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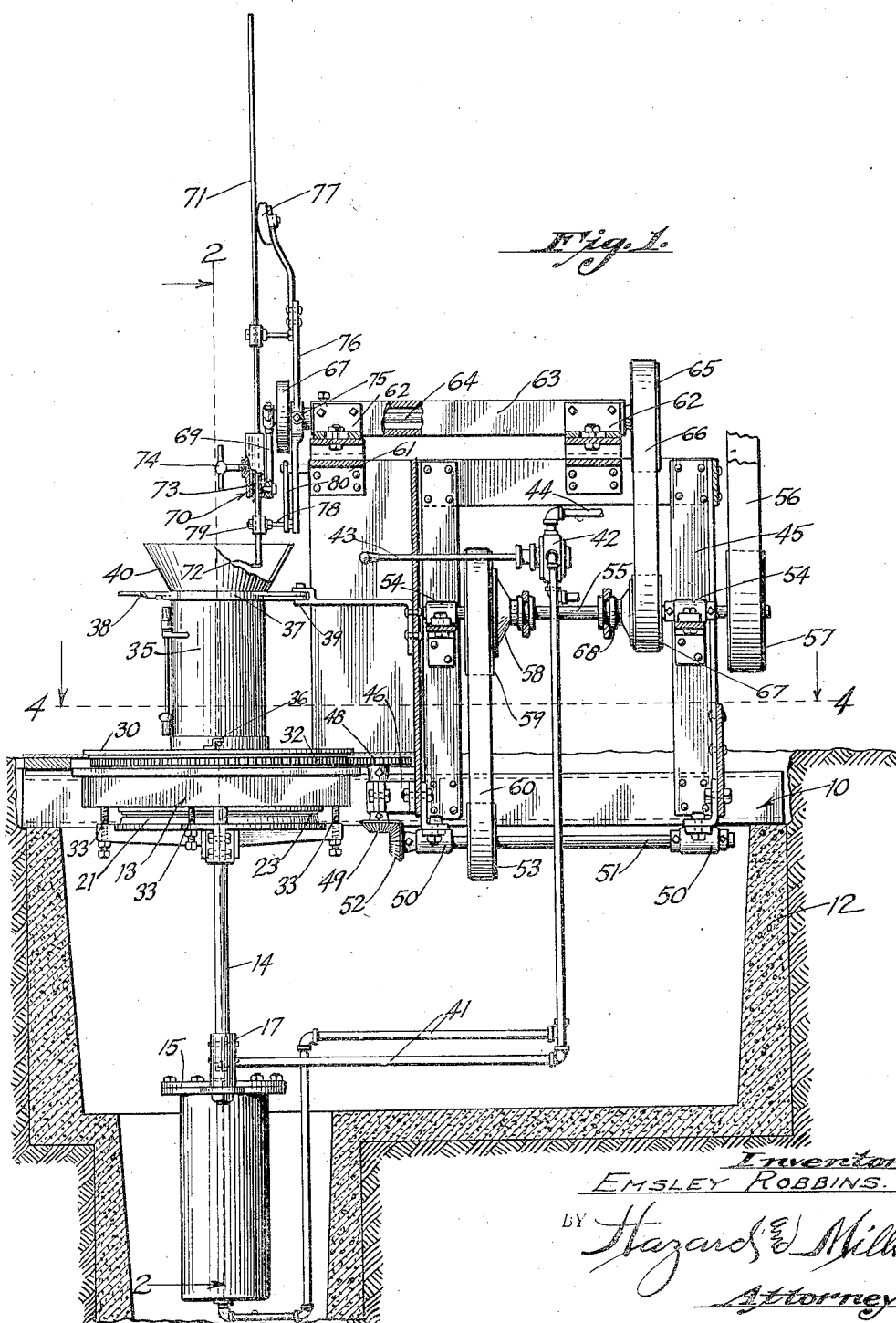
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E. ROBBINS

CONCRETE PIPE MACHINE

Filed Nov. 9, 1921

3 Sheets--Sheet 1



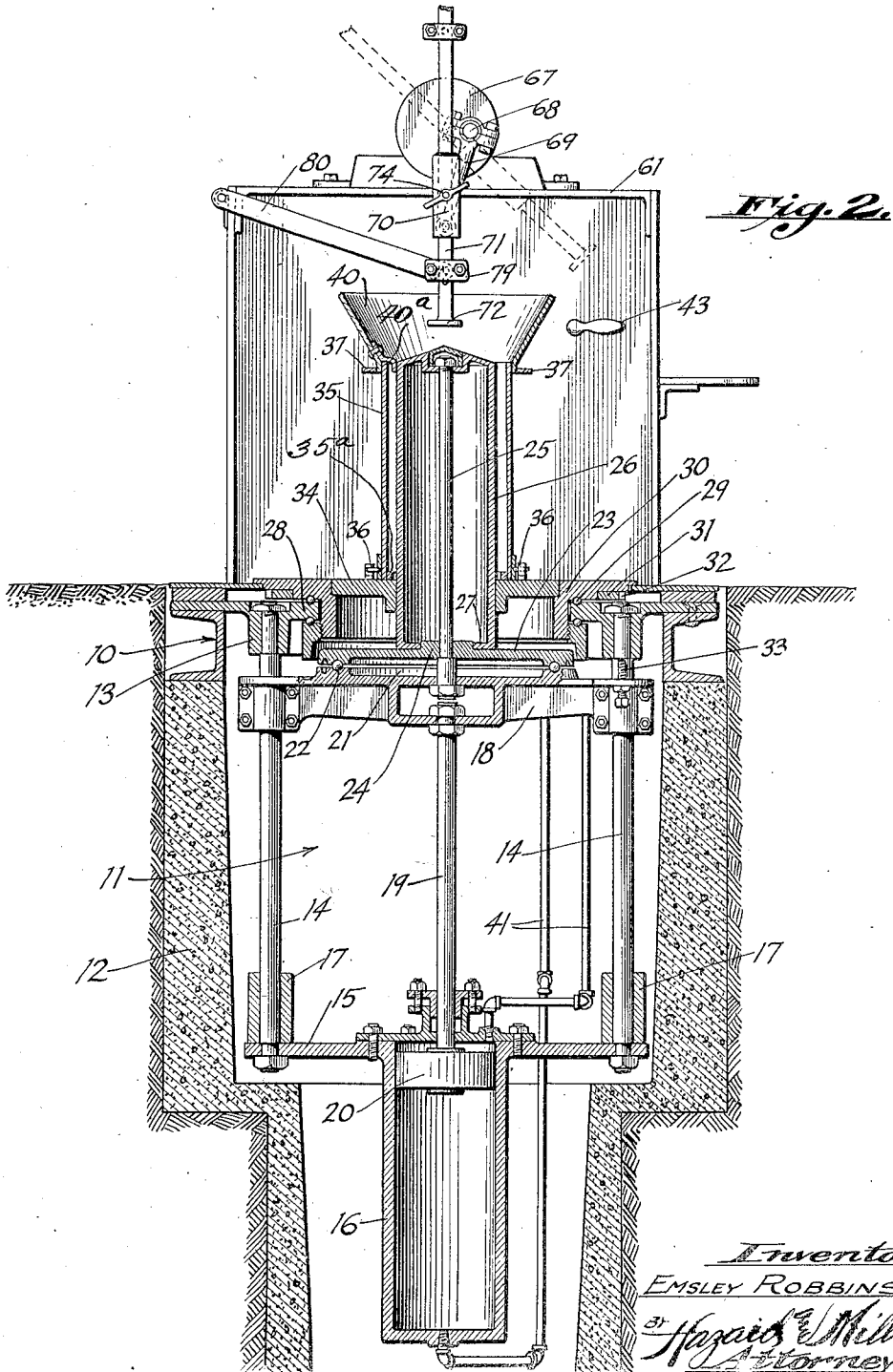
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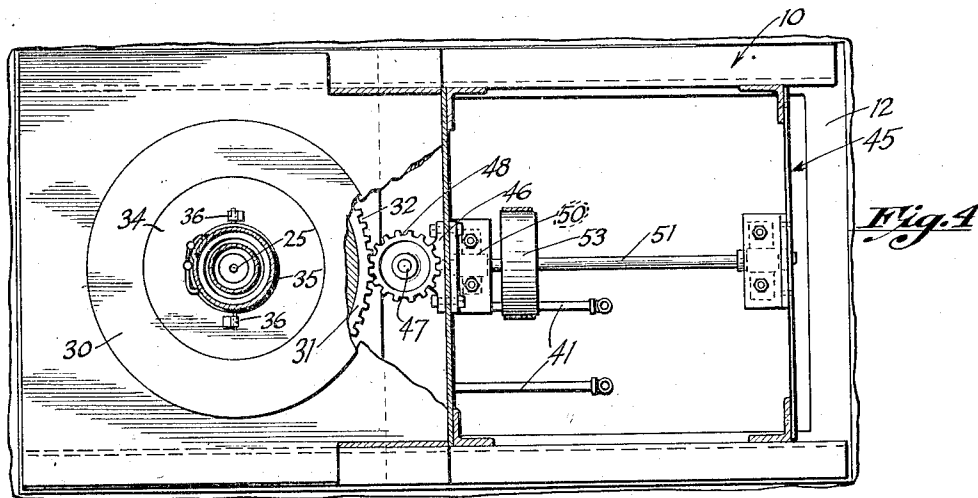
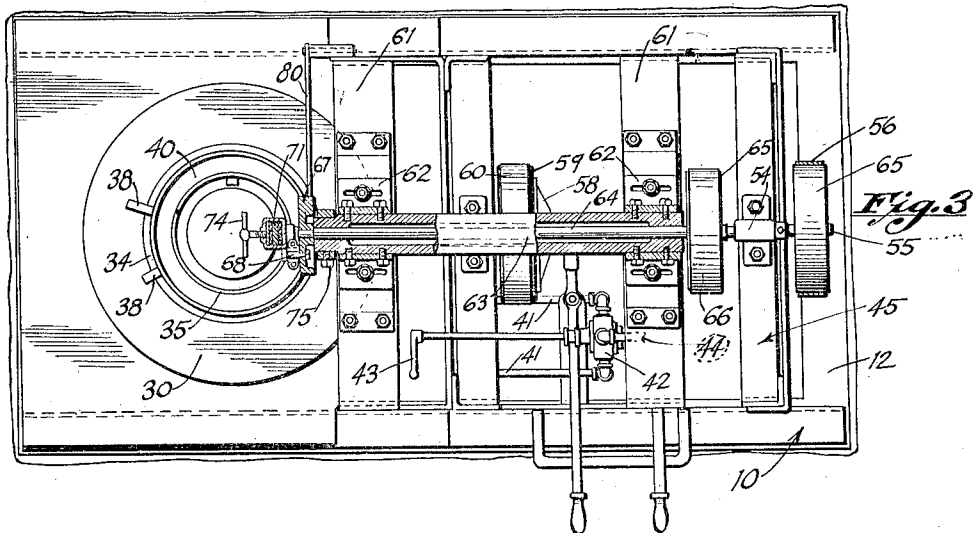
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

EMSLEY ROBBINS, OF UPLAND, CALIFORNIA.

CONCRETE-PIPE MACHINE.

Application filed November 9, 1921. Serial No. 513,919.

To all whom it may concern:

Be it known that I, EMSLEY ROBBINS, a citizen of the United States, residing at Upland, in the county of San Bernardino and State of California, have invented new and useful Improvements in Concrete-Pipe Machines, of which the following is a specification.

My invention relates to a machine for making pipe or conduit sections from concrete or like cementitious material, the principal objects of my invention being to generally improve upon and simplify the construction of the existing types of concrete pipe forming machines, to provide a machine that will very rapidly and effectively perform the operations incident to the production of concrete pipe and the like, to provide a machine having interchangeable forms, thereby making it possible to produce on the same machine, pipe sections of different diameters, and further to provide a concrete pipe forming machine having a wide range of adjustment, thereby making it possible to secure accuracy and uniformity of product.

Further objects of my invention are to provide in a machine of the character referred to, improved means for tamping the cementitious material that is delivered into the mold cavity, to arrange the tamping member so that it will automatically move upward as the cementitious material fills the mold cavity and further to mount the tamping means so that it may be shifted into an "out of the way" position while the finished pipe section in its enclosing form is being removed from the machine.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevational view of a concrete pipe forming machine of my improved construction, with parts thereof broken away and in section.

Fig. 2 is an enlarged vertical section taken approximately on the line 2—2 of Fig. 1.

Fig. 3 is a plan view of the machine with parts thereof in horizontal section.

Fig. 4 is a horizontal section taken approximately on the line 4—4 of Fig. 1.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a substantially rectangular frame that is arranged just beneath the surface of the ground, within a pit 11, and which latter is provided with a lining, or wall 12, preferably of concrete and upon which the frame 10 is mounted.

Supported by frame 10, above the forward portion of the pit 11, is a ring 13, preferably of cast metal and secured thereto at diametrically opposite points, are the upper ends of a pair of depending rods 14, the lower ends of which support a transversely disposed plate 15, from the center of which depends a fluid pressure cylinder 16.

Arranged on the lower portions of rods 14 are blocks 17 of rubber that perform the functions of cushions for the ends of a cross bar 18, and which ends are arranged for sliding movement on the rods 14.

Secured to the center of the cross bar 18, and depending therefrom, is a piston rod 19, the lower end of which is positioned within cylinder 16 and carries a piston 20.

Formed on top of cross bar 18, is a ring 21, in the top of which is formed a ball race that is occupied by a number of balls 22, and bearing thereupon is a disc-like plate 23.

Formed on top of center of disc 23, is a boss 24, and extending through an aperture formed in the center of said boss, is a rod 25, the lower end of which is secured to cross bar 18.

Rod 25 extends upwardly from plate 23, and its upper end is detachably secured to the upper end of a hollow cylindrical core 26, the lower end of the core being provided with an inturned flange 27, the inner edge of which bears against the edge of boss 24.

Each of my improved pipe forming machines is provided with a series of cylindrical cores 26, of different diameters, thereby making it possible to form pipe sections of different diameters.

Projecting inwardly from ring 13 is a flange 28, and supported by anti-friction bearings 29, preferably of the ball type that are arranged on said flange, is a horizontally disposed ring plate 30, the upper surface

of which occupies a plane slightly above the plane occupied by the ground in which pit 11 is formed.

Secured to the under side of ring plate 30, adjacent to its edge, is a ring 31, provided on its outer edge with a continuous row of gear teeth 32.

Seated in the ends of cross bar 18, are vertically disposed screws 33, the upper ends of which are adapted to bear against the under side of ring 28, thereby providing adjustable stops to limit the upward movement of said cross bar and the parts carried thereby.

Removably arranged within ring plate 30, is a smaller ring plate 34, that encircles the lower portion of cylindrical core 26, and each machine is provided with a number of ring plates 34, corresponding to the number of cores 26, and which ring plates are adapted to receive the various sized cores in order to permit different sized pipe sections to be produced.

The lower end of a shell, or enclosing cylinder 35, is removably positioned on ring plate 34, and is retained thereupon by suitable externally arranged latching devices 36, the wall of said shell being concentrically arranged relative to core 26.

Arranged adjacent to the upper end of cylinder 35, is a pair of semi-circular arms 37, provided on their forward ends with handles 38 and their rear ends being hinged to a suitable support 39.

Secured to the arms 37, are the mating parts or walls of a hopper 40, into which the pipe forming material in plastic form is adapted to be delivered. A lip 40^a is secured to the lower portion of the hopper 40 and extends over the end of the shell 35 against the upper end of the core 26, the downwardly extending end of the lip being substantially half the thickness of the casting to be made so as to make an outside rabbet. At the lower end of the casting space between the core 26 and shell 35 is a ring 35^a which fits against the inner face of the shell 35 and is substantially half the thickness of the casting space, so as to make an inside rabbet at the opposite end of the casting from the outside rabbet.

The parts just described and the core 26, are constructed so that the upper end of said core, when elevated, occupies approximately the same horizontal plane with the upper edge of the shell 35.

Connected to the upper and lower ends of cylinder 16, are fluid pressure carrying pipes 41, that lead to a three-way valve 42, which latter is provided with a suitably located operating handle 43, and leading to said three-way valve from a suitable source of compressed fluid supply, is a pipe 44.

Supported by frame 10, and disposed above the rear portion of pit 11, is a frame

work 45, and journaled in a bearing 46, that is located on the lower portion of said frame work 45; is a vertically disposed shaft 47, carrying on its upper end, a pinion 48, that meshes with the teeth 32, of ring 31, and the lower end of said shaft 47, carries a beveled pinion 49.

Arranged for rotation in suitable bearings 50, on the under side of the frame work 45, is a horizontally disposed shaft 51, carrying on its forward end a beveled pinion 52, that meshes with pinion 49, and secured on said shaft 50, is a belt wheel 53.

Journaled in suitably located bearings 54, in the upper portion of frame work 45, is a horizontally disposed driving shaft 55, that may be driven from a suitable source of power in any desired manner, preferably by means of a belt 56, that operates on a belt wheel 57.

Loosely arranged on shaft 55, and adapted to be connected thereto by means of a manually operable clutch 58, is a belt wheel 59, and operating thereupon and on belt wheel 53, is a belt 60.

The parts just described provide means for importing rotary motion to the ring plate 30, and parts carried thereby.

The upper portion of frame 45 includes a pair of transversely disposed rails 61, upon the central portions of which are arranged adjustable bearings 62, for a longitudinally disposed frame 63, and journaled in bearings in the ends of said frame, is a shaft 64. The rear end of this shaft carries a belt wheel 65, around which passes a belt 66, and said belt also passes around a belt wheel 67, that is loosely arranged on shaft 55.

Belt wheel 67 is adapted to be locked to shaft 55 by means of a manually operable clutch 68.

Fixed on the forward end of the shaft 64, is a disc 67, from which projects an eccentrically arranged wrist pin 68, and journaled on said wrist pin, is the upper end of a link 69. The lower end of link 69 is pivotally connected to the lower rear portion of a vertically disposed housing 70, through which passes a vertically disposed tamping rod 71, the lower end of which carries a short arcuate finger 72.

Arranged within housing 70, and bearing against the front face of tamping rod 71, is a friction plate 73, of leather, fibre or analogous material and which may be forced inwardly against the tamping rod by means of the set screw 74 that is located in the front wall of the box.

Arranged for swinging movement upon the forward end of the tubular frame 63, and adapted to be locked thereto by a set screw 75, is a vertically disposed arm 76, the upper end of which carries a friction pad 77, against which the upper portion of the tamping rod 71 bears while in operation.

The lower portion of arm 76, carries a forwardly projecting rod 78, and secured to the forward end thereof, is a bearing 79 for the lower portion of tamping rod. In order to firmly support the bearing 79, an arm 80, is pivotally mounted at its outer end to a part of frame 45, and the inner end of said arm being provided with a hook that is adapted to engage over rod 78 when the arm 76 occupies a vertical position.

When the hook on the lower end of arm 80 is disengaged from arm 78, and the set screw 75 is released, the arm 76 and parts carried thereby, may be swung into an inclined position as illustrated by dotted lines in Fig. 2, thereby permitting the cylinder 35 and parts carried thereby to be removed from the ring plate 34.

Frame 63 is mounted for longitudinal adjustment in order that the tamping means may be shifted toward or away from the front of frame 45, so that the lower portion of the tamping rod 71 will enter the annular chamber within the mold of the machine.

The operation of my improved pipe forming machine is as follows:

With the parts of the machine occupying the positions as illustrated in Figs. 1 and 2, and with driving shaft 55 being rotated by the application of suitable power, the plastic material from which the pipe sections are formed, is delivered into the hopper 40, and said material passes downwardly into the annular space between the core 26 and the wall of shell 35.

At the beginning of the plastic material feeding operations, the operator of the machine manipulates clutch 58 to lock belt wheel 59 to shaft 55, and as a result, rotary motion is imparted to shaft 51, and through the driving connections 52, 49, 47 and 48, ring plate 30 and parts carried thereby will be rotated so that as the plastic material is fed into the annular mold cavity, said material will be carried around the relatively stationary core 26 until enough material has been delivered into the mold to create sufficient friction to rotate the core 26 with the adjacent rotating parts.

To operate the tamping means, the operator actuates the clutch 68 to lock belt wheel 67 to the shaft 55, and through belt 66 and belt wheel 65, rotary motion will be imparted to shaft 64 and parts carried thereby.

As the disc 67 is rotated, link 69 will impart vertical reciprocatory movement to the tamping rod 71, with the result that the finger 72 on the lower end of said rod will engage and tamp the plastic material as it fills up the annular space in the mold, and as the height of said plastic material increases in said annular space, the tamping rod 72 will be automatically moved upward through its bearings and in so doing, it must necessarily overcome the resistance offered by

friction member 73, and the pressure of which latter it will be understood may be adjusted by set screw 74.

During the vertical movement of tamping rod 71, the lower portion thereof operates through bearing 79, and the upper end bears against pad 77, and thus said rod is firmly supported during its vertical movements.

When the plastic material completely fills the annular chamber between the core 26 and cylinder 35, and before the parts cease rotating the upper inner edge of the plastic material is engaged by the downwardly pending portion of a lip or flange 40^a that is secured to the lower portion of hopper 40 and as the cylinder of material continues to rotate, a rabbet or annular groove is formed in the inner face of the upper end of the tubular body of plastic material, and thus the finished pipe or conduit section may be fitted to the end of an adjacent section when the pipe or conduit sections are laid in the ground.

Located on the inner face of the lower portion of cylinder 35 is a ring 35^a that forms in the outer face of the lower end of the pipe or conduit section a rabbet or recess that is adapted to receive the projecting portion on the end of an adjacent pipe or conduit section.

When the annular chamber in the mold has been filled with plastic material, the operator releases the clutches 58 and 68, thereby cutting off the transmission of rotary movement from the driving shaft 55 to the shafts 51 and 64.

The operator now disengages the hook on the lower end of arm 80 from rod 78, then unscrews set screw 75, thereby permitting arm 76 to be swung into an inclined position as illustrated by dotted lines in Fig. 2. Thus, the parts of the tamping device are shifted into an "out of the way" position after which the handles 38 are engaged and swung outwardly from each other, thereby separating the parts of the hopper 40.

The operator now manipulates three-way valve 42, so as to admit fluid pressure from supply pipe 44 into the pipe 41 leading to the top of cylinder 16, and such action moves the piston 20 and parts connected thereto downward, with the result that core 26 is drawn downward from its position within the pipe section formed in the mold, and when the upper end of the core reaches its lower limit of movement, the latching devices 36 are released, thereby permitting the shell 35, with the pipe section therein, to be removed to a suitable drying chamber.

Another cylinder 35 is now positioned on ring plate 34 and core 26 is elevated by admitting fluid pressure to the bottom of cylinder 16, which action necessarily moves piston 20 upwardly within said cylinder and after properly placing the parts of the hop-

per 40 around the upper end of the cylinder 35, and shifting the parts of the tamping device back to normal position, the machine is ready for the succeeding pipe forming operations.

As hereinbefore stated, each machine is equipped with a number of different size cores 26, and shells 35, so that with each machine it is possible to produce pipe sections of different diameters. Obviously, each set of forms which include the core 26 and shell 35 must be provided with a proper ring plate 34 and with a corresponding hopper 40.

A concrete pipe forming machine of my improved construction is comparatively simple, is under ready control of a single operator, and very rapidly performs the operations necessary to produce cementitious pipe of tube sections.

It will be readily understood that minor changes in the form and construction of the various parts of my improved pipe forming machine may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a concrete pipe forming machine, a rotatively mounted support, a cylinder removably positioned upon said support, a support arranged for movements beneath the first mentioned support, a core removably positioned on the lower support and extending upwardly through the upper support and through the cylinder positioned thereon, a lip rigidly mounted at the upper end of the cylinder and extending downwardly against the outer end of the core to form an outside rabbet, and a ring fitting inside of the lower end of the cylinder to form an inside rabbet.

2. In a concrete pipe forming machine, a rotatively mounted support, a cylinder removably positioned upon said support, a support arranged for movements beneath the first mentioned support, a core removably positioned on the lower support and extending upwardly through the upper support and through the cylinder positioned thereon, means for raising and lowering said core and the support therefor, a lip rigidly mounted at the upper end of the cylinder and extending downwardly against the outer end of the core to form an outside rabbet, and a ring fitting inside of the lower end of the cylinder to form an inside rabbet.

3. In a concrete pipe forming machine, a rotatively mounted support, a cylinder removably positioned upon said support, a support arranged for movements beneath the first mentioned support, a core removably positioned on the lower support and extending upwardly through the upper support and through the cylinder positioned thereon, means for tamping plastic material

that is delivered into the annular chamber between the cylinder and core, a lip rigidly mounted at the upper end of the cylinder and extending downwardly against the outer end of the core to form an outside rabbet, and a ring fitting inside of the lower end of the cylinder to form an inside rabbet.

4. In a concrete pipe forming machine, a rotatively mounted support, a cylinder removably positioned upon said support, a support arranged for movements beneath the first mentioned support, a core removably positioned on the lower support and extending upwardly through the upper support and through the cylinder positioned thereon, means for raising and lowering said core and the support therefor, means for tamping plastic material that is delivered into the annular chamber between the cylinder and core, a lip rigidly mounted at the upper end of the cylinder and extending downwardly against the outer end of the core to form an outside rabbet, and a ring fitting inside of the lower end of the cylinder to form an inside rabbet.

5. In a concrete pipe forming machine, a mold comprising a rotatively mounted cylinder, a core concentrically arranged within said cylinder, said core being mounted to rotate independently of said cylinder, and to move lengthwise therethrough, a stationary hopper adapted to be positioned about the upper end of said cylinder, and a lip projecting from the lower edge of the hopper into the space between said cylinder and core.

6. In a concrete pipe forming machine, a rotatively mounted support, a hollow cylinder removably positioned on said support, a cylindrical core concentrically arranged within said cylinder and adapted to move lengthwise therethrough and to rotate independently thereof, a stationary hopper disposed about the upper end of the annular chamber between said core and cylinder, and a lip projecting from the lower edge of said hopper into said annular chamber.

7. In a concrete pipe forming machine, a rotatively mounted support, a hollow cylinder removably positioned on said support, a cylindrical core concentrically arranged within said cylinder and adapted to move lengthwise therethrough and to rotate independently thereof, a stationary hopper disposed about the upper end of the annular chamber between said core and cylinder, a lip projecting from the lower edge of said hopper into said annular chamber, and a ring located in the bottom of the cylinder and of a width less than that of the space between the cylinder and core.

8. A concrete pipe forming machine comprising a stationary support, rods depending from the support, an element slidable

on the rods, elevating means operatively connected to the element, a support rotatable on the element, a core on the rotatable support, a shell rotatable on the stationary support and adapted to receive said core when the element is elevated, and screws mounted in the element and engageable with the stationary support for defining the uppermost position of the core.

10 9. A concrete pipe forming machine comprising a stationary support, rods depending from the support, an element slidable

on the rods, elevating means operatively connected to the element, a support rotatable on the element, a core on the rotatable support, a shell rotatable on the stationary support and adapted to receive said core when the element is elevated, and adjustable means mounted on the element and engageable with the stationary support for defining the uppermost position of the core.

In testimony whereof I have signed my name to this specification.

EMSLEY ROBBINS.