. The tank 16, which can be of any suitable form, is provided with inclined tubes 18, extending through its bottom and supported by means of packing 19. The upper ends of tubes 18 are cut at a slant and are placed horizontally in a common plane. The tank has, besides, an overflow outlet 20 at the same level as the horizontal plane delimiting the upper ends of tubes 18. The overflow 20 is equipped with a drain 21. The device is completed by a shaft 22 carried by the tank 16 and provided with a loose roller 23.

The method of manipulating this device is as follows: The trench 24 in which the canalized structure is to be located having been prepared, a lining 25 is poured at the base of this trench and upon said lining are placed the tubes 1, which are to be used as cores for the construction of the canalized structure.

As shown, the closed end of each pipe 1 is inserted within the front end of the stump of canalized structure previously constructed, the free end of the said pipe being inserted over the corresponding tube 18 with the assistance of suitable means. The various tubes 1, after having been connected to the corresponding tubes 18, are filled with a liquid, for instance, water, and tank 16 is also filled with the same liquid, the liquid level within said tank remaining even with the upper ends of tubes 18.

By virtue of this arrangement an even pressure obtains and is maintained within the various tubes 1.

The cement or concrete for the construction of the canalized structure is then poured in place, as previously explained. For the withdrawal of the cores, it is only necessary to pull on cables 4, which cause the cores to be turned inside out. As each core is thus turned inside out, the water it contains is discharged into tank 16 and thence immediately through outlet 20.

Irrespective of what the status of each core 1 may be, the level of the water in tank 16 remains the same, and it follows, therefore, that the pressure within cores 1 remains uniform throughout.

The roller 23 is placed so as to maintain cables 4 in their proper alignment, so as to facilitate their operation when the pull is applied thereto.

It is, of course, possible to use a second tank (not shown) associated with tank 16, adapted to collect the water discharged from the latter, as each core 1 is turned inside out. In this manner, the water used for putting the cores under pressure can be saved, this being particularly advantageous when working in localities where water is scarce. Furthermore, by it the cost of constructing the canalized structure may be somewhat reduced.

By virtue of this arrangement, it is possible to effect a quick withdrawal of the flexible core 1 without the canalized structure being damaged internally in any manner. It is, therefore, possible to produce tubular conduits of an even section.

The feature of withdrawing the flexible core 1 whilst still under pressure prevents the said core from sagging and forming within the conduit an obstruction preventing it from yielding in the inside out turning thereof.

The invention can be applied not only in connection with single conduit structures but also in connection with canalized structures provided with a plurality of conduits. In the latter case, the required number of flexible cores are placed in proximity of one another and maintained in their relatively spaced positions by suitable means, such as sluices or other means.

For the construction of a canalized structure of reinforced cement the procedure is as explained above, the conduit to be covered with cement being made of a metallic trellis placed around the mould pipe.

It is obvious that the invention is in nowise limited to the embodiments which have been more especially described by way of example, but that it extends to all possible modifications coming, fairly, within the scope of the appended claims.

I claim:

1. Apparatus for the construction of a canalized

structure out of a self-setting plastic material, comprising an inflatable, collapsible, flexible core consisting of a hollow body closed at one end and having a pull cord attached thereto, means for admitting a fluid under pressure within said core so as to inflate the same, and means for maintaining pressure within said core, when a pull is exerted upon said cord so as to turn said core inside out, and to gradually detach it from the surface of the surrounding conduit, said cord extending through and beyond said pressure maintaining means.

2. Apparatus for the construction of a canalized structure out of a self-setting plastic material, comprising an inflatable, collapsible, flexible core consisting of a hollow body closed at one end, a cord attached to said end for turning said core inside out, a plurality of automatically operable pressure responsive valves associated with the other end of said core, some of said valves serving to admit liquid under pressure into said core so as to inflate the same and serving to maintain said pressure therein, and other of said valves serving to allow the liquid to escape when the core is being turned inside out and to maintain under pressure that portion of the fluid at any time remaining within the core.

3. Apparatus for the construction of a canalized structure out of a self-setting plastic material, comprising an inflatable, collapsible, flexible core consisting of a hollow body closed at one end, a tank, a sloping tube projecting within, and depending from said tank, connected to the open end of said core, an overflow outlet in said tank at the level of the top of said tube and causing the liquid within said tank to remain at a constant level, so as to exert a substantially uniform pressure within said core both when fully inflated and when gradually withdrawn, and a pull cord attached to the closed end of the core and passing through the core and tube.

JEAN PIERRE LOUIS MOURRAILLE.