

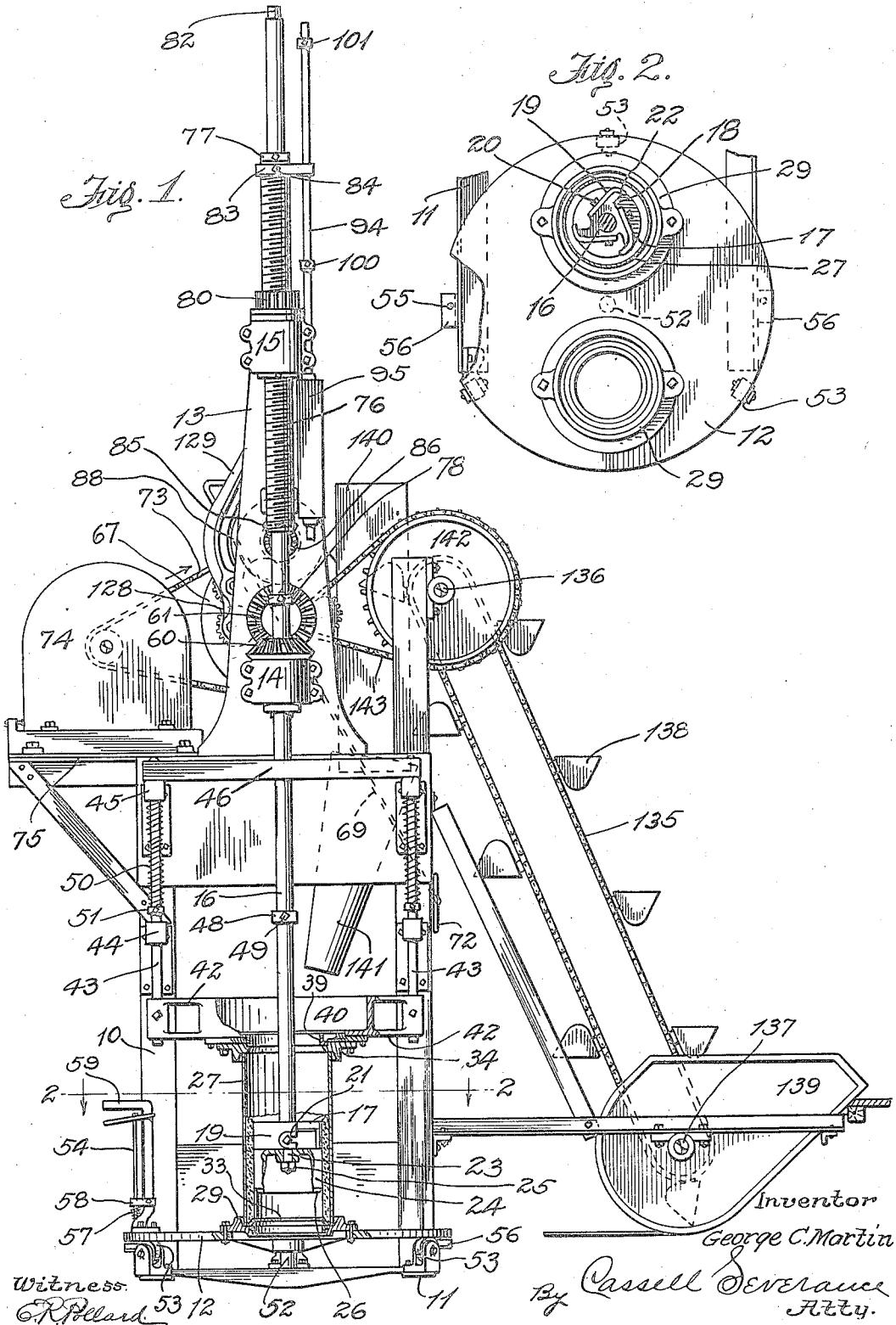
G. C. MARTIN.
CONCRETE PIPE MACHINE.

APPLICATION FILED AUG. 5, 1916. RENEWED JULY 31, 1920.

1,428,044.

Patented Sept. 5, 1922.

4 SHEETS--SHEET 1.



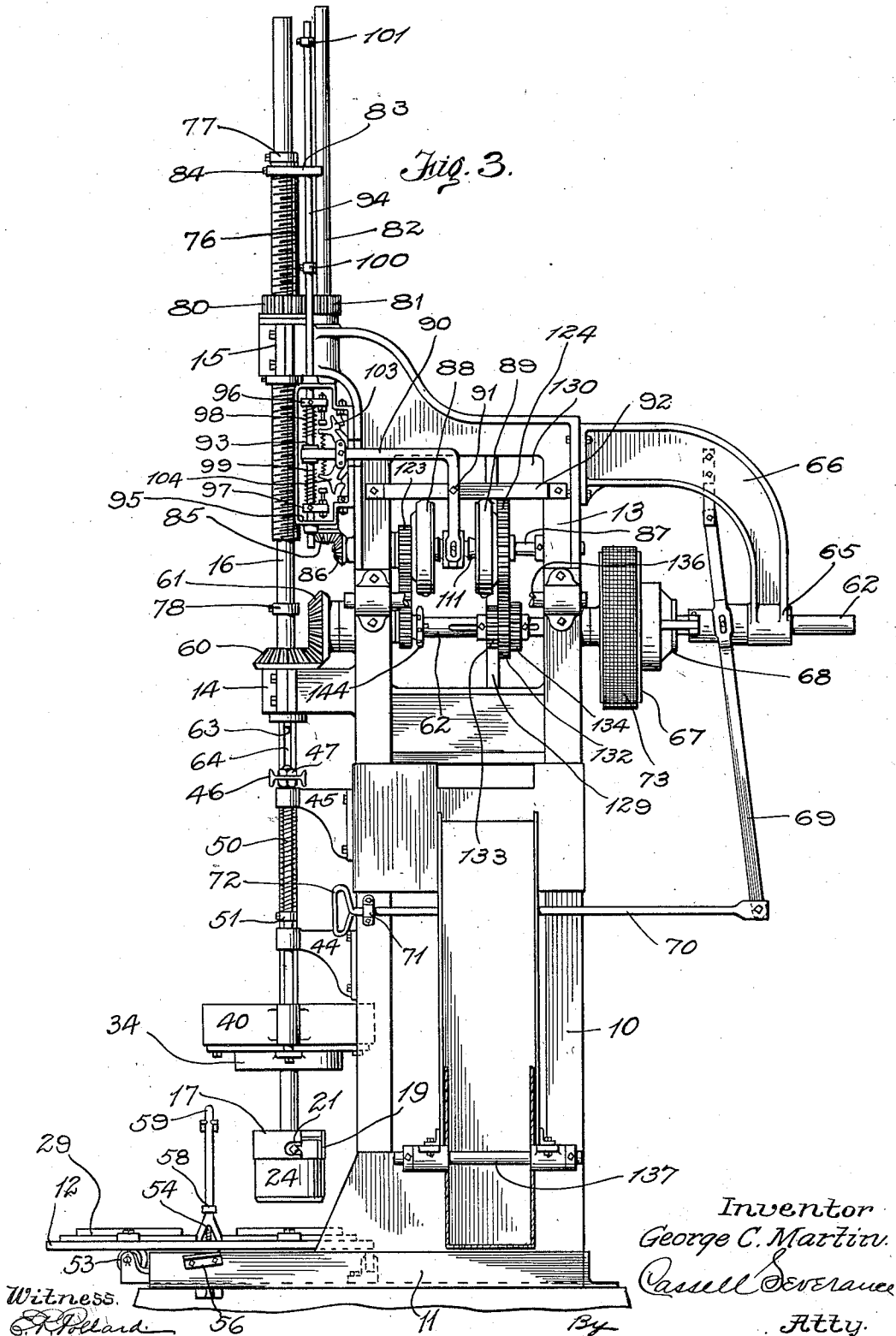
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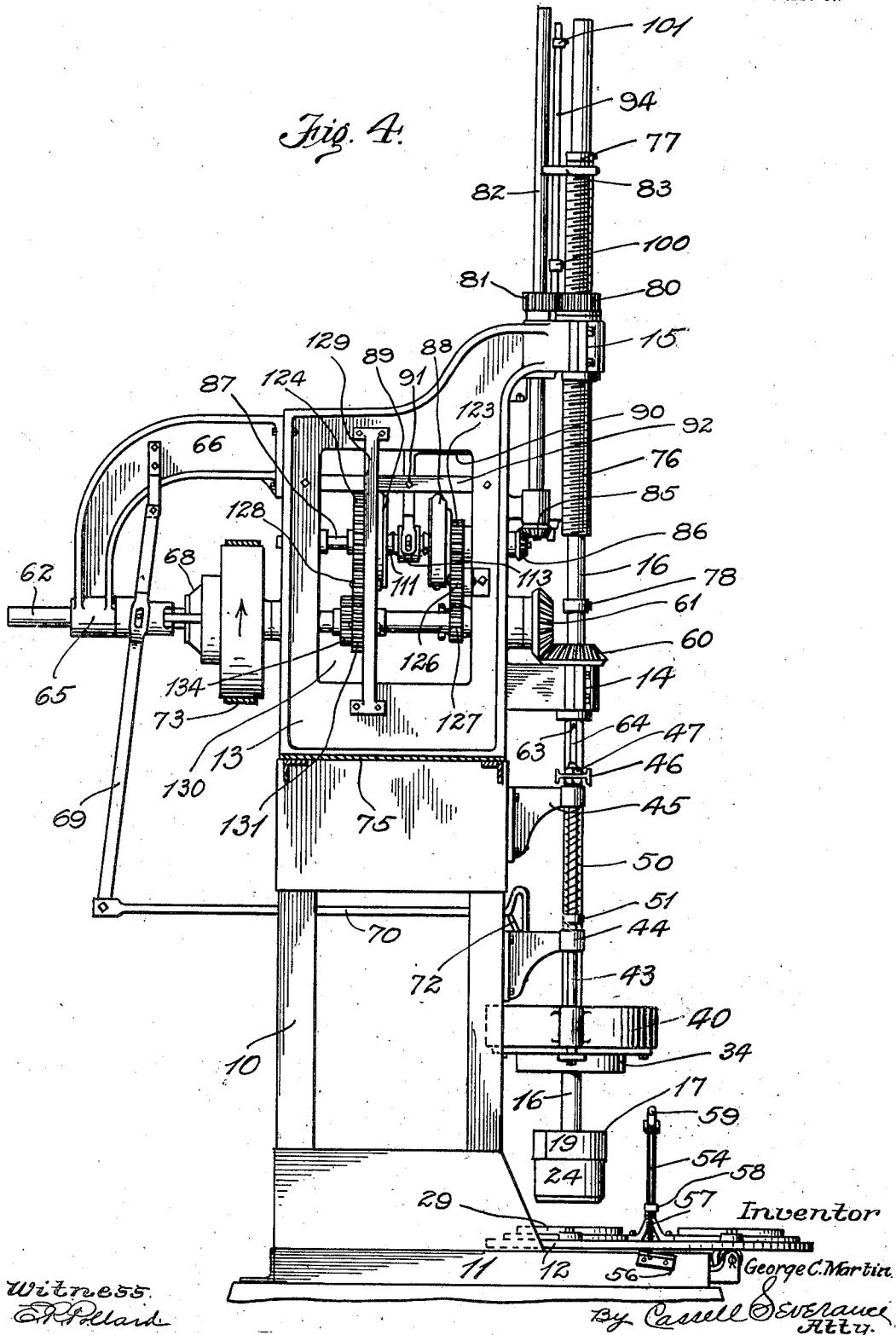
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4 SHEETS—SHEET 3.

Fig. 4.



Witness
E. P. Leland

By Cassell Severance
Att'y.

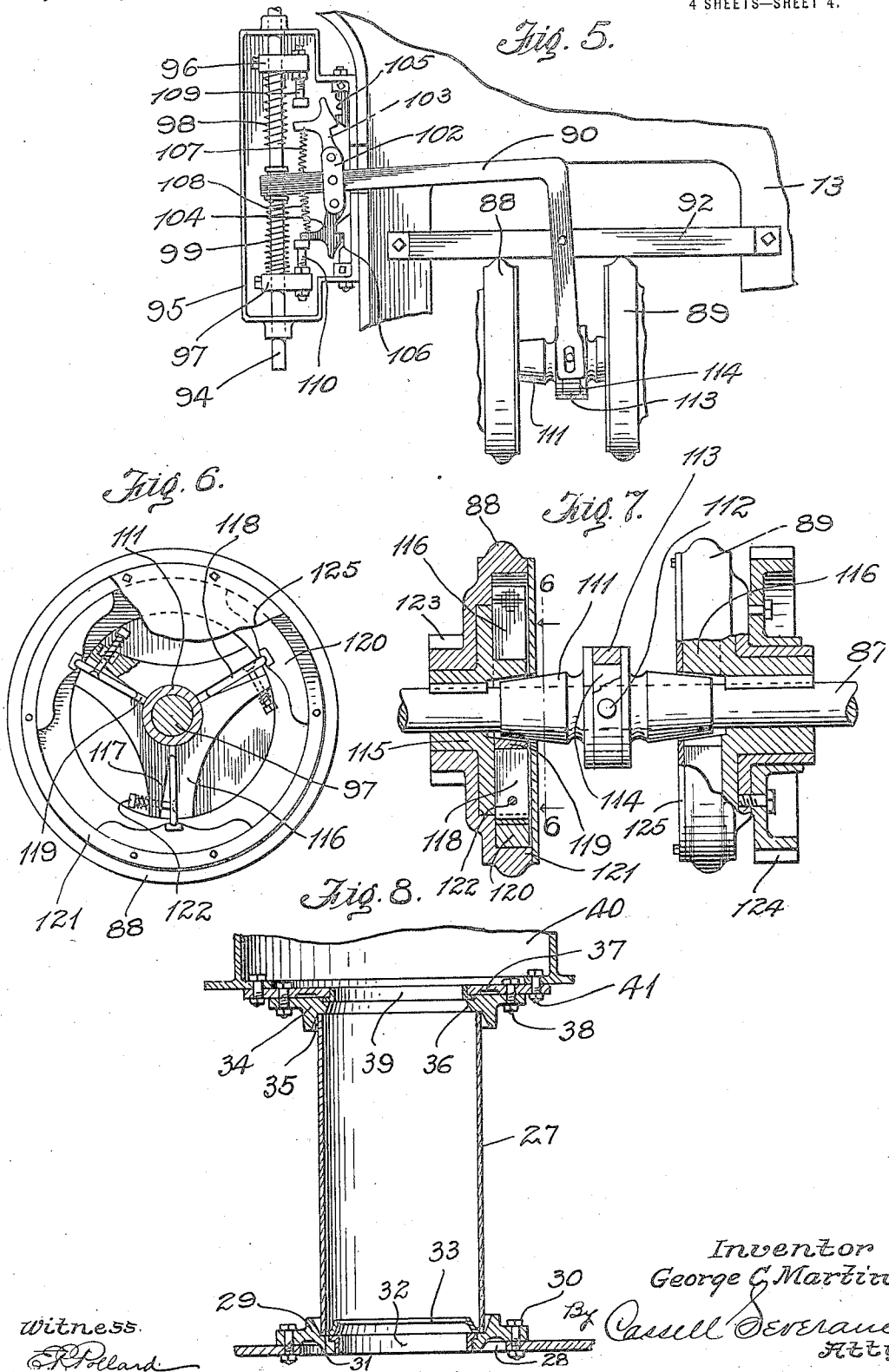
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4 SHEETS—SHEET 4.



Witness.
E. R. Pollard

Inventor
George C. Martin.

By *Carroll C. Deverance*
Atty.

UNITED STATES PATENT OFFICE.

GEORGE C. MARTIN, OF LOS ANGELES, CALIFORNIA.

CONCRETE-PIPE MACHINE.

Application filed August 5, 1916, Serial No. 113,360. Renewed July 31, 1920. Serial No. 400,525.

To all whom it may concern:

Be it known that I, GEORGE C. MARTIN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvement in Concrete-Pipe Machines, of which the following is a specification.

This invention relates to improvements in pipe machines and particularly to machines that are capable of forming pipe of materials in more or less plastic condition, as for instance cement concrete pipes, and especially such as are adapted for irrigation purposes, though of course the pipe may be employed for many uses for which piping is commonly employed.

An object of the invention is to provide a machine of this character which will more perfectly condense the cementitious pipe-forming material and form a cement pipe of superior strength and uniformity of texture taking advantage of the force of gravity to assist in accomplishing this work.

With this object in view the invention relates to the construction of the troweling head with effective centrifugal impellers to drive the plastic cementitious material forcibly against the surrounding mold, at the same time forming and smoothing the interior of the pipe, meanwhile moving the troweling head upward through the mold and supporting the formed portion of the pipe by a rotating cylindrical portion of the head, so that then it becomes set and smooth as the troweling head moves on up through the molded pipe.

Other objects are rapid, positive, direct and even operation of the troweling head, and simple and positive combination of the parts for reciprocating the troweling head up and down into and out of the mold respectively as the work proceeds.

With these and other objects in view, the invention comprises certain novel constructions, combinations, and arrangements of parts as will be hereinafter more fully described and claimed.

The pipe machine herein disclosed involves a new mechanical movement in the form of reversing mechanism for which I have on the — day of July, 1920, filed an application for patent, Serial Number —. I have also shown herein a novel

clutch for which I have on the — day of July, 1920, filed an application for patent, Serial Number —.

In the accompanying drawings forming a part of this specification:

Fig. 1 is a front elevation of an improved pipe forming machine embodying the features of this invention.

Fig. 2 is a fragmental top plan view of the mold carrying the turn table device employed with this invention, the view being taken upon the line 2—2 of Fig. 1.

Fig. 3 is a side elevation of the machine, looking at the same from the side in which the pipe forming concrete is fed thereto.

Fig. 4 is a side elevation of the said machine, looking at the same from the opposite side thereof from that shown in Fig. 3.

Fig. 5 is a fragmentary detail view of the upper part of the machine showing the trip mechanism employed for producing the alternate movements of the trowelling device vertically through the pipe mold.

Fig. 6 is a view partially in side elevation and partially in section of one of the friction devices or clutch mechanisms employed in controlling the raising and lowering of the trowelling device, the section being taken upon the line 6—6 of Fig. 7.

Fig. 7 is a vertical central sectional view through the two clutch devices employed in reversing the mechanism which operates the feed screw of the machine.

Fig. 8 is a vertical central sectional view through the mold employed in forming a pipe.

In forming certain kinds of pipe, and particularly in forming cement concrete pipe, the said pipe is generally formed by tamping or troweling cement concrete within a suitable mold after which it is permitted to harden sufficiently to allow the pipe to be removed from the mold. In forming a pipe with the mechanism of the present invention, the pipe is produced within an outer mold, by means of a rotating shaper or trowelling head, constructed to act through centrifugal force to drive the concrete against the inside face of the mold and to build the pipe body thereon and then to trowel the concrete to a suitable thickness inside the walls of the mold, the said head being gradually raised through the mold as its rotation is continued for forming and



and others will be substituted therefor in accordance with the change made in the size of the pipe, as will be understood.

At the top of the jacket, an upper ring member or rim 34 is provided having a seat 35 to receive and rest upon the upper end of the said jacket 27. The inner edge of the said rim is beveled at 36 to form the desired inner tapering edge of the pipe referred to as the spigot end. A centering plate or upper ring member 37 rests upon the rim 34 to which the said rim is secured by bolts 38, and the ring member is formed with a central opening in which a bushing 39 is fitted, the said bushing being held in place by the inner edge of the rim member 34 immediately below. Above the ring member 37 and carrying the same is a pan 40, in which the materials to form the pipe are deposited. The pan has a sufficiently large opening in the bottom thereof to permit of the use of different sizes of rings and rims, 37 and 36 respectively, as different sized pipes are to be produced, just as in the case of the rings and members at the bottom of the jacket 27. The ring member 37 is thus removably secured to the pan as by bolts 41. The pan member of the device is provided with outwardly projecting lateral arm portions 42, the outer ends being provided with sockets to receive the lower ends of sustaining rods 43 which support the said pan and the rings and rims fastened thereto. The rods 43 engage bearings in the outer ends of brackets 44 and 45 which project from the front of the machine and of the frame 10. The upper ends of the said rods 43 project through and above the bearings in the brackets 45 a sufficient distance to engage and be fastened to a cross head or pan 46 which is capable of supporting the pan mechanism. The said cross head 46 is usually made of a piece of I-beam, to the ends of the web portion of which the upper ends of the said rods 43 may be secured by nuts 47 which are threaded upon the upper ends of the said rods 43. The central portion of the said cross head 46 has an aperture in the web thereof to permit the passage of the shaft 16. The said cross head 46 normally rests upon the brackets 45, which permits the lowering of the pan 40 so that the rim 34 will engage the upper end of the jacket 27. When the jacket is to be removed from below the pan after the formation of a pipe, the pan with the rim and ring carried thereby, is elevated by means of a collar 48 which is fastened upon the shaft 16 by a suitable set screw 49. The collar will be carried high enough by the said shaft, when the trowelling device and centering head have been raised above the mold or jacket, to engage the cross head 46 and lift the pan together with the rods that carry the same. To insure a firm holding of

the pan in position upon the jacket 27 when the helical trowelling device is lowered again, springs 50 which are placed upon the upper ends of the rods 43 are interposed between the brackets 45 and collars 51 placed upon the said rods 43. After the trowelling device has been carried upwardly in the jacket 27 of the mold and has completed a pipe within the same, the continued upward movement of the shaft 16 will thus lift the pan so that the mold or jacket 27 with the pipe completed therein can be lifted off from the turn table and a new jacket be set in place thereon in readiness for the making of another pipe section. The lowering of the shaft 16 again will permit the pan to rest upon the upper end of the new jacket and permit the formation of the next pipe to begin. As shown in the drawing there are preferably two opening in the turn table 12, so that with the employment of a plurality of jackets, one can be receiving material for the formation of the pipe, while the other is turned outwardly for permitting the removal of a pipe already formed and the return of a jacket to the lower ring, in readiness for the formation of the next pipe. The turn table 12 is mounted upon the base 11 of the machine and is centrally pivoted as indicated in dotted lines at 52. The outer edges of the turn table 12 which is usually of disc formation, rests upon friction rollers 53 which are mounted in brackets secured to the base frame 11. In order to properly center the jackets beneath the trowelling device, a vertically operated latch rod 54 is employed, the lower end thereof being adapted to engage an aperture 55 formed in an angle iron bracket 54 secured to the beam of the base frame 11. There are preferably two apertured brackets 56, one being upon each side of the said base 11, and the brackets are preferably inclined as shown in Fig. 3 of the drawings, so that the lower end of the latch rod is easily guided upwardly thereon, as it approaches the bracket. The latch rod 54 is held in position by being mounted upon a standard 56 which rises from the edge of the turn table 12. A spring 57 fastened at its lower end to the latch rod 54 and having its upper end bearing against the bracket 58 upon the standard 56, normally tends to depress the said latch rod and hold it in engagement with the apertures 55, whereby the turn table is held so as to properly center either of the openings in the turn table beneath the trowelling mechanism. A lever or handle 59 may be secured to the upper end of the latch rod 54 for facilitating the operation.

About midway of the length of the shaft at a point above the base frame 10 is a bevel gear 60 secured upon the shaft 16 and meshing with another bevel gear 61 carried upon the end of a horizontal power shaft 62. The

gear 60 is mounted just above the bracket 14 and is connected with the shaft 16 by means of a spline or feather as at 63 which engages a groove 64 extending longitudinally of the said shaft, so that the shaft can be raised or lowered without interfering with its rotation, by means of the said gear 60. The horizontal or power shaft 62 is journaled in suitable bearings upon the standard 13 which rises from the main frame 10. One end of said shaft projects a considerable distance beyond the said standard and engages an additional bearing 65 formed upon the outer end of a bracket 66 carried by the upper part of the said standard 13. The shaft 62 is provided with a pulley 67 between the standard 13 and the bracket 66 which is loose on said shaft, but is adapted to be connected therewith by any suitable clutch mechanism 68. The clutch mechanism is arranged to be drawn into or out of pulley engaging position by means of a lever 69 which is pivotally supported upon the bracket 66 and which has connected with its lower end a thrust rod 70. The thrust rod 70 is pivoted to the lower end of said lever 69 and extends forwardly therefrom to a point near the front of the machine where it engages a guide 71 upon the frame 10. The front end of the thrust rod is provided with a handle 72 by which it may be operated. The pulley 67 is adapted to receive power from any desired source for operating the machine. Preferably the said pulley is connected by means of a belt 73 with the pulley of an electric motor 74 which is mounted upon a bracket or shelf 75 arranged at one side of the standard 13, upon the upper end of the main frame 10, as will be seen by reference to Fig. 1 of the drawings. The rotation of the trowel carrying shaft 16 is thus provided for and it may be effected through the connection with the motor under the control of the clutch 68, the operator of the machine using the thrust rod 70 to operate the said clutch as may be required.

An important feature of the machine is the means provided for raising and lowering the shaft 16 together with the mechanism carried thereby. It is also an important feature that said feed means for the said shaft 16, is of such a character that the shaft 16 is raised or lowered with a comparatively slow, uniform speed from one end of its movement to the other while the centrifugal impeller revolves at a high speed. Said head may be moved in both directions at the same slow speed if desired, or the shaft may be lowered more quickly than it is raised, but the movement in either direction is uniform from one end of the structure to the other, and on the upward movement the plastic is driven out with great force while the trowelling device is passing up through the pipe being formed with an even slow

rate of speed. The means for raising and lowering the said shaft 16 is a feed screw 76, which is hollow so as to fit upon the shaft 16, but permit the said shaft to move longitudinally therein and also to rotate within the same. The feed screw 76 is caused to raise the shaft 16 by engaging a collar 77 fixed upon the shaft not far from its upper end. The descent of the shaft 16 is arrested at a proper height by another collar 78 which is also fixed to the said shaft 16 above the gear 60. The shaft 16 will descend with the screw 76 until the said collar 78 reaches the hub of the gear 60, when its descent will be stopped. The feed screw will be able to descend somewhat lower by reason of the space left between the said collar 78 and the lower end of said screw. By this arrangement a number of revolutions of the trowelling device can be had at the bottom of the mold jacket 27 for forcing the cement concrete, of which the pipe is formed into the space around the lower ring 33 of the molding device. As soon as the said screw 76 in its upward movement reaches the collar 77 it will begin to elevate the shaft 16 and will carry the same with a gradual uniform movement to the full height to which the said feed screw is raised, and until the trowelling device has passed upwardly above the pipe mold.

The feed screw 76 is exteriorly threaded as shown in the drawings, and engages interior threads formed upon a hollow gear or spur wheel 80. The said gear wheel 80 has a bearing upon the upper end of the upper bracket 15 at the top of the standard 13. It meshes with and is driven by another gear or spur wheel 81 which is secured upon a shaft 82 which is journaled at the rear of said screw 76 to the upper end of the standard 13. Rotation of the shaft 82 will turn the gear 81 so as to rotate the gear 80 and move the screw 76 up and down.

In order to prevent the screw 76 from rotating upon the shaft 16, when the gear 80 is turned, a piece 83 is secured to the upper end of the screw 76, as by a set screw 84 so as to hold the screw against rotation, and one end of the said piece 83 is bifurcated so as to fit around the upper end of the shaft 82, which shaft is carried to a height a little greater than the piece 83 travels, so that the said guide piece 83 will engage the same to the full height to which the said screw 76 is moved, preventing said screw from turning. The rotation of the gear 80 will thus be effective upon the threads of the screw for raising and lowering the same.

The lower end of the shaft 82 is provided with a bevel gear 85 which meshes with a bevel gear 86 fastened to a shaft 87 which is arranged counter to the power shaft 62. The said shaft 87 has suitable bearings in the standard 13 and is adapted to be altered

nately rotated in one direction and then the other, by means of trains of gears which connect it with the shaft 62, such alternate operation being secured by the use of friction clutch mechanisms 88 and 89 which are adapted to alternately connect the said trains of gears with the said shaft 87. The clutch mechanisms are thrown into operation by a lever 90 which is pivoted at 91 to a cross bar 92 on the standard 13. The forward end of the lever 90 engages a sleeve 93 which moves up and down on a trip shaft 94 having bearings in a frame 95 secured upon the front of the standard 13. The said trip shaft carries trip blocks 96 and 97 between which and the sleeve 93 are helical springs 98 and 99 which surround the said trip shaft 94. The said springs are only compressed in moving the lever 90 back and forth. The trip shaft is adapted to be lowered when the piece 83 descends low enough to engage a collar 100 mounted on said trip shaft and said shaft is adapted to be raised when the piece 83 is raised high enough to engage a collar 101.

The forward free end of the lever 90 carries a double latch mechanism made up of a yoke 102 which is secured to the lever 90 and projects a sufficient distance above and below the same to pivotally carry latches 103 and 104. The said latches are adapted to engage keepers 105 and 106 alternately for holding the said lever in the extremes of its position. The latches are pressed toward the said keepers normally by springs 107 and 108 which bear against the outer end of the said lever 90 and extend to heel portions formed upon the latches. The trip blocks 96 and 97 have adjustable bolts 109 and 110 projecting inwardly therefrom and adapted to alternately strike the heels of the said latches, whereby they will be moved against their springs for disconnecting the latches from the keepers. The structure is such that when the trip rod 94 is moved downwardly by the feed screw 76, the upper latch will be struck by the bolt 109 and released from its keeper, permitting the lever 90 to drop. The spring 98 will have been compressed before the release of the latch against the sleeve 93 so that when the latch 103 is raised the spring 98 will throw the lever 90 downwardly with a positive action. The lower latch 104 will then engage the keeper 106 and hold the said lever downwardly. As the trip rod 94 is carried upwardly by the feed screw, the spring 99 will come in contact with the said sleeve 93 and as soon as the lower latch is released by the bolt 110, the said spring will throw the lever upwardly again. This movement of the lever 90 will be communicated to a double conical wedge device or member 111, which extends into the adjacent clutch devices 88 and 89. The lower end of the said lever 90 is slotted and engages a pin 112 carried by a sleeve 113 which is loosely mounted in a groove 114 in the central part of said conical wedge device, so that the lever is adapted to move the said wedge device back and forth. The friction or clutch mechanisms are preferably provided with a central unit or hub member 115 in each case, which is keyed to the shaft 87. The hub member of each clutch mechanism is provided with a plurality of outwardly extending arms 116, each of which is formed with a tapering recess 117. Toggle members 118 are mounted in said recesses 117, on wedge shaped seats 119, the inner edges of which conform to the conical wedge that is thrust against them. The toggle device 118 is capable of moving at its outer end to the extent permitted by the flaring recess 117. The outer ends of the said toggle members bear against friction shoes 120 which move upon the inner periphery of an outer ring member 121. The said shoes 120 are preferably made so as to not quite conform to the circular periphery of the said ring member and the straightening of the toggles is accomplished so that they will force the center of the said shoes tightly against said ring member. The outer members of the toggle devices are held in releasing position by the action of the springs upon the bolts 122. The outer ring portions of the clutches are constantly driven by the gears 123 and 124 which are fastened to the hubs thereof and are in mesh with gears which are being constantly rotated by the power shaft 62, when the machine is in operation. When one of the wedge cones as for instance the cone 111 is forced into the middle of the central unit 115, it pushes outwardly the wedge shaped members 119 of the toggle devices and tends to push the friction shoes 120 against the periphery of the outer ring 121. The shoes will then be caused to move with the ring 121 and straighten the toggles against the action of the springs on the bolts 122. When the said toggles are in the position shown in Fig. 6, they will force the central portions of the shoes outwardly so as to cause them to take firm hold upon the said rings 121 and move therewith. When either conical wedge 111 is withdrawn from the center of its clutch mechanism by the movement of the lever 90, it will release the inner wedge shaped toggle pieces 119 and permit the toggle to tilt over or sway within the recesses 117 and release the shoe 120 from the rings 121. When the conical wedge 111 is forced by the lever 90 into its clutch mechanism, the gear which is turning said mechanism will be caused to transmit its motion to the shaft 87. The two conical wedges are so related that only one can be operating its clutch at a time, the other one having been

at the same time caused to release its clutch device. The use of the shoes 120 bearing upon the inner frictional surfaces of the ring members forms a very effective clutch device, and yet one that is quickly and easily operated and it will instantly take up its work upon the shifting of the cones. A face plate as 125 may be arranged upon the inner faces of each clutch device so that the parts may be made to run in oil or grease if desired, and will be entirely protected from dust, grit or other like materials.

The trains of gearing interposed between the power shaft 62 and the counter shaft 87, may be made up of any desired number of gears, but they are always arranged with different numbers in each train, whereby the shaft 87 will be driven in one direction by one train of gears and in the opposite direction by the other train of gears. As shown in the drawings, in the train of gears which includes the gear 123, one intermediate gear as 126 meshes with the gear 123 of the clutch and connects the same with a gear 127 which is rigidly secured upon the power counter shaft 62. The said shaft 87 is thus given a movement in an opposite direction to the movement of the power shaft 62. The gear 124 which is secured to the other clutch device 89, meshes with an intermediate gear 128 which is pivotally mounted upon a brace arm 129. The said arm 129 projects outwardly to one side of the standard 13 and bridges an opening 130 which is occupied by the trains of gearing and the clutch devices heretofore described. The intermediate gear 128 meshes with a second intermediate gear 131 which in turn meshes with a gear 132 carried upon a power shaft 62. This train of gears therefore drives the shaft 87 so as to rotate in the same direction as the shaft 62. Gears of other sizes as 133 and 134 are also preferably provided on each side of the gear 132, so that the intermediate gears employed may be made of different sizes to alter the speed with which the counter shaft is driven. Various combinations of gears may thus be had, though usually the gears are so related that the downward movement of the feed screw 76 is more rapid than the upward movement, whereby the return movement of the trowelling device to the bottom of an empty mold will be made more rapidly than the upward trowelling movement of the trowelling device as it gradually forms a pipe within the mold.

In operating the machine, any suitable means is employed for delivering the concrete mixture to the pipe forming molding and trowelling mechanism. As shown in the drawings, an endless conveyor 135 is employed which travels over suitable drums at the top and bottom mounted upon shafts 136 and 137 in any usual or ordinary way.

The elevating buckets 138 are carried by the conveyor belt and at the bottom, pass through a material receiving bin 139, scooping up the mixture of sand, gravel and cement, or whatever the pipe is to be formed of, and carrying the same upwardly to the upper end of the conveyor. As the buckets pass around the upper end of said conveyor, they dump their contents into a hopper 140, from the lower end of which the said materials are delivered into the pan 40 through a chute 141. The elevator is provided upon its upper shaft 136 with a sprocket wheel 142 which is connected by a sprocket chain 143 with a sprocket 144 mounted upon the shaft 62 adjacent to the gear wheel 127. Power is thus obtained from the power shaft 62 for operating the elevator. The materials for forming the pipe may be mixed in any desired way and placed in the bin 139. In the operation of the machine the electric motor is set in motion. The operator then grasps the handle 72 of the rod 70 and throws the clutch mechanism 68 into connected position, whereby the pulley 67 which is driven by the motor will communicate movement to the power shaft 62. The movement of the shaft continually rotates the trowelling shaft 16 through the gears 60 and 61. The straight tangential impelling faces 19 of the shoe are arranged at an angle determined as the hypotenuse of an angle between two equal radii at right angles to each other having the axis of the shaft as the center. Said faces being arranged at this angle of about 45° acts upon the plastic concrete directly to impel it outward with great force as the shaft 16 rapidly revolves on its up-stroke. Through the trains of gears interposed between the shaft 22 and the shaft 87, the said shaft will be constantly driven, first in one direction and then in the other, whereby through the inter-connecting mechanism heretofore described, the screw 76 will be constantly fed upwardly and then downwardly with an even rate of speed from end to end. At the termination of the upward movement the revolving head is entirely withdrawn, so that the mold 27 and the molded pipe therein can be removed and another mold 27 brought into position to receive the head on its next downward movement. Usually the downward movement is at a more rapid rate than the upward movement to facilitate the return of the trowelling mechanism. The latch mechanisms 103 and 104 automatically trip the lever 90 so that the clutches are thrown back and forth for changing the direction of the said feed screw 76. The turn table is moved from side to side for placing empty molds in position and removing those within which pipes have been formed, the whole structure being thus well adapted for a continuous operation. The peculiar formation of the

clutches with their friction shoes and toggle devices are particularly well adapted for permitting of the automatic change in the driving of the feed screw 76 for raising or lowering it. It will be evident that many of the minor details of construction may be altered and that mechanical equivalents may be substituted for some of the parts without departing in the least from the spirit of the present invention.

It is thus seen that I have provided for lost motion through the medium of the reciprocating hollow screw 76 of a determined length operated by the rotating nut or interiorly-threaded spur 80 surrounding the shaft 16 and reciprocating the same vertically with lost motion before the start upward through contact with the collars 77 and 78 that are spaced apart a distance greater than the length of said reciprocating screw 76. I have made provisions whereby the trowelling head may be rotated for a period at the bottom of the mold, while the screw descends and ascends free from the collars. This allows a latitude with regard to the feeding operation, which is suspended until the head has been brought to the lowered position. The head is thus allowed to rotate at such lowered position for a period of time long enough to insure that a proper accumulation of the plastic material may have occurred at the bottom of the mold, and will have been compacted by both the centrifugal action of the tangential faces 19 and the impact of the curved ends 22 of the shoe before the head starts up.

What is claimed is:—

1. A machine for forming pipes out of cementitious material, comprising a mould, a troweling device, a shaft moving longitudinally for carrying said troweling device through the mould, and means for rotating said shaft continuously, in combination with lost motion means for reciprocating said shaft longitudinally at low and high speeds respectively.

2. In a cement pipe machine the combination with a mould, a vertical shaft, a pipe shaping head on the shaft, and means for rotating the shaft and head; of a hollow feed screw on said shaft for moving the shaft longitudinally, and mechanism for rotating said feed screw in one direction and then in the other for reciprocating said shaft into and from the mould.

3. A cement pipe machine comprising a rotary trowelling head, a shaft for rotating the same, an actuating shaft adapted to rotate said trowel carrying shaft continuously, a counter shaft parallel to said actuating shaft, gearing for imparting movement to said counter shaft in one direction, gearing for imparting movement to said counter shaft in the other direction, clutches for controlling the direction in which said counter

shaft shall be rotated through said trains of gearing, and means operated by the said counter shaft for reciprocating the trowel carrying shaft.

4. In a pipe forming machine, a trowelling device, lost motion means for moving the trowelling device up and down, and a clutch mechanism for reversing the same.

5. A pipe machine having a reciprocating troweller, means for rotating the same, means for moving the troweller in one direction at a uniform rate of speed for trowelling a pipe, and means also capable of moving the said troweller in the other direction, comprising lost motion means to allow the head to remain at the low level for a period to begin the trowelling of another pipe.

6. A pipe trowelling device having a troweller head, means for rotating the same, a gear mechanism for reciprocating the said head, a hollow screw and a shaft surrounded by said screw and operating thereon with lost motion and means for reversing the gearing to produce said reciprocation.

7. A pipe making machine having a mold-jacket, a shaft carrying a pipe shaper adapted to form a pipe within said jacket, a hollow feed screw on said shaft operating with lost motion to act reversely on the shaft and adapted to raise and lower it for driving said screw back and forth and clutches for automatically reversing the same.

8. A pipe making machine comprising a rotating shaper, a shaft carrying the same, a feed screw for raising and lowering the shafting without interfering with its rotation, means on the shaft for engaging said feed screw, whereby the shaft will be raised and lowered with a uniform rate of speed, gearing for raising and lowering the said screw without turning the same, a shaft for driving said gearing, a second shaft for operating said latter shaft, clutch devices for alternately turning said latter shaft in one direction and then the other, a trip mechanism for alternately tightening said clutch mechanisms, gearing for driving the clutch mechanisms in opposite directions, a power shaft for driving said gearing, the said shaft also being capable of rotating the shaper shaft.

9. In a cement pipe machine, the combination with a mold, a vertical shaft, a pipe shaping head on said shaft, and means for rotating the shaft and head; of a tubular feed screw slidably mounted on said shaft; limiting means on said shaft spaced apart so as to permit a certain amount of sliding movement of the feed screw on said shaft; means for rotating said feed screw in one direction and then in the other, for moving said head into and out of the mold; and means limiting the downward movement of said shaft.

10. In a cement pipe machine, a shaft

adapted to move longitudinally; means for limiting the longitudinal movement of the shaft; a pipe shaping head on the shaft; means for rotating the shaft and head; a tubular externally screw threaded member slidably mounted on said shaft; collars on the shaft above and below said tubular member for limiting the sliding movement of said tubular member relative to said shaft, said collars being spaced apart a distance greater than the length of said tubular member; thereby allowing the tubular member to slide a predetermined distance on said shaft after the shaft has reached the lower limit of its longitudinal movement; and means for reversing the movement of said shaft.

11. In a cement pipe machine, a shaft

mounted for longitudinal movement, a pipe shaping head on said shaft, means for limiting said longitudinal movement, means for rotating the shaft, a feed screw associated with the shaft and adapted to have longitudinal movement relative to said shaft and to impart longitudinal movement to said shaft; and means on said shaft for limiting the longitudinal movement of the feed screw relative to the shaft.

In testimony whereof, I have hereunto set my hand, in presence of two witnesses.

GEO. C. MARTIN.

Witnesses:

CASSELL SEVERANCE,
EARLE R. POLLARD.