Sept. 9, 1958 P. L. OSWEILER 2,850,784

MEANS FOR MAKING CONCRETE PIPE

Filed Jan. 30, 1953 2 Sheets-Sheet 1

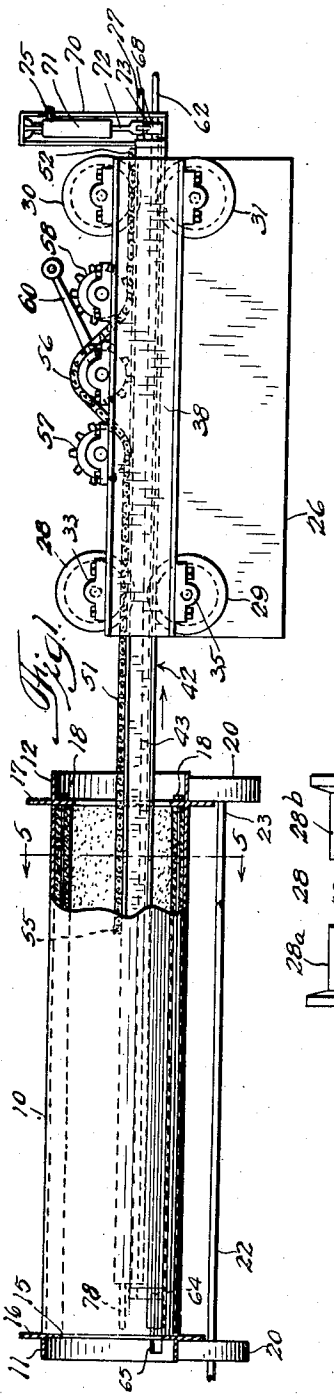


Fig. 1.

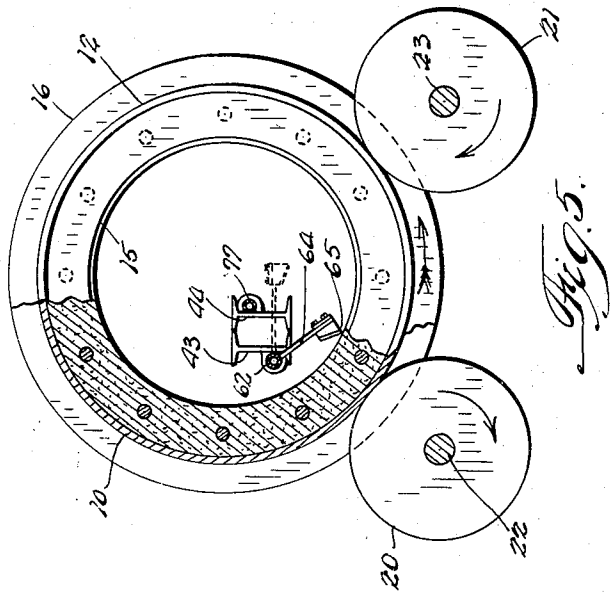


Fig. 5.

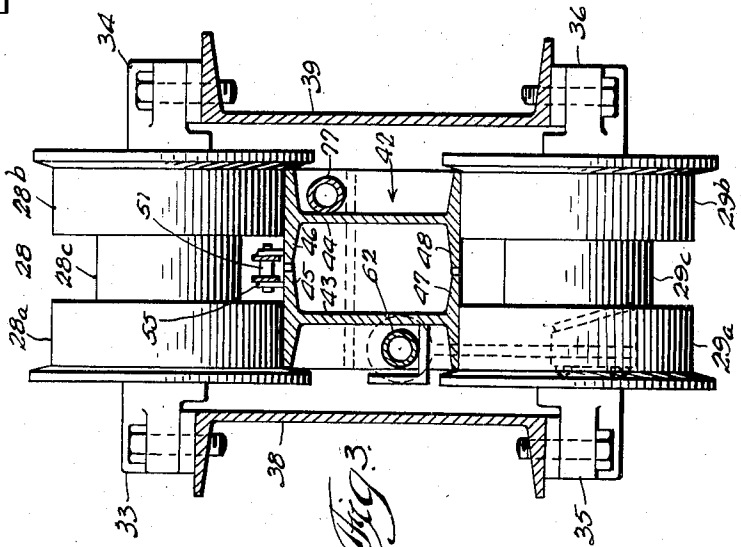


Fig. 3.

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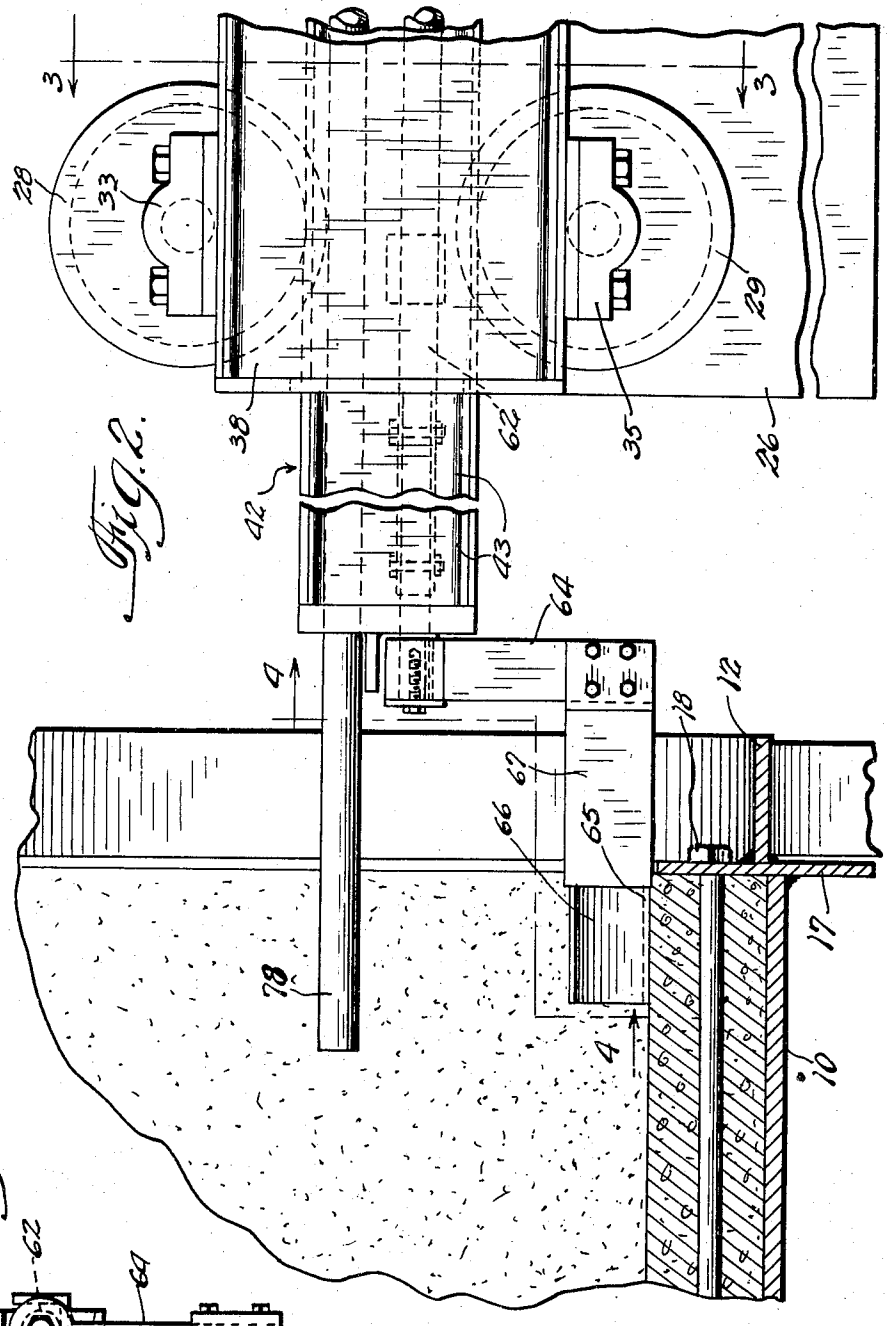


Fig. 2.

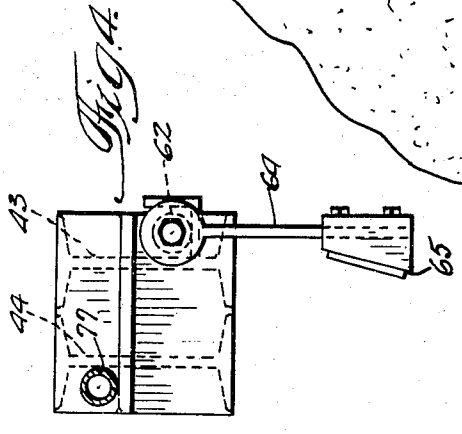


Fig. 4.

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MEANS FOR MAKING CONCRETE PIPE

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Application January 30, 1953, Serial No. 334,186

1 Claim. (Cl. 25—30)

This invention relates to a means for making concrete pipe by centrifugal casting.

Concrete pipe, with or without steel reinforcement, is manufactured in a number of ways. One common method of manufacturing involves centrifugal casting of the pipe until the concrete is generally self-supporting after which the form containing the unset and uncured concrete pipe is removed from the casting machine to an ageing room. In centrifugal casting, a cylindrical form having annular rings at the ends thereof is usually provided. This form is disposed horizontally on rollers.

The form may contain steel longitudinal rods or wires suitably tensioned between the end form rings. The form is adapted to have a suitable mix, including some aggregates, poured into it. The form is rotated while in the horizontal position at high speed so that centrifugal force disposes the concrete in the shape of a pipe having a generally uniform wall thickness determined by the amount of concrete that has been poured into the form.

After the concrete has begun to set and is sufficiently firm, the rotating form is stopped and removed from the machine. The form with the uncured concrete pipe therein may then be transferred to a steam room or any suitable place where the pipe may cure or age. The concrete pipe may cure under normal room conditions for a desired length of time or may undergo an accelerated curing in a steam room. After the concrete pipe has set, the form is removed and the pipe is free. Thereafter, the pipe may be used as is or the pipe may be wound with wire thereover for providing circumferential reinforcement, the reinforcing wire usually being suitably tensioned. Inasmuch as the subsequent reinforcement of a concrete pipe after curing is well known, the details of such wire reinforcement are not herewith given.

In centrifugal casting, it frequently occurs that relatively large pieces of stone will find a final resting place along the inner surface of the concrete. This is due to the low specific gravity of such stones compared to that of the concrete aggregates. The resulting pipe will therefore have a relatively rough and irregular inner surface. This has a tendency to increase substantially the flow resistance of material, such as water or sewage to be conducted by the pipe. This invention provides a means for smoothing the inner surface of concrete mix during the casting thereof, so that the resulting pipe will be smooth.

In general, this invention provides means for scraping the inside surface of the concrete pipe during the casting thereof. During this smoothing operation, undesirable stones are removed and the depressions or pockets left by such stones are filled in with adjacent material. Additionally, this invention provides means for blowing air along the inside surface of the concrete to remove excess water and slurry.

In order that the invention may be understood, an exemplary apparatus will be disclosed, it being understood, however, that variations in the apparatus may be made without departing from the scope of the invention except as defined by the appended claim.

Referring therefore to the drawings:

Figure 1 is a side elevation, partly in section of a new machine embodying the present invention.

Figure 2 is an enlarged view of a portion of the mechanism shown in Figure 1, the trowel or scraper being in a different position with respect to the concrete pipe than shown in Figure 1;

Figure 3 is a section along line 3—3 of Figure 2, the section only showing the mechanism for moving the beam and not showing the concrete form;

Figure 4 is an enlarged sectional detail along broken line 4—4 of Figure 2;

Figure 5 is a section along line 5—5 of Figure 1.

The form for casting pipe generally comprises cylindrical member **10** usually of steel or other suitably rigid material. Form **10** has end portions **11** and **12** which are beyond the concrete casting part of the form. Referring to end portion **11**, form **10** has internal flange **15** and external flange **16**. These two flanges are rigidly attached to the form.

The other end **12** of form **10** has external flange **17** similar to flange **16**. Form **10** has internal flange **18** which may have means, not shown, for adjusting the longitudinal position of the flange along the length of the form to control the length of pipe to be cast. If desired, flange **18** may be fixed and flange **15** may be made adjustable longitudinally of the form.

The two flanges are provided with suitable apertures and are strong enough so that longitudinal reinforcing rods or wires of steel may be tensioned between the flanges, these rods or wires being maintained under tension until the concrete has been cured. The rods or wires are distributed circularly with respect to the pipe axis, as shown in Figure 5. Adjacent rods or wires are spaced a suitable distance depending upon the stress to which the wires are tensioned and also the desired pipe characteristics. Inasmuch as the form details do not constitute any part of the present invention, a detailed description is not given. However, with regard to means for maintaining the longitudinal rods under tension, means for engaging the longitudinal tensioning rods are disclosed and claimed in the copending application of Gayle B. Price and Paul L. Osweiler, Serial No. 304,524, filed August 15, 1952, now abandoned, and may be used here.

Form **10** is supported on a number of rollers **20** and **21**. Rollers **20** are attached to one common shaft **22**, while rollers **21** are attached to another common shaft **23**. Each pair of rollers engages the form at end portions **11** and **12**. One pair of rollers, as for example, **20**, may be driven by suitable means, as an electric motor or engine, while the other pair of rollers **21**, for example, may be idle. As shown in Figure 5, rollers **20** and **21** are so disposed that form **10** may rest upon these rollers and be driven. Other means for supporting and driving the form may be provided. However, the means illustrated is simple and effective.

The mechanism so far described is generally conventional. Cooperating with the centrifugal casting means thus far described is a means for scraping or trowelling the inner surface of the concrete during casting and for blowing excess water from such surface. Thus referring to Figure 1, base **26** carries a system of flanged rollers at the two ends thereof. Base **26** at one end carries a pair of flanged rollers indicated by numerals **28** and **29**. At the other end, base **26** carries systems of flanged rollers **30** and **31**. The systems of rollers are the same at both ends so that the systems of rollers at one end only will be described.

Referring to Figure 3, rollers **28** consist of flanged rollers **28***a* and **28***b*, the flanges being on the outside. Between flanged rollers **28***a* and **28***b* is hub **28***c*. Flanged rollers **28***a* and **28***b* may either be separate or be tied

together as one unit. The hub 28c may either be stationary or revolve. However, flanged rollers 28a and 28b are mounted to rotate. The shafts upon which these rollers are rotatively mounted are supported in suitable pillow blocks 33 and 34.

Flanged rollers 29 are similar to rollers 28 in having flanged rollers 29a and 29b with hub 29c therebetween. Pillow blocks 35 and 36 support the shaft upon which flanged rollers 29a and 29b rotate.

The two systems of rollers 28 and 29 are in vertical alignment, the various pillow blocks being carried by transversely spaced beams 38 and 39 having suitable flanges at their ends to which the various pillow blocks are bolted. Beams 38 and 39 extend the full length of base 26. Rollers 30 and 31 are similar in all respects to rollers 28 and 29.

Longitudinally movable between the vertically spaced systems of rollers is a long beam generally indicated by numeral 42. This beam may be constructed in any suitable fashion and is here shown as consisting of a pair of I beams 43 and 44, disposed in parallel position. The beams have the opposing flange edges 45 and 46 at the top and 47 and 48 at the bottom welded together to form a rigid, unitary construction. The general beam construction indicated by numeral 42 is so dimensioned as to fit snugly between opposing flanged rollers. The outer flanges of the various rollers overlie the outer flanged edges of the beam construction to maintain beam 42 laterally in position while permitting the beam to move longitudinally between the various flanged rollers. Beam 42 is long enough and base 26 is long enough and the horizontal distance between the flanged rollers at the ends of base 26 is great enough, so that beam 42 may be moved longitudinally a distance substantially equal to the length of form 10. Thus as an example, form 10 may have a length of 16 feet, it being understood that the effective part of the form many be reduced by movement of the internal annular flanges to cast any pipe having any desired length of 16 feet or less. Beam 42 may have a length of about 30 feet. Base 26 may have a length of about 10 feet while the distance between the opposing ends of base 26 and form 10 may be about 4 feet. It is understood of course that when beam 42 is moved to the right, as seen in Figure 1, the right end of the beam will extend beyond base 26. The above dimensions are merely exemplary and may be varied.

Suitable means for moving beam 42 longitudinally of base 26 are provided. While various means may be provided, such as for example having a rope or chain attached to the beam at each end thereof, a simple and effective means is illustrated. Sprocket chain 51 has one end 52 anchored to the top of the right hand end of the beam as seen in Figure 1. Chain 51 is disposed symmetrically along the top of beam 42 so that the chain itself will lie between the two flanged rollers and underneath the hub between the rollers. Thus specifically with reference to rollers 28, chain 51 will lie between flanged rollers 28a and 28b and be below hub 28c.

It is understood, that chain 51 is loose on the beam except at one end 52 where it is anchored to one end of the beam and at the other end of the chain 55 where it is anchored to the beam at a suitable point.

Side beams 38 and 39 support, in suitable bearings, drive sprocket 56 over which chain 51 passes. Idler sprockets 57 and 58 are carried by beams 38 and 39 in front and rear of sprocket 56. Idlers 57 and 58 engage the chains at the bottom of these sprockets while drive sprocket 56 engages the chain at the top thereof. Means, such as handle 60, are provided for turning sprocket 56. Rotation of sprocket 56 will create a force tending to move beam 42 either in one direction or the other, depending upon the direction of rotation of the sprocket. If desired, electric motor or other power means for driving sprocket 56 may be provided.

The point of attachment 55 on beam 42 is so selected that the sprocket will be long enough to permit the beam to travel over the desired casting form length. Preferably, although not necessarily, beam 42 is disposed eccentrically of form 10 so that the beam itself is along one radial direction in proximity to the inner wall of a concrete pipe to be cast. Journaled between the flanges of beam 42 is pipe 62 extending the full length of the beam. As shown in Figure 3, pipe 62 is suitably supported in bearings at the outer side of I beam 43. Pipe 62 may be solid if desired and is sufficiently rigid so that a 30 foot length thereof may be accurately controlled and withstand the torsion.

Pipe 62 carries, at one end, arm 64 extending laterally therefrom. Arm 64 carries at its free end scraper blade or trowel 65, this having the general shape shown in Figures 2 and 4. Trowel 65 has hollowed part 66 and straight part 67. Part 66 cuts high spots and stones while part 67 smooths the concrete surface. Preferably, trowel 65 is moved initially so that part 67 engages the concrete surface. The trowel may have any other desired shape and construction, and is of metal and sufficiently strong to operate along the surface of the concrete mix. Arm 64 is long enough so that it will engage the desired inner surface of the concrete mass when pipe 62 is turned.

In order to turn pipe 62, suitable means are coupled to end 68 of the pipe. In its simplest form, this means may consist of a crank for manual operation. However, since a steady force is exerted on pipe 62, power means for turning and maintaining pipe 62 in desired position is provided. Suitably mounted upon beam 42 is auxiliary frame 70 carrying air cylinder 71. Cylinder 71 has a piston therein, not shown, this piston having piston rod 72. Rod 72 is pivotally secured to crank 73, carried by end 68 of pipe 62. Flexible air hose 75 supplies compressed air to cylinder 71. Suitable valve means are provided for controlling the admission and retention of air within the air cylinder. Thus by control of the pressure of air within the air cylinder, pipe 62 may be adjusted to any desired rotary position and by maintaining the air within the cylinder at a constant pressure the force upon pipe 62 may be maintained. If desired, mechanical means for locking pipe 62 in a desired rotary position may be provided so that the radial position of trowel 65 is maintained.

The trowel will smooth the inner surface of the concrete free of stones and other large particles. The stones have a lower specific gravity than the concrete aggregate and many normally remain on the inner surface. When stones are loosened or worked into the concrete the mix is smoothed. During the casting, the trovel will be moved longitudinally of the form. The number of revolutions of the form to inch of longitudinal travel of the trowel (roughly the pitch) should be such that a smooth surface results. It is preferred to have the trowel move relatively slowly so that the form turns many times to an inch of travel of trowel 65. In practice, a small number of passes of the trowel, along the length of pipe, is necessary. For a rough interior of pipe, a relatively slow trowel feed along the pipe is desirable. After several passes, the trowel is removed.

Means are provided for blowing excess water and slurry from the inside surface of the concrete. This consists of air hose 77 extending the full length of beam 42 and retained in suitable position therein by suitable clamping means. Thus as shown in Figure 3, air hose 77 is attached to the outside of I beam 44. End 78 of the hose discharges air inside of the concrete pipe.

Ordinarily the air blast is discharged clear of the trowel and several inches away from the concrete surface. The air blast may be used after trowelling and prior to removal of the pipe and form from the casting machine. It may, however, be used in conjunction with the trowel to eliminate excess water, loose stones and the like.

What is claimed is:

In an apparatus for centrifugally casting concrete pipe,

a base, an elongated beam having flanges, means including superposed pairs of flanged rollers engaging said flanges on opposite sides of the beam for moving said beam along said base for a distance substantially equal to the length of the pipe being cast, a long rod supported by said beam and extending longitudinally along a beam surface, an arm carried by said rod and extending normal to said rod, a trowel carried by said arm at the free end thereof, said trowel having a length short in comparison to the length of the pipe being cast, said beam being adapted to be moved longitudinally of the pipe with the rod and arm extending within the pipe during spinning of the pipe, pneumatic means coupled to said rod for adjusting the position of the trowel with respect to the surface of the concrete pipe, and an air pipe carried by said beam along the full length thereof, said air pipe having a discharge end disposed in proximity to said trowel.

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