Oct. 27, 1931. H. COOK 1,828,890

METHOD AND APPARATUS FOR MAKING REENFORCED PIPE

Filed June 25, 1928

Fig. 1

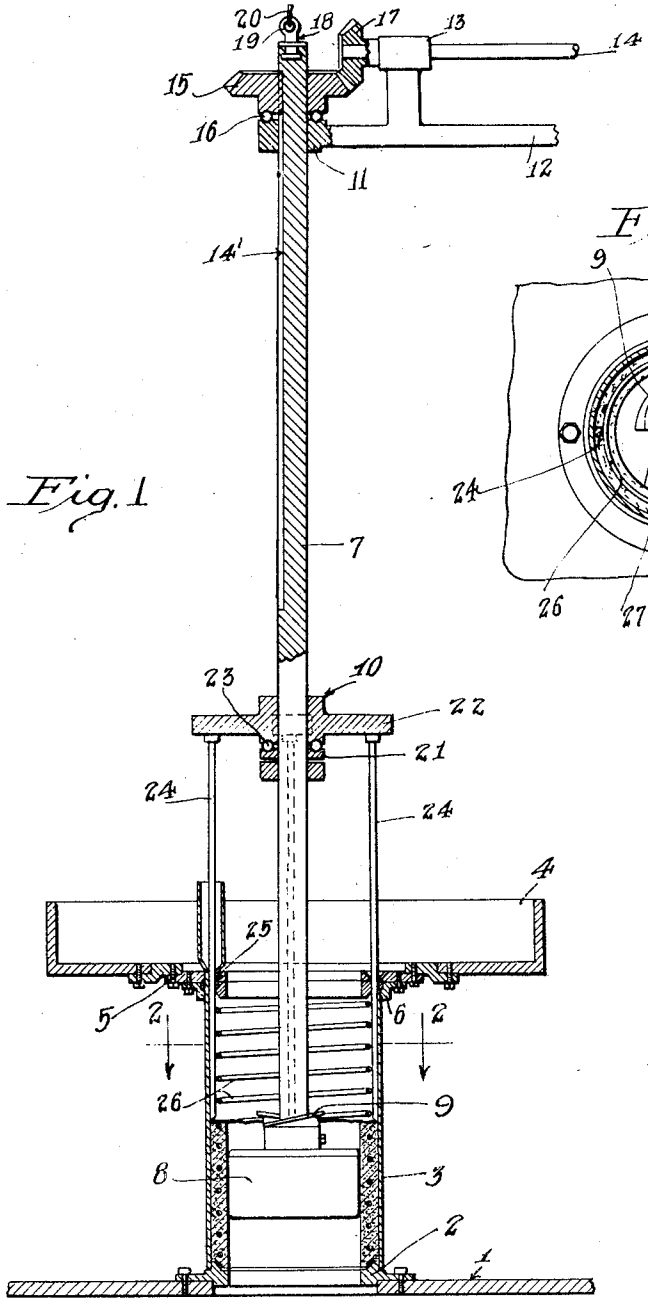


Fig. 2

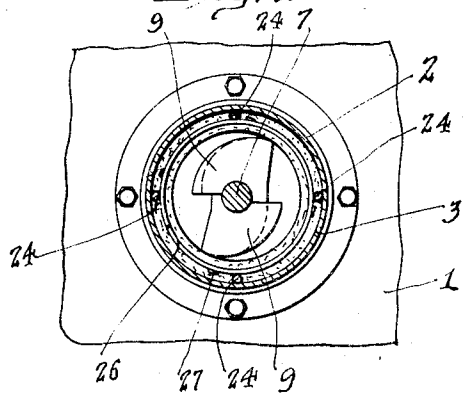
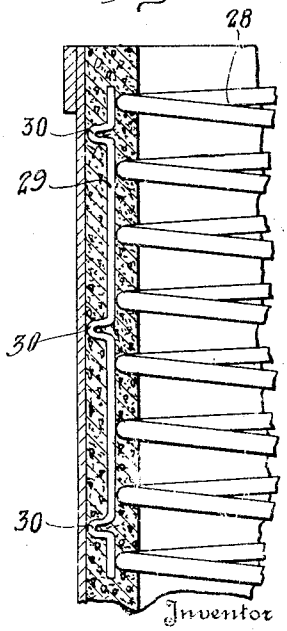


Fig. 3



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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR MAKING REENFORCED PIPE

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This invention relates to a method and apparatus for making cementitious bodies containing reenforcing materials and particularly relates to a method and apparatus adapted to be used in the manufacture of reenforced concrete pipe.

There are now employed several methods of making concrete pipe, the most common being centrifugal method, packer head method and elementary molding method. The latter is the crudest and merely consists in placing concrete within the space between an outer jacket and an inner core. No automatic machines are used in the manufacture of pipe by this method and, therefore, a large amount of labor is required. Furthermore, a large number of jackets and cores are necessitated as the filled molds must be set aside for a considerable length of time so as to allow the concrete to cure.

The centrifugal method is quite rapid, which necessitates the use of large and expensive machines to spin the jackets in which the pipe is made. A great deal of difficulty has been encountered in making reenforced concrete pipe by this method, as it is difficult to maintain the reenforcing at the proper distance from the walls of the finished pipe, or from the walls of the jacket. A similar difficulty has been encountered whenever an attempt has been made to make reenforced concrete pipe by what is known as "packer head" method. In packer head machines, a hollow jacket is employed and a revolving head adapted to move vertically is positioned centrally of the jacket. This head, customarily, is provided with fins exerting radial pressure internally of the jacket and thereby comprises the cementitious material between the head and the jacket. The revolution of the packer head within the jacket creates a smooth finish on the inner surface of the pipe. The difficulty of making concrete pipe provided with continuous or spiral reenforcing by the present methods and machines, has even led to the use of short bent pieces of wire and the like as a reenforcing material although such forms of reenforcing are not particularly desirable.

This invention, however, makes available an improved method and apparatus whereby concrete pipe with continuous or spiral reenforcing members can be made in a relatively inexpensive and very efficient manner.

An object of this invention is to disclose and provide a machine capable of maintaining reenforcing members in a desirable position within a mold and within a plastic cementitious material, while said cementitious material is being placed around said reenforcement and formed to a desired shape.

Another object of this invention is to provide a method whereby concrete pipe reenforced with a spiral or continuous reenforcing may be manufactured by a modification of what is known as the packer head system.

Other objects, functions and characteristics of this invention and the combination and elements embraced thereby will become apparent from the following detailed description of the method and one preferred form of the machine by means of which the method may be put into operation.

In the drawings:

Figure 1 is a vertical section through a machine embracing the invention.

Figure 2 is a horizontal section taken along line 2—2 of Figure 1.

Figure 3 is a vertical section through a portion of reenforced pipe made in accordance with this invention.

Referring to the drawings:

The machine comprises a suitable base 1 provided with a removable annular bottom member 2, an outer jacket 3, of any desired construction may be placed upon the bottom ring 2 and attached thereto in any suitable manner. The size or inner diameter of the jacket 3 controls the outer diameter of the finished pipe to be made by means of this ap-

paratus, a suitable ring or bottom retainer being provided for jackets of varying diameter.

A suitable charging platform 4, positioned above the base 1 and at a suitable distance therefrom, may be provided with a circular opening to which a ring 5 is connected in a suitable manner. A retaining member 6 is attached to the ring 5 and adapted to receive and hold the upper edge of the jacket 3. The loading platform or hopper 4, together with the retaining rings 5 and 6 may be movable in a vertical plane so as to facilitate assembling of the jacket and charging platform or hopper, or the charging platform or hopper 4 may be vertically movable while the base 1 and bottom ring 2 are vertically movable. Means for moving either the base or the charging platform are not shown, as various methods and forms of construction well known in the arts, may be employed.

Extending centrally through the chamber formed by the jacket 3, a shaft 7 is provided, said shaft carrying, at the lower end thereof, a packer head 8. The outer diameter of the packer head should be equivalent to the inner diameter of the concrete pipe which it is desired to form. Fins 9 may be provided near the upper portion of the packer head 8 so as to allow the packer head to throw cementitious material introduced into the chamber above the packer head to the sides thereof and against the inner surfaces of the jacket 3. The exact shape and arrangement of the fins 9 is immaterial. If desired, the fins 9 may be arranged at an angle to the horizontal, as shown in the drawing, or the fins may take the form of arcuate plates in a substantially vertical plane or slightly inclined thereto, the tips of the fins or vanes terminating at a slightly greater radial distance from the center of the shaft 7 than the sides of the packer head 8. When this construction is used, the tips of the vanes 9 exert a smoothing or troweling action on the inner surfaces of the pipe being formed.

The shaft 7 may pass through a suitable journal 10 slightly above the charging floor 4, and through another journal 11 formed in an extension of a support 12 which also carries a horizontal bearing 13, in which a drive shaft 14 may be journaled. A keyway 14′ may be provided in the upper portion of the shaft 7 and a suitable bevel gear 15 feathered on the shaft 7 by means of a key slidably received in the keyway 14′. A bearing 16 may be mounted between the bevel gear 15 and the journal 11.

The bevel gear 15 should be operably connected with the drive shaft 14 as, for example, by means of a bevel gear 17 mounted on the end of the drive shaft. In this manner, the shaft 7 and packer head 8 connected thereto may be rotated.

Any suitable means of moving the shaft 7 and packer head vertically may be employed, but for purposes of illustration, the upper end of the shaft 7 may be provided with a rotatable connection 18 in rotatable engagement with the shaft 7, and provided with a hook or eye 19 through which a cable 20 may be attached, the cable 20 being connected to a suitable hoisting mechanism. In this manner, a vertical motion may be imparted to the packer head while said packer head is being rotated.

The shaft 7 may be provided with a shoulder 21 or a collar slightly above the journal 10 when the packer head 8 and shaft 7 are in their lowermost position within the jacket 3. A yoke 22 may be rotatably journaled on the shaft 7 above the shoulder 21 and suitable bearings 23 interposed between the shoulder 21 and the yoke 22. A plurality of spacing rods 24 may be suspended from the ends of the yoke 22, such spacing rods 24 passing through vertical guides 25 positioned in suitable apertures in the ring 5 connected to the charging floor 4. The guides 25 are preferably of sufficient heights to prevent concrete or other cementitious material placed upon the charging floor 4, from easily entering the interior of the guides 25. The spacing rods 24 are directed by means of the guides 25 against the inner surface of the jacket 3.

The arms of the yoke 22 may be of greater length than the diameter of the jacket 3 and the spacing rods 24 may be adjustably positioned along the arms of the yoke 22, so that the distance between spacing rods 22 may be varied, in accordance with the size or inner diameter of the jackets 3 in which they are to be slidably received.

In making reenforced concrete pipe in accordance with this invention, packer head 8 is dropped to its lowermost position in the bottom of the chamber formed by the jacket 3 and the spacing rods 24 will automatically be also dropped to a position within the jacket 3. A spiral or any other form of reenforcing which it is desired to use, is then placed within the jacket 3 and between the packer head and the spacing rods 24. Or, the reenforcing may be introduced into the jacket and then the packer head and spacing rods lowered into position. The spacing rods will, however, prevent the reenforcing from coming in contact with the sides of the jacket 3, as is clearly shown in the drawings. A cementitious composition, for example, a Portland cement concrete of a desirable plasticity is then placed within the chamber formed by the jacket 3, and the packer head caused to revolve. The vanes or fins 9 exert a radial pressure upon the cementitious material introduced into the mold and force the material to the sides of the chamber and against the inner surfaces of the jacket 3. Ordinarily, the force exerted by the rotation of the packer head tends to force the reenforcing 26 in

contact with the inner walls of the jacket 3, but the spacing rods 24 prevent this, in accordance with this invention.

Additional quantities of cementitious material are introduced into the chamber formed by the jacket 3, the packer head continues to revolve and is simultaneously raised so that a complete reenforced concrete pipe is formed. The spacing rods 24 move in synchronism with the packer head 8, so that the space previously occupied by the spacing rods is filled up with cementitious material. As shown in the drawings, the spacing rods 24 preferably terminate slightly above the lowermost portion reached by the packer head, so that they are withdrawn slightly in advance of the packer head.

In order to counteract any turning or twisting tendency which may be imparted to the reenforcing 26 by the rotary motion of the packer head 8, small lugs 27 may be provided on the outer surfaces of the reenforcing 26 and adapted to engage with the spacing rods 24. It will be understood that although the packer head rotates, as shown by the direction of the arrow in Figure 2, the spacing rods 24 do not rotate and, therefore, the lugs 27 prevent the reenforcing 26 from being displaced. The spacing rods, therefore, move in a substantially fixed vertical plane and not only space the reenforcing from the mould jacket 3, but also prevent the reenforcing from rotating during the formation of the pipe.

In Figure 3, there is shown a slightly different type of reenforcing, consisting of a spiral or helical portion 28 and vertical rods 29, suitably attached to the spiral reenforcing 28. The spacing rods 29 prevent the spiral reenforcing 28 from sagging when the reenforcing is placed within an empty jacket, although, the spacing rods 24 tend to prevent sagging even if no vertical rods, such as the rods 29, are used.

If desired, the vertical rods 29 may be formed with externally directed bends 30 adapted not only to space the major reenforcing 28 from the sides of the jacket 3, but also to compensate somewhat for the shrinkage of concrete during curing thereof. The vertical rods 29 may be formed of a relatively soft or easily bent metal. It is well known that during curing and setting of a concrete composition, a considerable amount of shrinkage occurs and the bends 30 are adapted to give during such shrinkage and thereby prevent separation or breaking of the bond between the concrete and the reenforcing.

For example, the spacing rods 24 may be placed within a cage of reenforcing (instead of between the reenforcing and the jacket) and thereby maintain the reenforcing in position.

The above description is believed to clearly explain the novel features of the invention. It will be understood that numerous changes and modifications may be made, both in the apparatus described and in the method without departing from the scope of the following claims.

I claim:

1. In a pipe making machine of the character described, the combination of a vertical mold jacket, packer head means adapted to rotate and move in and out of said mold jacket, a plurality of laterally immovable spacing rods adjoining the inner surface of the mold jacket and means for moving the spacing rods in a substantially fixed vertical plane in and out of the said mold jacket in substantial synchronism with the movement of the packer head.

2. In a pipe forming machine of the character described, the combination of a frame, a vertical mold jacket, a plurality of substantially immovable guide means positioned above the inner edge of the jacket and attached to the frame, a plurality of spacing means operably positioned in said guide means and adapted to space a reenforcing from the inner surface of the jacket, a rotatable packer head and means for moving the packer head and spacing means in a vertical plane simultaneously.

3. In a pipe making machine of the character described, a vertical mold jacket, a plurality of guide means positioned above the inner edge of the jacket, a plurality of spacing means operably positioned in said guide means and adapted to space a reenforcing from the inner surface of the jacket, a packer head, means for rotating said packer head and means for moving the packer head and spacing means in a vertical plane simultaneously while said packer head is rotating.

4. A machine for making reenforced concrete pipe comprising, a rotatable shaft, packer head means mounted on said shaft, a yoke rotatably journaled on said shaft, a plurality of spacing rods operably connected to the yoke, a vertically disposed outer mold jacket, guide means positioned above the inner edge of said mold jacket and adapted to slidably receive said spacing rods, means for rotating the shaft, and means for moving the packer head and yoke in a vertical plane.

5. The method of making reenforced concrete pipe, which consists in spacing a reenforcing away from the inner surfaces of the mould and preventing said reenforcing from rotating in said mould, pouring a plastic cementitious material into the mould, compacting the cementitious material along the inner surfaces of the mould, and withdrawing the spacing means while maintaining same in a substantially fixed vertical plane and while compacting the cementitious material.

6. The method of making reenforced con-

crete pipe which consists in spacing a reenforcing away from the inner surfaces of a mold, pouring a plastic cementitious material into the mold, subjecting the cementitious material to a radially directed pressure along the inner surfaces of the mold and then withdrawing the spacing means longitudinally out of the mold slightly in advance of the zone subjected to said radially directed pressure.

Signed at Los Angeles, California this 18th day of June 1928.

HARRY COOK.