H. R. McMAHON.

MACHINE FOR MAKING REINFORCED CONCRETE PIPE.

APPLICATION FILED DEC. 28, 1907.

958,156. **Patented May 17, 1910.**

3 SHEETS—SHEET 1.

Fig. 1

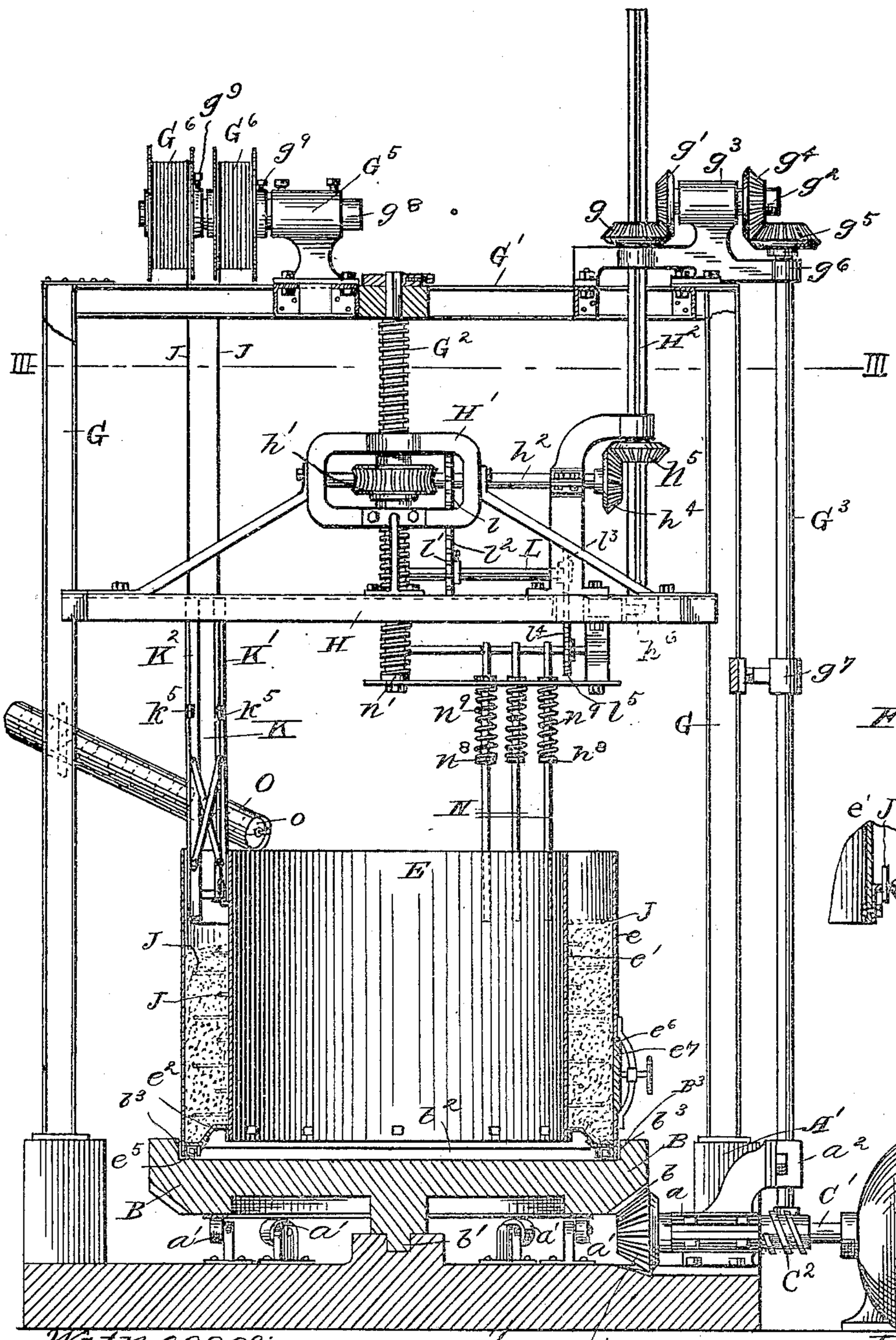
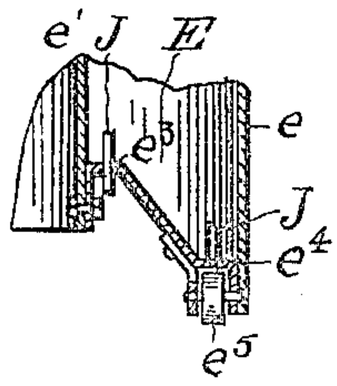


Fig. 1a



Witnesses:
H. C. Turner
F. Krenek

A' C

Inventor:
Harry R. McMahon
by A. C. Merkel.
his Attorney.

H. R. McMAHON.

MACHINE FOR MAKING REINFORCED CONCRETE PIPE.

APPLICATION FILED DEC. 28, 1907.

958,156. Patented May 17, 1910.

3 SHEETS—SHEET 2.

Fig. 2

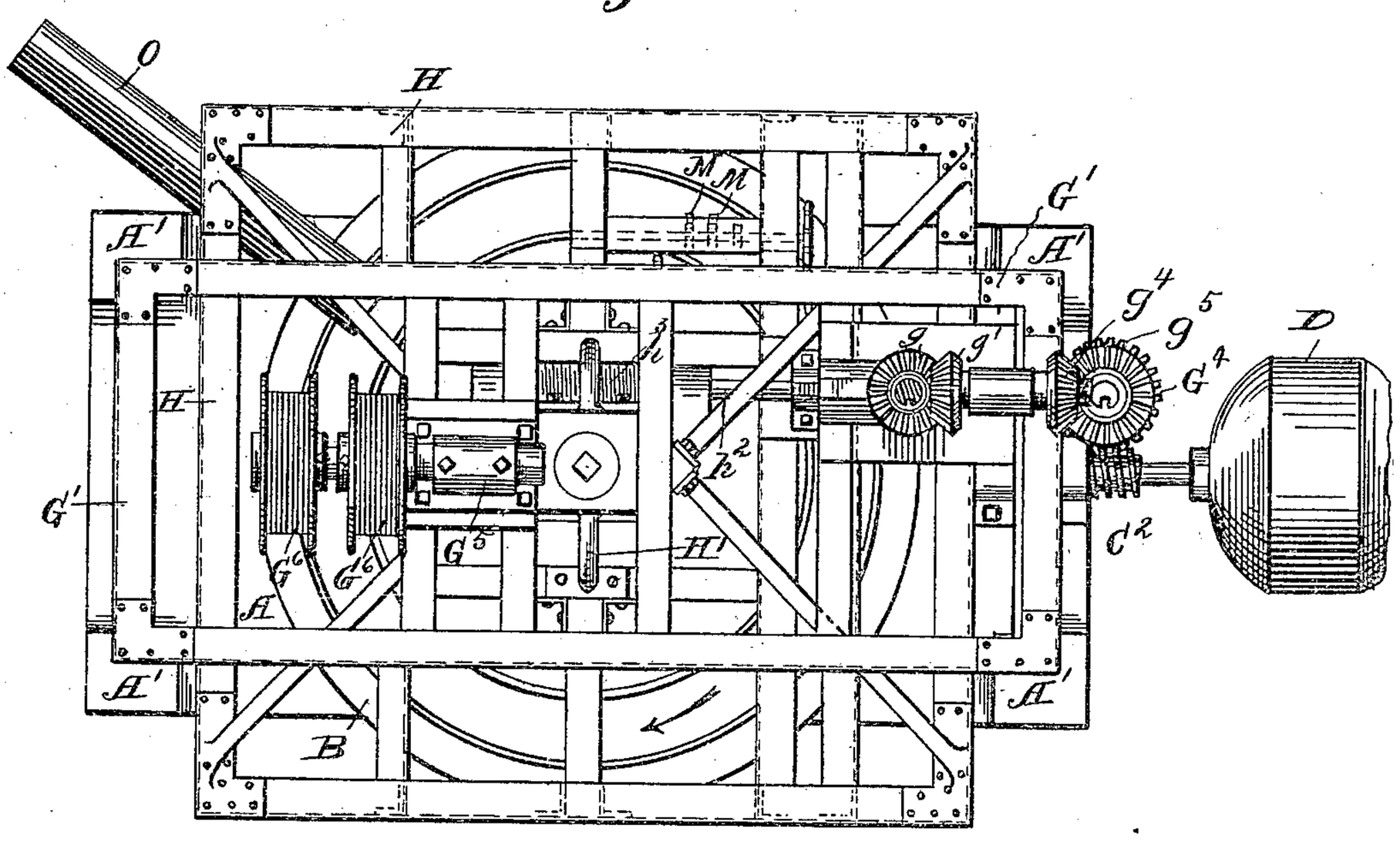
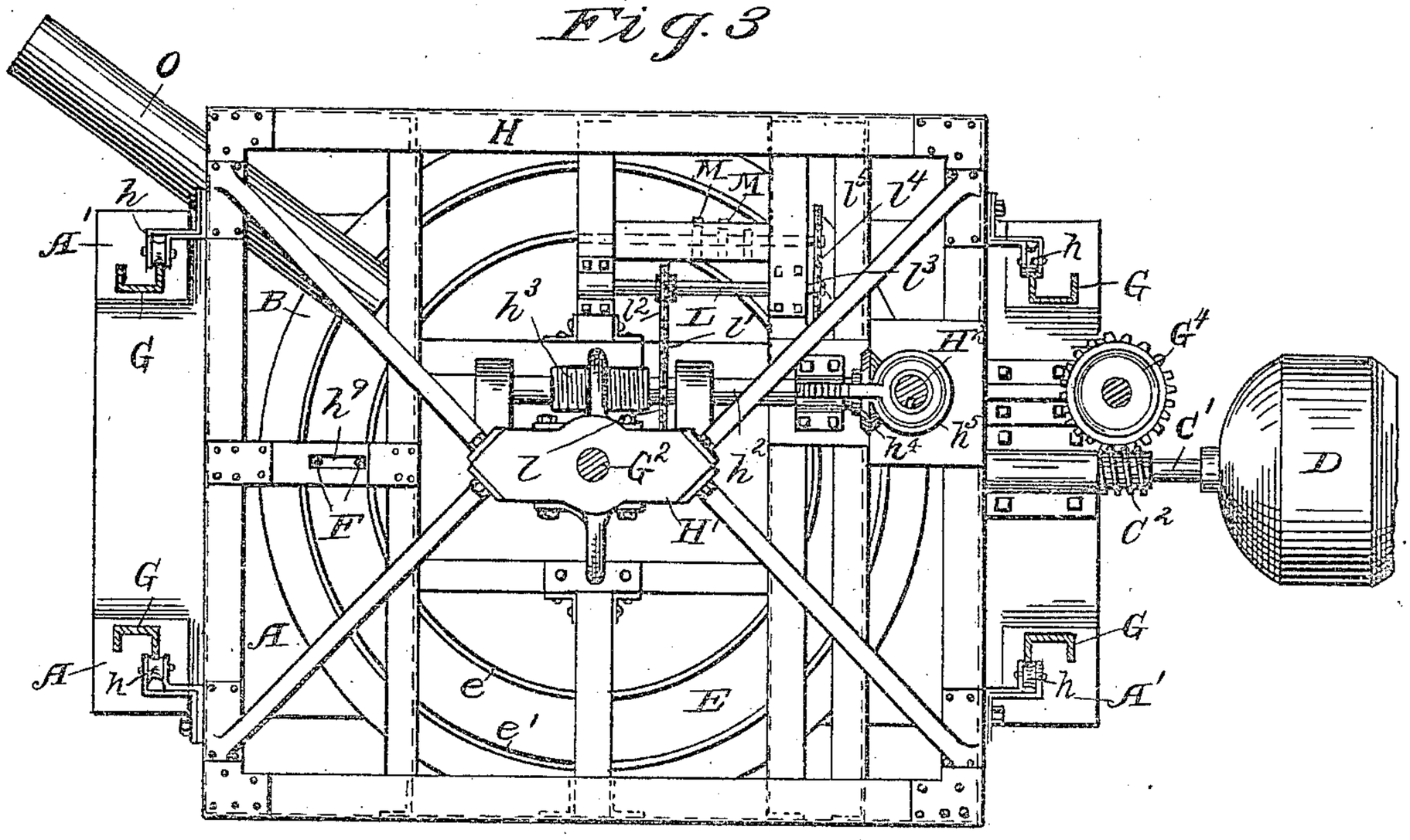


Fig. 3



Witnesses:
J. C. Turner
F. Krenek

Inventor:
Harry R McMahon
by A. C. Emerkel
his Attorney.

H. R. McMAHON.

MACHINE FOR MAKING REINFORCED CONCRETE PIPE.

APPLICATION FILED DEC. 28, 1907.

958,156.

Patented May 17, 1910.

3 SHEETS—SHEET 3.

Fig. 4

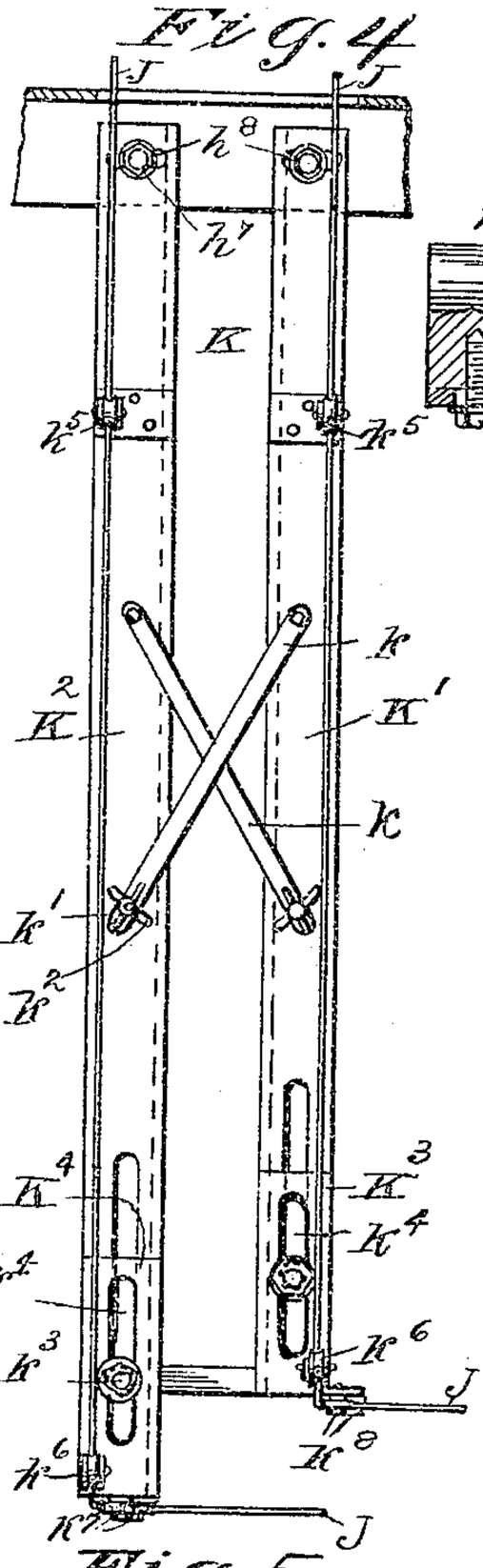


Fig. 5

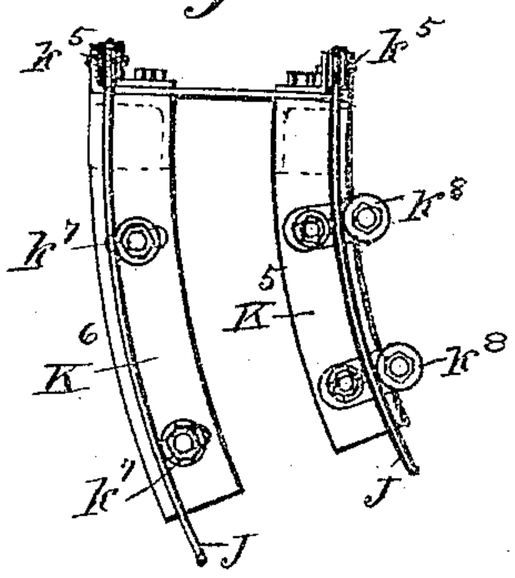


Fig. 6

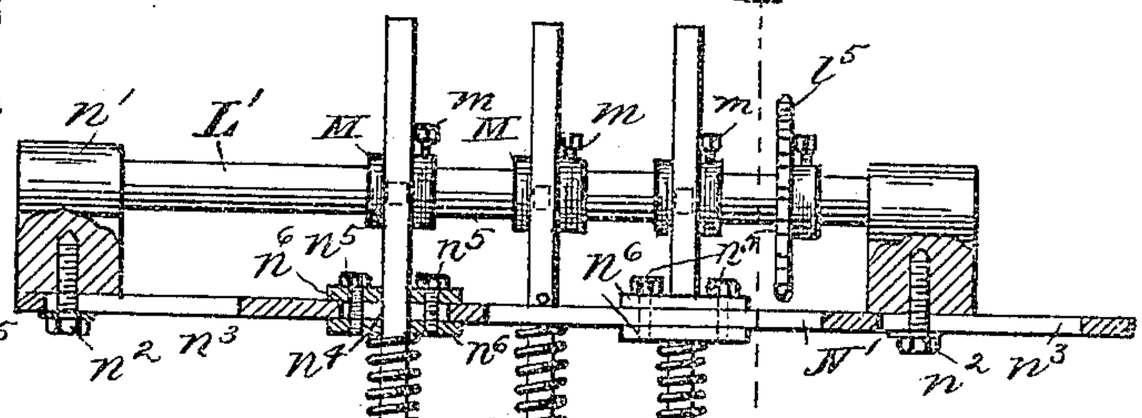


Fig. 7

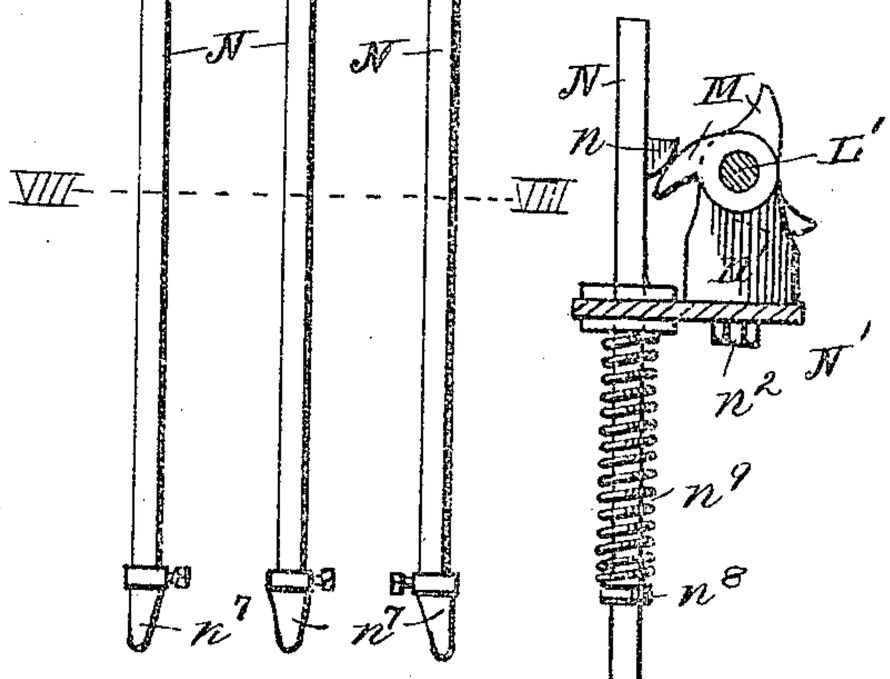


Fig. 8

Witnesses:

J. C. Turner

F. Krenek

Inventor:

Harry R. McMahon

By A. E. Merkel.

his Attorney.

UNITED STATES PATENT OFFICE.

HARRY R. McMAHON, OF CLEVELAND, OHIO.

MACHINE FOR MAKING REINFORCED-CONCRETE PIPE.

958,156. Specification of Letters Patent. Patented May 17, 1910.

Application filed December 28, 1907. Serial No. 408,341.

To all whom it may concern:

Be it known that I, HARRY R. McMAHON, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Machines for Making Reinforced-Concrete Pipe, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to machines for making reinforced concrete pipe.

The object of said invention is the production of concrete pipe having the physical characteristics necessary to meet the requirements of the service which it is desired to perform, and at the same time to effect such production in an efficient and economical manner.

The said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawings and the following description set forth in detail, certain mechanism embodying the invention, the disclosed means constituting but one of various mechanical forms in which the principle of the invention may be applied.

In said annexed drawings:—Figure 1 represents a front elevation, partly in vertical axial section, of a machine embodying my invention. Fig. 1ª represents a partial section, upon an enlarged scale, of the lower portion of one side of the mold forming a part of said machine. Fig. 2 represents a plan of such machine. Fig. 3 represents a horizontal section of the machine taken upon the plane indicated by line III—III in Fig. 1. Fig. 4 represents a detailed elevational view, upon an enlarged scale, of the reinforcement guiding-means and Fig. 5 represents a bottom plan of same. Fig. 6 represents an elevational view, partly in section, of the tamping mechanism of the machine and Fig. 7 represents a section of same taken upon the plane indicated by line VII—VII in Fig. 6, such latter view being taken in the direction of the arrow in said figure. Fig. 8 represents a horizontal section taken upon the plane indicated by the line VIII—VIII in Fig. 6 showing also, in plan, a portion of the mold. Said Figs. 6, 7 and 8 are also drawn on an enlarged scale.

Referring to Fig. 1, A is a suitable base upon which is mounted a horizontal rotatable table B. This table is provided on its under surface with beveled gear teeth b which are engaged by the bevel-gear C. This latter gear is mounted upon the shaft C′ which is suitably mounted in a bearing a and driven by a suitable motor D. The table B is provided with a central pilot b' and is additionally supported upon its under surface by anti-friction rollers a' a', and upon it is supported a mold E. This mold in its general characteristics is similar to molds ordinarily used for the purpose of manufacturing concrete pipe sections, in that it consists of an outer cylindrical shell e and an inner cylindrical shell e' concentric with the outer and a removable bottom ring e^2. The following modifications are, however, introduced: The bottom ring is provided with two apertures e^3 e^4 which receive the ends of the reinforcement members J J and is provided with rollers e^5 suitably mounted beneath its lower surface and with a hand-hole e^6 and cover e^7 therefor. This hand-hole is located, as shown, in the vicinity of that portion of the bottom ring containing the apertures e^3 e^4. The upper portion of the rotatable table B is formed with a depression b^2 having parallel sides b^3 b^3. This depression receives the mold, the latter being rolled onto and off of the table by means of the rollers e^5. Fixed to bases A′ A′, are four upright guiding-members G G whose upper ends support a horizontal frame G′. Intermediate of the mold and the frame G′ is a vertically movable carrier H provided with four guiding-rollers h h engaging and traveling upon the upright guiding-members G G. Mounted in a bracket H′ suitably secured to the carrier H is a horizontally rotatable worm-wheel h'. This worm-wheel is centrally threaded to receive a vertical screw G^2 which is fixedly mounted in the frame G′ in a suitable manner. A shaft h^2 is horizontally mounted upon the carrier and has fixedly secured thereto a worm h^3, Figs. 2 and 3, which engages the worm-wheel h'. The one end of said shaft h^2 has fixed upon it a bevel-gear h^4 which is engaged by a second bevel-gear h^5 slidably mounted by means of a feather and groove, upon a vertical shaft H^2. This shaft is rotatably mounted by means of a step bearing h^6 in

the carrier H. Slidably mounted upon the said shaft H^2 is a third bevel-gear g which is engaged by a bevel-gear g' fixed to a shaft g^2 mounted in a bearing g^3, the latter being fixed to the frame G'. This shaft g^2 is driven by means of bevel-gears g^4 and g^5, the latter being fixed to a vertical shaft G^3 suitably mounted in fixed bearings g^6 g^7 and a^2. Fixed to the bottom of shaft G^3, Fig. 3, is a worm-wheel G^4, which is engaged and rotated by means of a worm C^2 fixed to the shaft C'. It will therefore be observed that the rotation of the shaft C' will effect simultaneously the rotation of the table B and mold E, and a vertical movement of the carrier H.

Mounted upon the frame G' is a bearing G^5 in which is fixed a rod g^8, and mounted upon this rod as a bearing are two reels G^6 G^6. These reels are mounted so as to be slidable along the rod g^8, and are fixed in position by means of suitable set-screws g^9 g^9. By these means it will be observed that the reels are adjustable relatively to each other along their common bearing-rod. Upon these reels are wound flexible reinforcement J, which consists preferably of ordinary commercial wire of suitable size.

Extending downwardly from the carrier H is a reinforcement guiding-device K, Figs. 1 and 4. This device consists of two vertical members K' K^2 and is secured to the carrier H by means of bolts h^7 passing through slots h^8 formed in the carrier, whereby the said two members are laterally adjustable relatively to each other. Such lateral adjustment is further maintained by means of two radial cross-arms k k pivoted at one end and secured at the other end by means of bolts k' passing through curved slots k^2 k^2 formed in the vertical members K' K^2 respectively. The lower ends of these two members are provided with auxiliary portions K^3 K^4 respectively, which are secured in place by means of bolts k^3 k^3 which pass through slots k^4 k^4 formed therein and in the main members K' K^2 and by means of which the members K and K' may be extended and adjusted longitudinally. Secured to the bottom of the two members K^3 K^4 respectively are two horizontal circularly curved members K^5 K^6, the center of whose curvature is in the axis of the rotatable table B. Guiding-rollers k^5 k^5 are mounted upon the main members K' K^2 and additional rollers k^6 k^6 are mounted upon the auxiliary members K^3 K^4, as shown. Mounted upon the bottom of the members K^5 K^6 are guiding-rollers k^7 k^7 and k^8 k^8. The reinforcing wire passes downwardly from the rollers through a slot k^9, Fig. 3, behind the rollers k^5 k^5 over the rollers k^6 k^6 and around the rollers k^7 k^7 and k^8 k^8 whence it is fed into the mold in a manner hereinafter described.

The above described guiding-device is located vertically above the annular space of the mold in which the pipe structure is formed, so that by lowering the carrier H such guiding-device may be projected into such space.

Fixed to the shaft h^2 is a sprocket l over which runs a chain l' which drives a second sprocket l^2. This second sprocket is fixed to a countershaft L which is mounted in bearings upon the carrier H, as shown in Fig. 3. Upon the end of this shaft L is mounted a sprocket l^3 over which passes a second chain l^4 which drives a sprocket l^5 which is fixed to a shaft L'. Upon the said shaft L' are fixed, by means of set-screws m m, a series of cams M M, Figs. 6 and 7, which respectively engage lugs n fixed to or integral with a series of tamping rods N N. These rods are preferably three in number and are mounted in and supported by an adjustable plate N' which is secured to the hangers n' n' which form the bearing for the shaft L' and supported by means of bolts n^2 n^2 which pass through slots n^3 n^3 formed in the plate. The shaft L' is located vertically above the annular space in the mold as shown in Fig. 3, and the rods N are placed transversely of said space and so that they may be caused to project into same when the carrier H is moved downwardly. The slots n^3 render the plate N' adjustable in the direction of the axis of shaft L', as will be readily understood. The two outer rods N N are mounted in slots n^4 n^4 formed in the plate N' and are secured by means of auxiliary bolts n^5 n^5 passing through the slots n^4 n^4, and plates n^6 n^6 secured by such bolts. It will therefore be seen that the two outer rods N may be adjusted toward and from the center rod, and the position of the center rod may be changed by adjusting the plate N'. The three rods may therefore be placed to meet the conditions imposed by molds of varying diameters and having annular spaces of varying width. Secured to the bottom of rods N by means of set-screws, are tampers n^7 n^7, as shown in Figs. 6 and 8. These tampers may, by means of the set-screws, be adjusted angularly upon their respective rods N. Upon each rod N is fixed or formed a collar n^8 and intermediately of such collar and the plate N' is a coiled spring n^9, by means of which latter the rod is actuated downwardly after having been lifted by its cam M as will be readily understood.

Discharging into the annular space and at a point intermediate of the tamping rods N and the reinforcement guiding-means K is a tube O provided in its interior with a feeding-screw o. This tube O communicates with a suitable source or reservoir of concrete (not shown) from which the latter is fed into the annular space by the said

screw *o*. The latter is rotated by any suitable means, (not shown).

In preparing the above described machine for operation the required mold E is placed upon the rotatable table B, the carrier H having first been raised so as to cause the guiding-means and tamping-means to clear the top of such mold. The two guiding-members K′ K² are then adjusted so that they may enter the annular space of the mold and have their lower extremities in proximity to the inner and outer shell of the mold upon so doing. The reinforcement wire is then passed through the slot h^3 under rollers k^5 k^5 over rollers k^6 k^6 and around the rollers k^7 k^8, as previously described. The carrier is then lowered so as to bring such lower extremities of the guiding-means in proximity to the bottom ring e^2. The table is then turned to bring the apertures e^3 e^4 out of the vertical plane of the guiding-means K. The ends of the wire are now carried around to the vicinity of the hand-hole, the cover having first been removed, and are then bent and passed through the apertures e^3 e^4 respectively in the bottom ring. Prior to such operation, however, the tamping rods are adjusted so that when they are caused to enter the annular space of the mold, the two outside tampers n^6 n^6 are caused to lie in close proximity to the inner and outer shells of the mold, and to cause the center tamper to lie at or near the middle of such space. These tampers are adjusted angularly upon their rods so as to overlap each other in the direction of the rotation of the mold, so the entire plane of the annular space is intersected during the rotation of the mold by such tampers. Such adjustment having been effected the motor is caused to rotate the mold in the direction indicated by the arrow in Fig. 2 and the concrete is caused to feed into the annular space. In this manner the reinforcing wire is laid into the mold in a helical form and near the inner and outer portions of such space. During such operation the concrete covers the reinforcement and the tampers tamp such concrete and eliminate voids and air-spaces which may form therein. The reinforcement is thus progressively fed into the mold from bottom to top and concrete simultaneously fed therein and to progressively fill such mold therewith. After the entire mold is filled and provided with reinforcement, the wire is severed and the carrier H raised to a height sufficient to clear the top of the mold. The latter is then removed from the table, the top ring then placed thereon and the upper end of the section formed in the usual manner. Sufficient wire is left to provide the last portion of the section with reinforcement, as will be readily understood. The mold is then allowed to stand until the concrete has sufficiently set, as has heretofore been the practice in the manufacture of concrete pipe sections, whereupon the bottom and top rings are detached and the section of pipe removed from the mold.

Other modes of applying the principle of my invention may be employed, instead of the one explained, and change may be made as regards the mechanism herein disclosed, provided the means covered by any one of the following claims be employed.

I, therefore, particularly point out and distinctly claim as my invention:—

1. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold, a mold mounted upon the latter, a carrier mounted so as to be capable of vertical movement toward and from said table, means comprising said shaft for effecting both the rotatable and vertical movement, reinforcement guiding-means mounted upon said carrier; and means for automatically feeding concrete to said mold.

2. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold and a mold mounted upon the latter, a carrier mounted so as to be capable of vertical movement toward and from said table, means comprising said shaft for effecting both the rotatable and vertical movement, reinforcement guiding-means mounted upon said carrier, tamping mechanism mounted upon the latter, and means for automatically feeding concrete to said mold.

3. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold, a stationary frame, a carrier vertically movable toward and from said table and means comprising said shaft for effecting both the rotatable and vertical movement, reinforcement guiding-means and tamping means mounted upon said carrier, a reinforcement supply, mounted upon said frame, and means for automatically feeding concrete to said mold.

4. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold, a stationary frame, a carrier vertically movable toward and from said table and means comprising said shaft for effecting both the rotatable and vertical movement, reinforcement guiding-means and tamping means mounted upon said carrier, a reinforcement supply mounted upon said frame, and means for automatically feeding concrete to said mold.

5. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold, a stationary frame, a car-

rier vertically movable toward and from said table and means comprising said shaft for effecting both the rotatable and vertical movement; adjustable reinforcement guiding-means, tamping means, said guiding and tamping means being mounted upon said carrier; a reinforcement supply, and means for automatically feeding concrete to said mold.

6. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold, a stationary frame, a carrier vertically movable toward and from said table and means comprising said shaft for effecting both the rotatable and vertical movement; adjustable reinforcement guiding-means, tamping means, said guiding and tamping means being mounted upon said carrier; a reinforcement supply mounted upon said frame and means for automatically feeding concrete to said mold.

7. In a machine for manufacturing reinforced concrete pipe, the combination of a horizontal shaft, a rotatable table for receiving a mold, a stationary frame, a carrier vertically movable toward and from said table and means comprising said shaft for effecting both the rotatable and vertical movement; adjustable reinforcement guiding-means, adjustable tamping means, said guiding and tamping means being mounted upon said carrier; a reinforcement supply mounted upon said frame and means for automatically feeding concrete to said mold.

8. In a machine for manufacturing reinforced concrete pipe, the combination with a mold, of reinforcement, of guiding-means adapted to guide two reinforcing elements simultaneously in such mold.

9. In a machine for manufacturing reinforced concrete pipe, the combination with a mold, of guiding means adapted to guide two reinforcing elements simultaneously in such mold, said guiding means being adjustable laterally.

10. In a machine for manufacturing reinforced concrete pipe, the combination with a mold, of guiding means comprising two parts each adapted to guide a reinforcing element, one of such parts being adjustable longitudinally.

11. In a machine for manufacturing reinforced concrete pipe, the combination with a mold, of guiding-means comprising two parts relatively adjustable to each other and each adapted to guide a reinforcing element, one of such parts being adjustable longitudinally.

Signed by me, this 14th day of December, 1907.

HARRY R. McMAHON.

Attested by—
Witnesses:
JENNIE E. GARY,
LENA A. DIRLANE.