L. J. SANKER.

MACHINE FOR MANUFACTURING CONCRETE PIPE.

APPLICATION FILED MAR. 30, 1914.

1,166,788.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

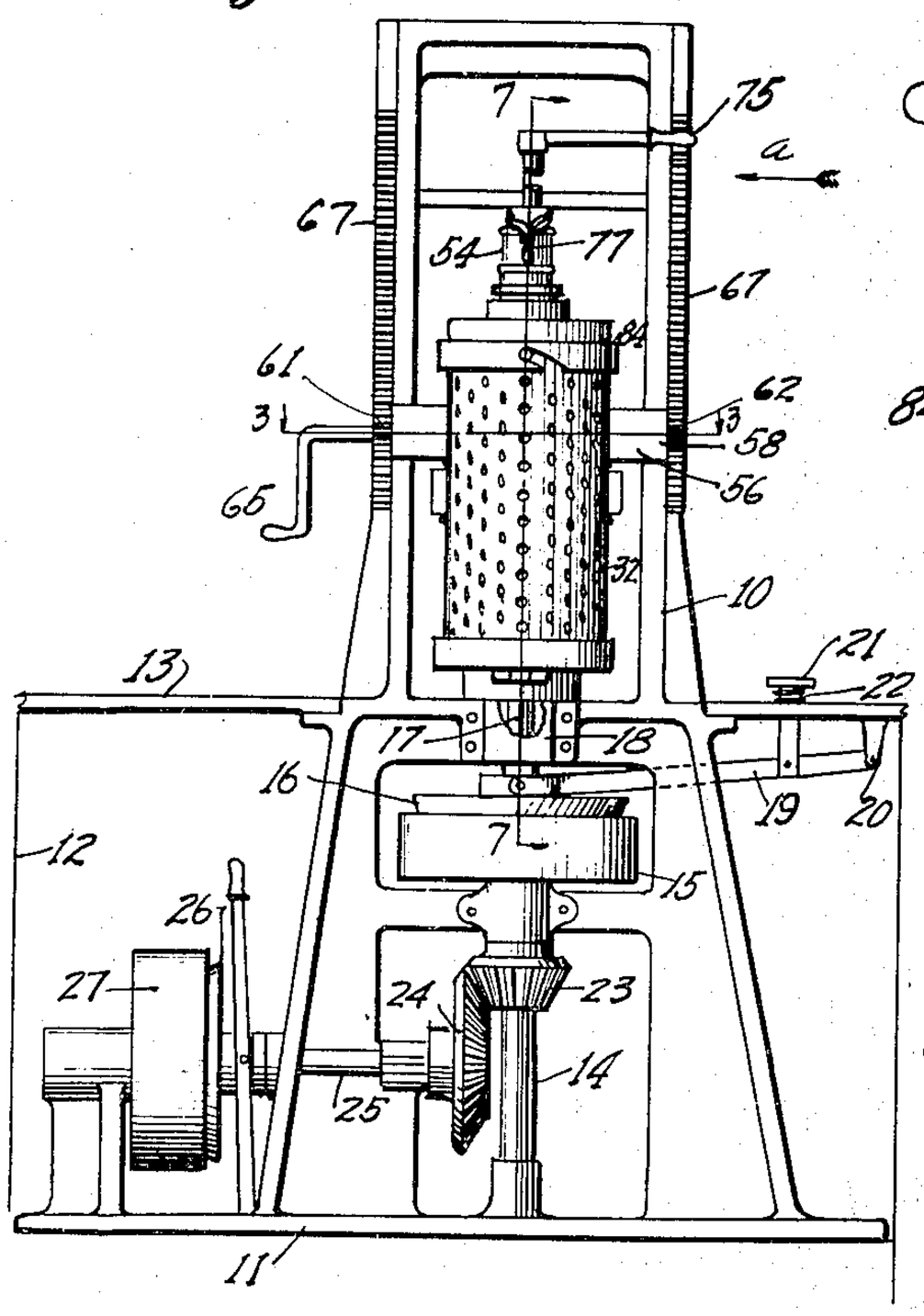


Fig. 2.

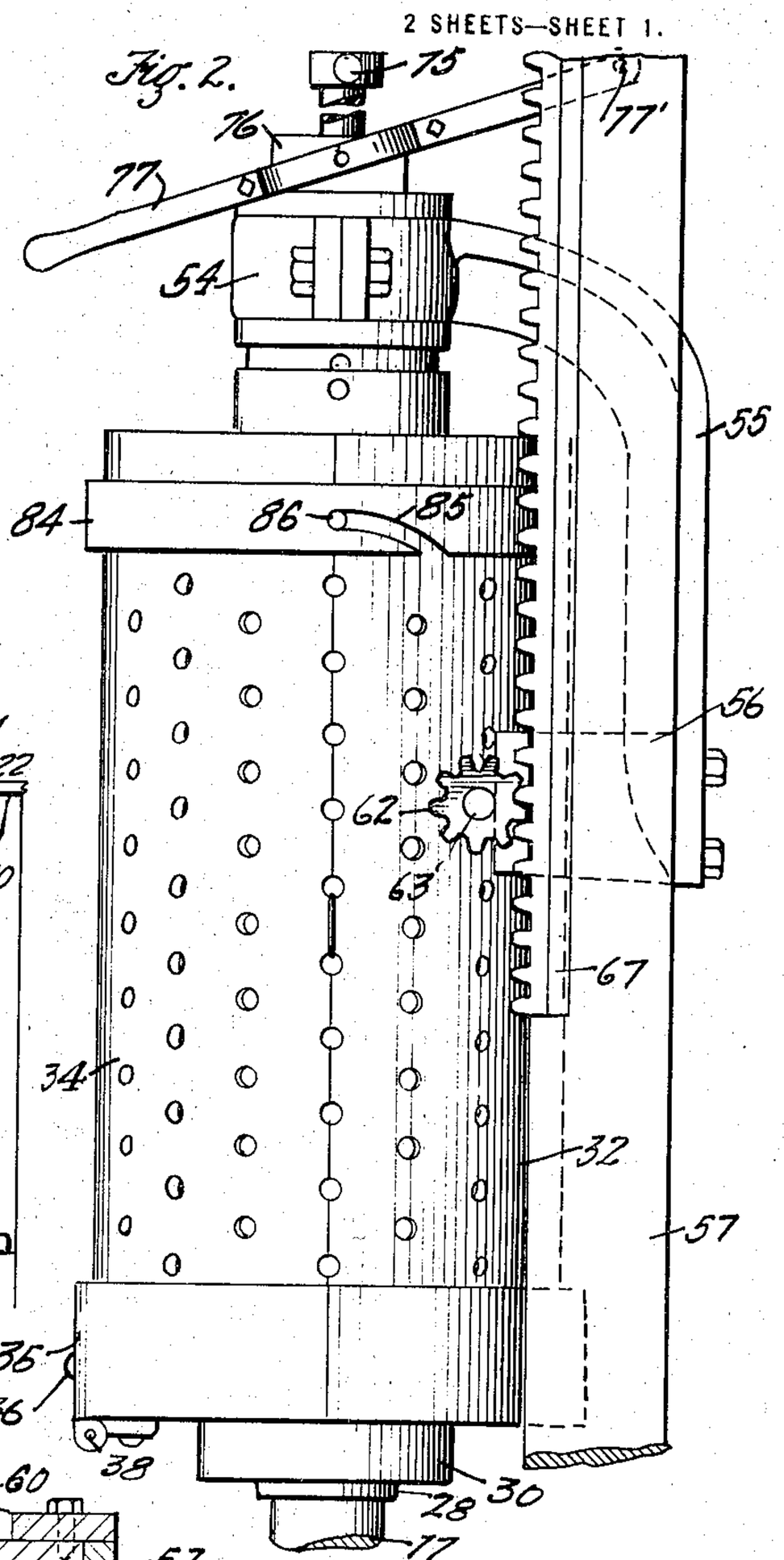


Fig. 3.

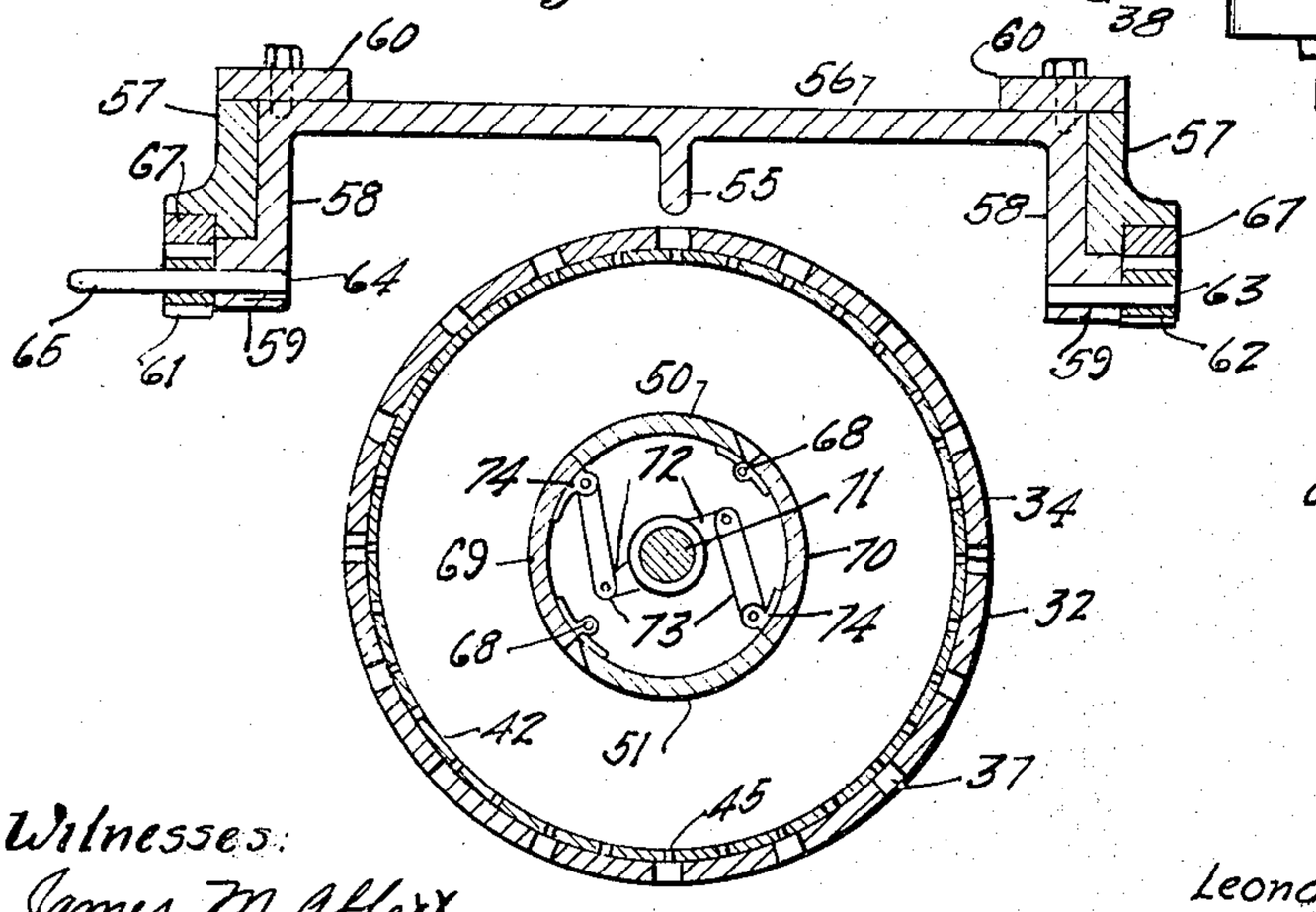
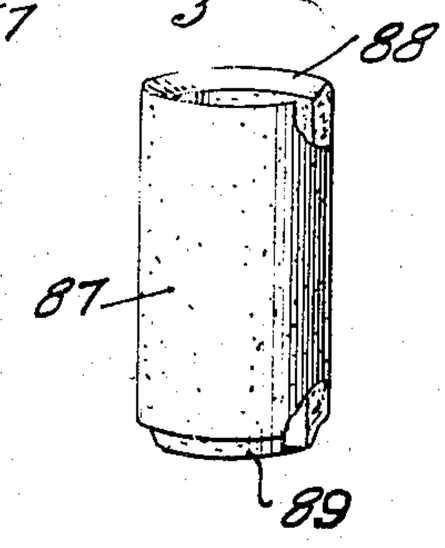


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

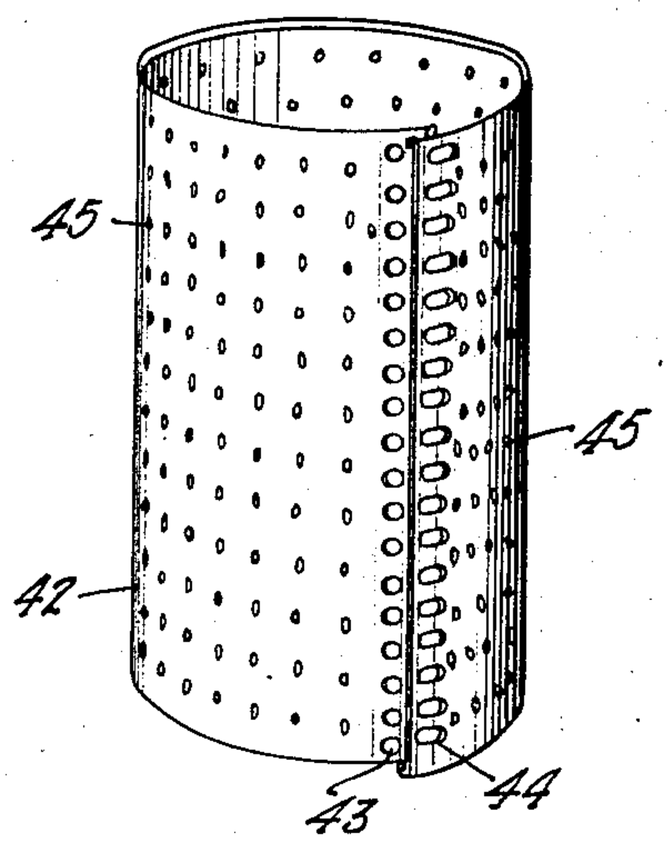


Fig. 6.

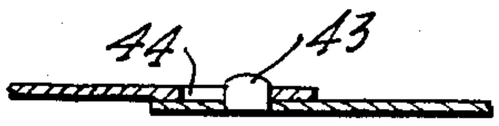
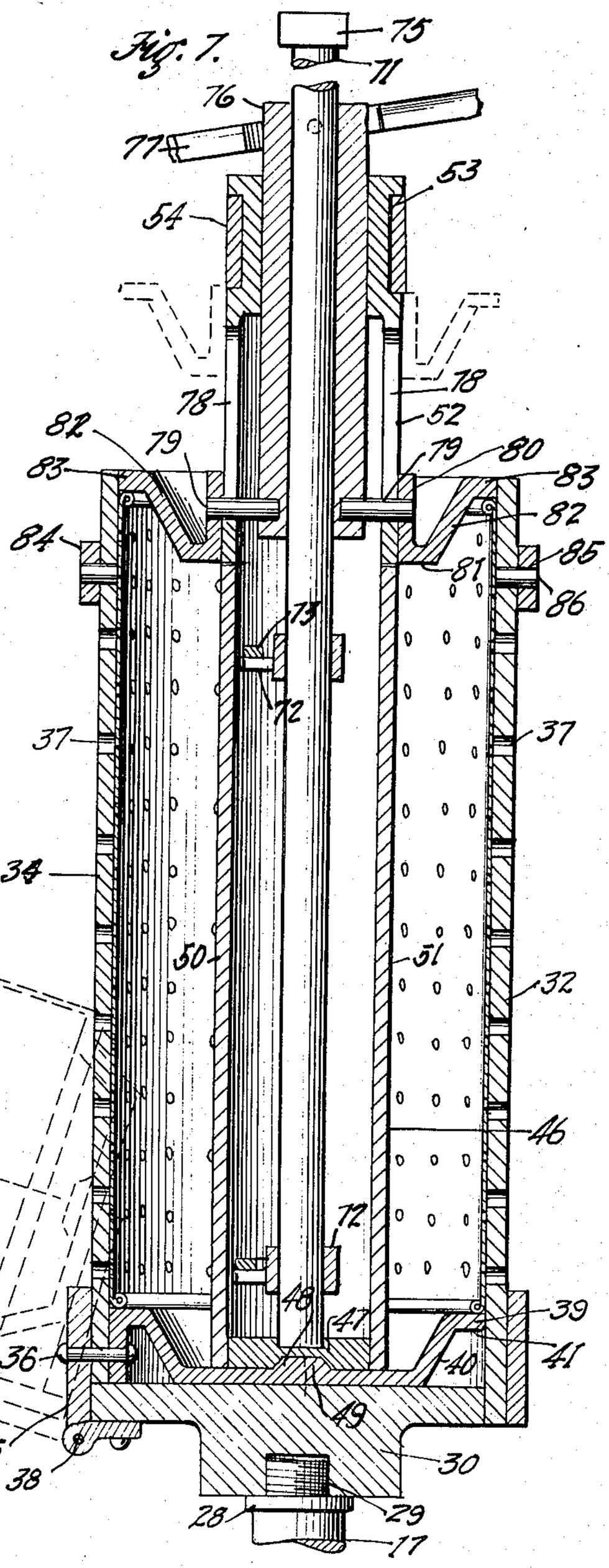


Fig. 7.



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UNITED STATES PATENT OFFICE.

LEONARD J. SANKER, OF LOS ANGELES, CALIFORNIA.

MACHINE FOR MANUFACTURING CONCRETE PIPE.

1,166,788. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed March 30, 1914. Serial No. 828,120.

To all whom it may concern:

Be it known that I, LEONARD J. SANKER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Machines for Manufacturing Concrete Pipe, of which the following is a specification.

This invention relates to a machine for manufacturing concrete pipe.

It is the object of this invention to provide a concrete pipe making machine by which the concrete materials of which the pipe is formed may be molded and packed and removed from the machine with great rapidity.

A further object is to provide a concrete pipe forming machine in which centrifugal force is employed in packing the plastic mixture and removing superfluous moisture therefrom.

A further object is to provide means for facilitating the removal of the formed pipe from the machine without danger of injuring the same.

A further object is to provide means for troweling the interior surface of the pipe in the course of its manufacture.

A further object is to provide a pipe molding machine for forming pipes of concrete by means of which the heavier aggregates of the concrete will be arranged adjacent the outer periphery of the pipe and the finer aggregates positioned on the inner periphery of the pipe so as to form a smooth impervious surface on the interior of the pipe.

Other objects will appear hereinafter.

The invention primarily resides in a dividable mold member formed with a perforated annular wall, a separable annular perforated mold casing adapted to be removably mounted in the mold member, an expansible core adapted to be inserted in the space encompassed by the mold member and casing, and means for rotating the mold, whereby the materials in the mold will be packed to form a pipe.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a view of the machine in side elevation, with parts broken away. Fig. 2 is a detail in side elevation of the upper portion of the machine as seen in the direction indicated by the arrow —*a*— in Fig. 1. Fig. 3 is a horizontal section on the line 3—3 of Fig. 1. Fig. 4 is a detail perspective with portions broken away of the concrete pipe produced by this machine. Fig. 5 is a detail in perspective of the separable cylindrical mold casing or lining. Fig. 6 is a detail in section illustrating the manner of connecting the ends of the mold casing together to form it into a cylinder. Fig. 7 is an enlarged detail vertical section on the line 7—7 of Fig. 1, showing the mold in its molding position in full lines, and illustrating the manner of removing the molded pipe therefrom in dotted lines.

More specifically, 10 indicates the framework of the machine which is supported on a base plate 11, usually disposed in a pit 12 below a floor 13; the portion of the framework extending above the floor 13 carrying the mold and core mechanism, and the portion of the frame below the floor 13 supporting the driving mechanism. This driving mechanism may be of any suitable construction, but is here shown as including a vertical revoluble shaft 14 fitted at its upper end with a fly-wheel 15 having a clutch engaging face on its upper face normally out of engagement with a clutch member 16 on a stud shaft 17 arranged in alinement with the shaft 14 and extending through a bearing 18 with its upper end terminating adjacent the surface of the floor 13.

The clutch member 16 is adapted to be thrown in and out of engagement with the fly-wheel 15 by means of a lever 19 pivoted at 20 and fitted with a foot treadle 21 by which it may be actuated by the operator when it is desired to throw the clutch member 16 into frictional engagement with the fly-wheel 15.

The spring 22 bearing between the floor 13 and the foot treadle 21 normally maintains the clutch member 16 out of engagement with the fly-wheel 15. The shaft 14 is fitted with a beveled gear 23 meshing with a gear 24 on a horizontal shaft 25 provided with a clutch 26 adapted to be engaged with a belt wheel 27 which may be rotated from any suitable source of power to rotate the shaft 14 at high speed when the clutch member 26 is in engagement with the belt wheel 27.

The upper end of the stud shaft 17 is formed with a flange 28 adjacent the bearing 18 and is formed with a central threaded portion 29 to receive a circular mold base block 30; the block 30 thus being adapted to be detached from the shaft 17 when it is desired to replace the same by blocks of differ-

ent sizes according to the diameters of the pipe to be molded.

Rigidly mounted on the block 30 and extending around the rear half of its periphery is an upwardly extending semi-circular mold member 32 of a length approximating that of the length of the pipe section to be molded. A corresponding semi-cylindrical mold member 34 forming the front half of the mold is attached to a semi-circular band 35 encompassing the forward half of the peripheral edge of the block 30 by means of rivets or bolts 36; the lower edge of the mold section 34 being adapted to seat on the upper face of the block 30, the forward half of which is slightly enlarged to receive the mold member 34. The vertical edges of the mold member 34 are designed to abut against the vertical edges of the mold member 32 to complete a mold cylinder, the walls of which are formed with apertures or perforations 37 at suitable intervals throughout.

The band 35 is pivoted to the block 30 by means of a pivot pin 38 so that the forward portion 34 of the mold may be swung outwardly from the rearward portion. The bottom of the mold comprises a disk 39 adapted to seat on the upper face of the block 30 having an upwardly and outwardly inclined flanged portion 40 terminating in a horizontally extending flange 41, the outer periphery of which conforms to the inner peripheries of the mold members 32 and 34. This bottom member 39 is connected to the forward mold member 34 by means of rivets or bolts 36 so that when the mold member 34 is rocked the bottom portion 39 will move therewith. The mold members 32 and 34 are adapted to encompass a mold casing 42 particularly shown in Fig. 5, which is formed of sheet metal bent to the shape of a cylinder, with its ends normally separated but adapted to be connected together by means of lugs 43 on the outer face of one end of the sheet which are arranged to engage perforations 44 on the overlapping opposite end of the sheet to form a complete cylinder.

The upper and lower edges of the casing 42 are beaded to reinforce the casing and serve to normally retain the latter in its cylindrical formation. This casing 42 is formed with perforations 45 of smaller diameter than the perforations 39 in the mold casing and are provided for the purpose of permitting the escape of superfluous water in the concrete in the molding operation, as later described.

Extending axially of the mold members 32 and 34 is an expansible core member 46 which is adapted to be reciprocated vertically and moved in and out of the space encompassed by the mold members 32 and 34 longitudinally of the latter, as occasion requires. This core member comprises an end-plate 47 formed with a depression 48 on its underside adapted to be engaged by a tapered centering lug 49 projecting centrally from the upper face of the bottom plate 39.

Rigidly connecting with the plate 47 on diametrically opposite sides thereof are quadrant plates 50 and 51 which extend upwardly and connected with a cylinder 52 of which the quadrants 50 and 51 are a continuation. This cylinder 52 is formed with an annular groove or channel 53 adjacent its upper end which is encompassed by a split sleeve 54 carried on a bracket 55 mounted on a cross bar 56 arranged rearwardly of the mold member 32 and slidable vertically on guide members 57 formed on the frame 10.

The frame 56 is formed with side flanges 58 which slidably abut against the inner faces of the guide members 57, the outer ends of which flanges are turned outwardly at 59 to project in front of the guide members in contact therewith; removable plates 60 being attached to the rear face of the frame 56 to project rearwardly of the guide members 57 to coöperate with the projections 57 in retaining the frame 56 in place. The frame 56 is raised and lowered on the guide members 57 to move the core member 46 in and out of the space encompassed by the mold members 32 and 34. This movement may be accomplished in any desired manner, but is here shown as effected by means of pinions 61 and 62 on stud shafts 63 and 64 mounted on the projections 59 of the frame.

The pinion 61 is rigid on the stud shaft 64 which shaft is fitted with a crank 65 by means of which it can be rotated to cause the pinion 61 to travel on a vertical rack 66 on one of the guide members 57, thereby raising or lowering the frame 56; the pinion 62 traveling in or on a rack 67 on the other guide member 57.

Hingedly connected to the quadrant plates 50 and 51 of the core member 46 by means of hinges 68 are quadrant plates 69 and 70, which, when in their normal innermost position, form a continuous cylindrical core wall. These hinged quadrant plates 69 and 70 are designed to be swung outwardly to crowd concrete materials interposed between the core member and the mold members outwardly against the casing 42 when the mold is revolved and at the same time trowel the inner surface of the molded pipe. This swinging of the members 69 and 70 is accomplished by means of a vertical shaft 71 having lugs 72 on its diametrically opposite sides connected with links 73 which are pivoted at their outer ends by pivot pins 74 to the outer edges of the hinged quadrant plates 69 and 70.

The shaft 71 projects above the upper end of the cylinder 52 and is fitted with a hand lever 75 by which it may be turned to fit the opening and closing of the hinged quadrant plates 69 and 70. The lower end of the

shaft 71 seats in a bearing formed in the end plate 47 of the core and its upper end is guided in a sleeve 76 mounted to reciprocate vertically in the core 52; the upper end of the sleeve 76 being connected to a hand lever 77 pivoted at 77' by which it may be raised and lowered as occasion may require. Secured to the sleeve 76 and extending through vertical slots 78 formed in the cylinder 52 are pins 79, the outer ends of which engage a sleeve 80 slidably mounted on the exterior of the cylinder 52 and formed with an outwardly extending flange 81 on its lower edge, which terminates in an upwardly divergent flange 82 having an annular rim 83 on its outer edge conforming to the inner periphery of the mold members 32 and 34. The sleeve 80 with its flanges forms the top of the mold and is designed to be moved out and in engagement therewith by operation of the hand lever 77.

In the operation of the invention the casing mold member 42 is positioned upon the mold member 34 with its lower end abutting against the bottom plate 40 when the mold member 34 is in its open position as indicated in dotted lines in Fig. 7, whereupon the mold member 34 is rocked on its hinged pivot 38 into its closed relation with the mold member 32 in which position it is secured by means of a loose ring 84 which is slipped over the upper ends of the mold members 32 and 34 and engaged therewith by means of open-ended slots 85 formed on the lower edge of the ring 84, which slots are curved and are adapted to engage studs 86 on the mold members 32 and 34. This ring 84 serves to prevent the mold members 32 and 34 from separating during the molding operation.

The core 46 is then lowered into the space encompassed by the mold members by operation of the crank 65 until the lower end of the core is seated upon the bottom plate 40 of the mold and engaged by the lug 49, which lug serves both to center the core and also hold it against lateral movement.

The top of the mold comprising the sleeve 80 and its connected parts is then disposed in its uppermost position, as shown in dotted lines in Fig. 7, by operating the hand lever 77, whereupon the concrete or other plastic mixture, of which the pipe 87, as shown in Fig. 4, is formed, is introduced into the upper end of the mold in such quantity as to fill the latter, whereupon the top of the mold is lowered into contact therewith. When this has been effected the foot treadle 21 is operated to throw the clutch member 16 into engagement with the fly-wheel 15, which is being continuously rotated through the medium of the shafts 14, 25, and the belt wheel 27; the clutch member 26 being previously engaged with the latter. On the engagement of the clutch member 16 with the fly-wheel 15 a rapid rotation of the stud shaft 17 and the mold member connected thereon is effected. This rotation is of high speed, being preferably about two thousand revolutions to the minute and sets up a considerable centrifugal force, which, in operating on the plastic or concrete mixture within the mold, acts to drive the superfluous moisture or liquid therein outwardly through the perforations 45 in the casing and through the perforations 37 in the mold members 32 and 34 and at the same time causing heavier ingredients of the concrete to be forced outwardly to points adjacent the inner wall of the mold casing 45.

The top part of the mold in forced downward during this operation so as to compress the concrete in the mold and at the same time form a channel 88 in the upper end of the molded body of concrete adapted to receive a projection 89 on the lower end of said body by the bottom plate of the mold.

To render the concrete more compact and at the same time trowel the inner surface of the molded pipe the shaft 71 is rocked by means of the hand hold 75 so as to swing the segment plates 69 and 70 outwardly against the body of concrete in the mold, thereby effectively troweling the latter and causing a glazed surface to be formed on the interior of the pipe by reason of the rapid speed of its rotation and because the finer materials of which the concrete is composed will be disposed adjacent the core. When the foregoing operation has been completed, which in practice requires about two minutes' time, the quadrant members 69 and 70 of the core are reciprocated, thus leaving the core clear of the inner walls of the molded pipe, whereupon the core is lifted clear of the molds and the ring 86 removed. The outer mold 34 is then rocked outwardly on its hinges 38 in the position shown in Fig. 7, whereupon the casing 42 containing the molded pipe can be readily removed and disposed in a convenient place to thoroughly dry. The concrete by being subjected to the centrifugal force is rendered very compact so that the molded pipe in the casing 45 can be readily handled without danger of injury. When the concrete has been sufficiently set the casing 42 is removed therefrom by prying the overlapping edge thereof out of engagement with the projections 43.

By the use of this invention concrete pipes of great density and strength can be formed in a short space of time.

What I claim is:

1. A centrifugal molding machine for forming tubular bodies of plastic material, comprising a revoluble base, a divided centrifugal mold member formed with apertured walls having one portion rigidly affixed to said base and the other portion pivotally connected thereto, a mold bottom

rigidly attached to the hinged portion of the cylindrical mold body, a reciprocal and non-rotatable core adapted to be positioned in the mold body, a mold top slidably mounted on the core, means for reciprocating said mold top independent of the core, and means for locking the mold members together.

2. In a centrifugal machine for forming tubular bodies of plastic material, a revoluble base, a pivoted cylindrical mold member formed with apertured walls, one portion of which is rigidly affixed to the base and the other portion hingedly connected thereto, a mold bottom secured to the hinged portion of the mold body for shaping the end of the tubular body, a tubular core adapted to be inserted in the mold member, means for slidably engaging the lower end of said core with the mold bottom, a mold top slidably mounted on the core for forming the opposite end of the mold body, means for reciprocating the mold top independent of the core, hinged walls on said core, and manually operated means for rocking said walls to expand the core.

3. In a centrifugal machine for forming tubular bodies of plastic material, a revoluble base, a pivoted cylindrical mold member formed with apertured walls, one portion of which is rigidly affixed to the base and the other portion hingedly connected thereto, a mold bottom secured to the hinged portion of the mold body for shaping the end of the tubular body, a tubular core adapted to be inserted in the mold member, means for slidably engaging the lower end of said core with the mold bottom, a mold top mounted on the core for forming the opposite end of the mold body, means for reciprocating the mold top independent of the core, hinged walls on said core, manually operated means for rocking said walls to expand the core, comprising a rock shaft extending longitudinally of the core, and link connections between said rock shaft and the hinged walls of the core.

4. A machine for forming tubular bodies of plastic material, comprising a revoluble base, a pivoted cylindrical body member formed of apertured walls having one portion rigidly affixed to said base and the other portion hingedly connected thereto, a mold bottom attached to the hinged portion of the mold body, a perforated casing adapted to be encompassed by the mold body, a reciprocal non-rotatable core, hinged walls on said core, a shaft extending into the core, linked connections between the shaft and the hinged portions thereof by which the latter may be rocked to expand the core by actuating the shaft, and a closure for the upper end of the mold body slidably mounted on the core.

In witness that I claim the foregoing I have hereunto subscribed my name this 16th day of March, 1914.

LEONARD J. SANKER.

Witnesses:
EDMUND A. STRAUSE,
MARGUERITE BATES.