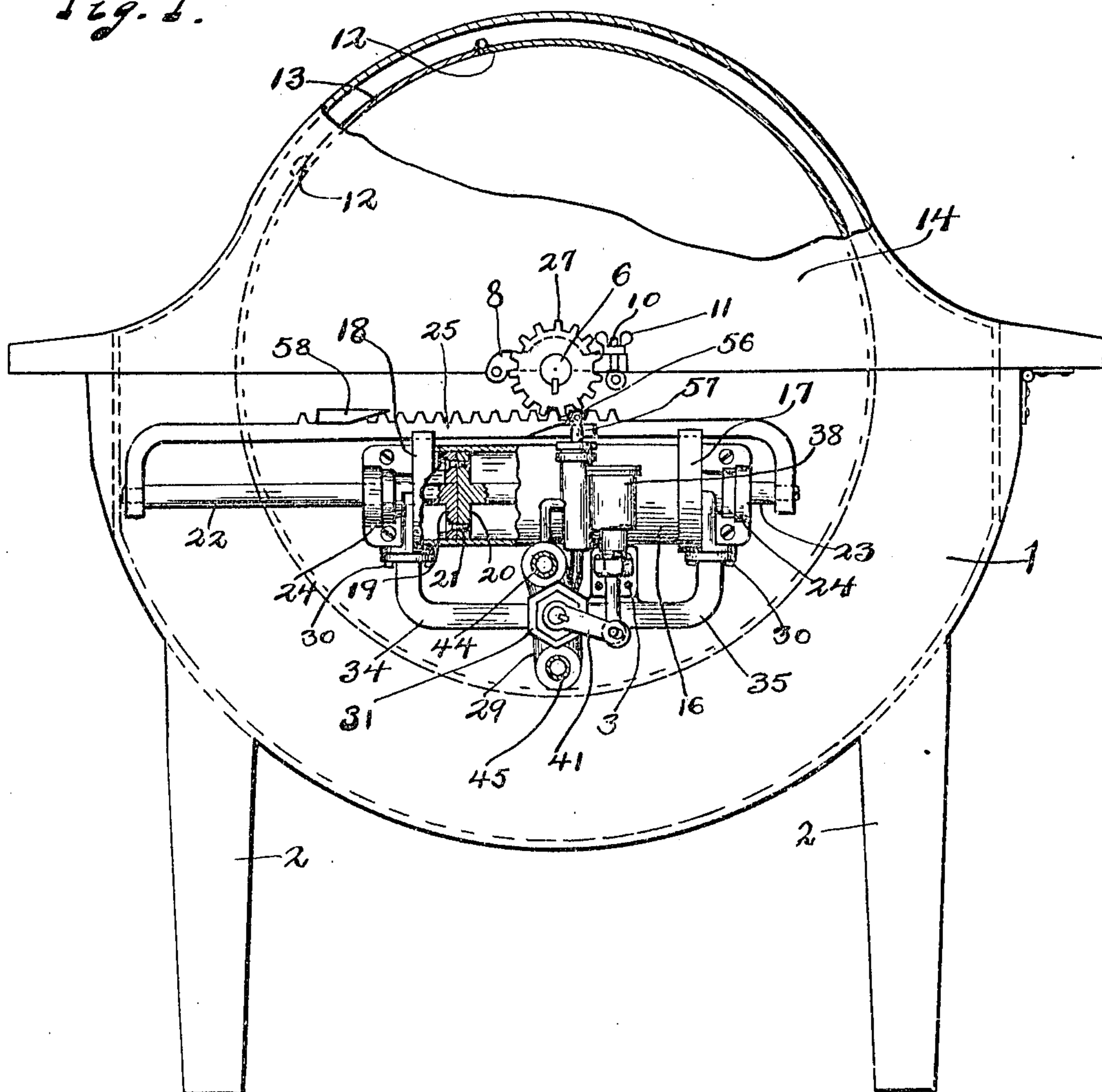


WATER MOTOR.

954,433.

3 SHEETS—SHEET 1.

Fig. 1.



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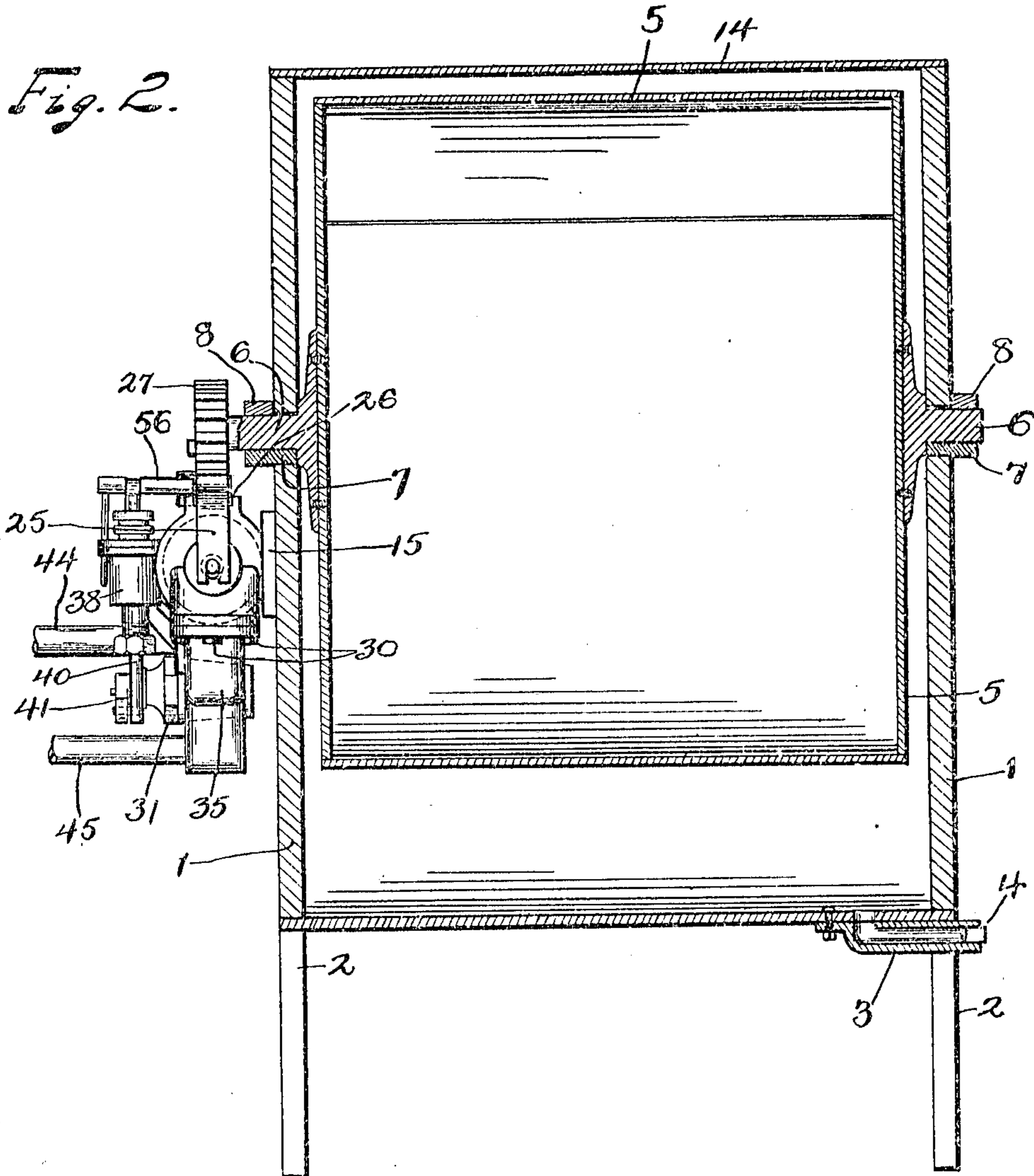
WATER MOTOR.

APPLICATION FILED DEC. 20, 1907. RENEWED DEC. 11, 1909.

954,433.

Patented Apr. 12, 1910.

3 SHEETS—SHEET 2.



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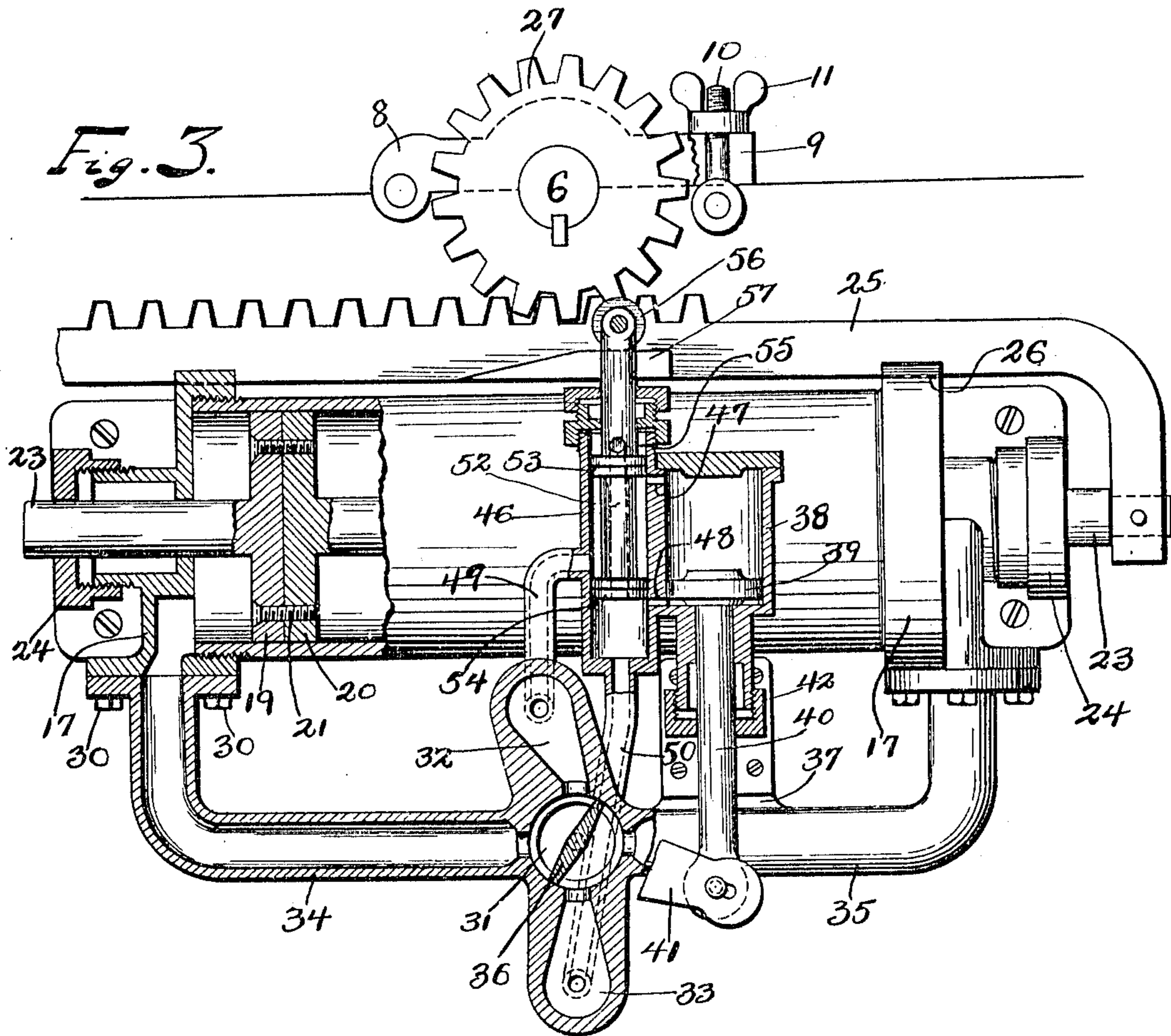
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Patented Apr. 12, 1910.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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WATER-MOTOR.

954,433.

Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed December 20, 1907, Serial No. 407,279. Renewed December 11, 1909. Serial No. 532,677.

To all whom it may concern:

Be it known that I, JOHN H. HENDRICKSON, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Water-Motors; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in water motors, and especially to devices of this character for operating domestic washing machines.

The object of this invention is to provide a motor of this character which will be compact in form so that it can be conveniently mounted on a tub, which will be economical in the use of water and which will require no attention during its operation.

My invention, therefore, consists in the features of construction, and combination of parts as described in the specification, pointed out in the claims and illustrated in the accompanying drawings.

In the accompanying drawings, Figure 1 is an end elevation of the tub provided with a motor embodying my invention. Fig. 2 is a view showing the tub in central section and the motor in end elevation. Fig. 3 is a side view of the motor partly in section.

Again referring to the drawings, 1 indicates the tub or water receptacle which is semi-cylindrical in form and is provided with suitable supports 2. In the bottom of the tub is arranged a drainage outlet 3 which is closed by a stopper 4. The drum 5 for holding the clothes is supported by means of trunnions 6 which rest in semi-circular bearings 7 formed in the side of the tub. The trunnions 6 are held in the bearing 7 by means of straps 8. Each of the straps 8 is pivotally secured at one end to the tub and in the opposite end of the strap is formed a slot 9. A bolt 10 is pivotally secured on each side of the tub and is arranged to enter the slot 9 in the strap 8, and on the upper end of the bolt 10 is arranged a thumb-screw 11 so that by screwing down on the thumb-screws the straps 8 are secured over the trunnions, or by loosening the thumb-screws the bolts can be swung out of their slots permitting the straps to be raised and the clothes drum to be removed from the tub.

The clothes drum is provided with an opening 12 having a hinged cover 13.

The tub is provided with a semi-cylindrical hinged cover 14. On one end of the tub is secured a plate 15 on which is mounted a cylinder 16 which is closed at its ends by heads 17 and 18. Within the cylinder is arranged a piston which, preferably, consists of two circular plates 19 and 20 which are secured together by screws 21. Piston rods 22 and 23 are formed integral with the respective plates 19 and 20. The piston rods 22 and 23 are made sufficiently long so that they will at all times project at the ends of the cylinder 16 and where the rods extend through the said cylinder they are provided with suitable packing glands 24. Above and extending longitudinally of the cylinder 16 is arranged a rack 25, the ends of which rest on and are secured to the ends of the piston rods 22 and 23. On the cylinder 16 are formed guideways 26 in which the rack 25 travels. On the adjacent trunnions 6 of the clothes drum is secured a gear wheel 27 which is arranged to mesh with the rack 25. It will therefore be understood that when the piston is forced to one end of the cylinder 16 the rack will travel in the same direction rotating the gear wheel 27 and consequently rotating the clothes drum and when the piston is forced to the opposite end of the cylinder the rack will again move with it, and the gear wheel 27 and the clothes drum will be rotated in the opposite direction to that in which they were first rotated. Below the cylinder 16 is arranged a casting 29 which is secured to said cylinder by screws 30 and in said casting is formed a valve chamber 31, an intake chamber 32 which communicates with the valve chamber at the top thereof, a drainage chamber 33 which communicates with the valve chamber at the bottom thereof and two passage-ways 34 and 35 which communicate with the valve chamber at diametrically opposite sides thereof and with the cylinder 16 at the respective ends thereof.

In the valve chamber 31 is mounted a valve 36 and the arrangement of the valve is such that when it is in one position it will establish communication between the intake chamber 32 and passage-way 34 and between the drainage chamber 33 and the passage-way 35 and when in its other position it will establish communication between the intake

chamber 32 and the passage-way 35 and the drainage chamber 33 and the passage-way 34. A water supply pipe 44 is connected with the intake chamber and a waste pipe 45 is connected with the drainage chamber. Therefore when the valve 36 is in the position shown in Fig. 3 the water from the supply pipe will enter the intake chamber 32 and then pass through the valve chamber 31 and through the passage-way 34 and exert a pressure on the piston in the cylinder 16 which will cause the piston to move toward the opposite end of the cylinder and the water in the cylinder will be forced through the passage-way 35 and the valve chamber 31 into the drainage chamber 33 from whence it will pass out through the waste pipe 45.

The mechanism for controlling the operation of the valve 36 is actuated by the water from the supply pipe 44 and is mounted and arranged as follows,— On the casting 29 is formed a bracket or support 37 and on this bracket is mounted a vertical cylinder 38 in which is arranged a piston 39 having a piston rod 40 which extends down and is connected with the valve 36 by an arm 41, so that as the piston moves up and down in said cylinder it will bring the valve to one or the other of its operative positions. The cylinder 38 is provided with a suitable packing gland 42. At the side of and preferably formed integral with the cylinder 38 is arranged a valve casing 46 which communicates with said cylinder 38 through passage-ways 47 and 48 at the upper and lower ends of said cylinder. The valve casing 46 is connected with the outlet chamber 33 by a pipe 50 which extends from the lower end of the valve casing and with the intake chamber by a pipe 49 which extends from the side of the casing.

In the valve casing 46 is arranged a balanced valve comprising a hollow rod 52 on which are arranged two valves 53 and 54 and the arrangement thereof is such that one of the valves will always be above and the other below the mouth of the pipe 49. A drainage opening 55 is formed in the rod 52 above the valve 53. On the end of the rod 52 is mounted a roller 56 and on the opposite ends of the rack 25 are arranged two oppositely disposed cams 57 and 58. The cam 57 is arranged to pass under the roller 56 when the rack 25 is nearing the end of its travel in one direction and thereby raise the valve rod 52 and establish communication between the pipe 49 and the cylinder 38 through the valve casing 46 and the passage-way 47 so that water from the intake chamber 32 will enter the cylinder 38 above the piston 39 and at the same time it establishes communication between the pipe 50 and the cylinder 33 through the passage-way 48 so that any water in the cylinder 38 is free to pass down

into the drainage chamber 33. The cam 58 is arranged to pass over the roller 56 and thereby depress the valve rod 52 when the rack is near the end of its travel in the opposite direction thereby establishing communication between the pipe 49 and the cylinder 38 through the passage-way 48 so that water from the intake chamber 32 will enter the cylinder 38 below the piston 39 and also establishing communication between the pipe 50 and the cylinder 38 through the valve casing, through the valve rod itself and the passage-way 47 so that water above the piston 39 will drain out through the passage-way 47 into the valve casing above the valve 52, then through the opening 47 in the valve rod and through the valve rod into the lower part of the valve casing and thence through the pipe 50 into the drainage chamber 33.

The general operation of the device is as follows,—The clothes to be washed are placed in the drum 14 and if we assume that the machine was stopped in the position shown in Fig. 3 then when the water is turned on it will enter the intake chamber 32 and divide, part flowing through the passage-way 34 and into the cylinder 16 behind the operating piston and will cause the piston to move to the opposite end of the cylinder carrying with it the rack 25 and thereby rotating the gear 27 and consequently rotating the clothes drum and part of the water will flow through the pipe 49 and into the cylinder 38 above the piston 39, but as the piston is already in its lowest position it will produce no movement of the piston at this time. As the rack 25 nears the end of its travel the cam 58 will pass over the roller 56 shoving down the valve rod 52 and as soon as the valve 54 passes below the passage-way 48 water from the intake chamber 32 will enter the cylinder 38 below the piston 39 producing an upward movement of said piston 39 and before the rack ceases to move in the direction in which it was traveling the piston 39 will have been forced to the top of the cylinder 38 carrying up the piston rod 40 and the arm 41 and thereby rotating the valve 36 so as to establish communication between the intake chamber 32 and the passage-way 35 and between the drainage chamber 33 and the passage-way 34. The water will now pass from the intake chamber 32 through the passage-way 35 into the cylinder 16 at the opposite end thereof forcing the piston to move in the opposite direction through the cylinder and consequently driving the rack in the opposite direction and again rotating the gear 27 and the clothes drum.

What I claim is,—

1. In a motor, the combination of an operating cylinder, a piston rod, a rack mounted on said piston rod, means for supplying

water to each end of said cylinder, a valve arranged to intercept the water from one end or the other end of the cylinder according to the position to which said valve is turned, an arm secured to said valve, a controlling cylinder, a piston arranged in said controlling cylinder and operatively connected with the arm of said valve, means for supplying water to said controlling cylinder, a reciprocating valve for controlling the admission of water to said controlling cylinder and oppositely disposed cams mounted on said rack and arranged to actuate said valve when the rack approaches the end of its travel in each direction.

2. In a water motor, the combination of an operating cylinder, a piston arranged in said operating cylinder and provided with a piston rod at each side thereof, a rack mounted on said piston rods, a valve casing, passageways extending from said valve casing to each end of said operating cylinder, an intake chamber communicating with said valve-casing, a drainage chamber communicating with said valve-casing, a valve arranged in said valve chamber and adapted to establish communication between the intake chamber and either of said passageways and the drainage chamber and either of said passageways according to the position in which the valve is turned, a controlling cylinder, a piston arranged in said controlling cylinder and operatively connected with said valve so that the upward movement of said piston will shift the valve to one position and the downward movement thereof will shift the valve to its other position, an auxiliary valve casing communicating with said controlling cylinder, pipes connecting the auxiliary casing with the intake chamber and the drainage chamber, respectively, a balanced valve arranged in said valve casing the valve stem having a passageway opening into the valve casing above the upper valve and below the lower valve and oppositely disposed cams mounted on the ends of the rack and arranged to come in contact with said valve stem as the rack approaches the end of its travel in either direction.

3. In a device of the character indicated, the combination of a water receptacle, a clothes drum rotatably mounted in said receptacle, a gear wheel mounted on said drum, a controlling cylinder, a piston arranged in said controlling cylinder, and provided with a piston rod at each side thereof, a rack mounted on said piston rods, said rack being arranged to engage with the gear wheel on the clothes drum, a valve chamber, an intake chamber communicating with said valve chamber, a drainage chamber communicating with said valve chamber, passageways extending from the valve chamber to each end of the operating cylinder, a con-

trolling cylinder, a piston mounted in said controlling cylinder and operatively connected with said valve, an auxiliary valve casing arranged in proximity to the controlling cylinder and communicating therewith at the upper and lower ends of said cylinder, a balanced valve arranged in said valve casing the valve stem having a passageway opening into the valve casing above the upper valve and below the lower valve and oppositely disposed cams mounted on the ends of the rack and arranged to come in contact with said valve stem as the rack approaches the end of its travel in either direction.

4. In a washing machine, the combination of a water holding receptacle, semi-circular bearings arranged in the sides of the receptacle, a clothes drum provided with trunnions arranged to rest in the bearings in the sides of said receptacle, straps pivotally secured to the sides of said receptacle and arranged to extend over said trunnions, means for locking said straps over said trunnions, a gear wheel mounted on one of said trunnions, an operating cylinder, a piston rod, a rack mounted on said piston rod and arranged to mesh with said gear wheel, means for supplying water to each end of said cylinder, a valve arranged to intercept the water from one or the other end of the cylinder according to the position to which the said valve is turned, an arm secured to said valve, a controlling cylinder, a piston arranged in said controlling cylinder and operatively connected with the arm of said valve, means for supplying water to said controlling cylinder, a reciprocating valve for controlling the admission of water to said controlling cylinder and oppositely disposed cams mounted on said rack and arranged to actuate said valve when the rack approaches the end of its travel in each direction.

5. In a washing machine, the combination of a water holding receptacle, semi-circular bearings arranged in the sides of said receptacle, a clothes drum provided with trunnions arranged to rest in the bearings in the sides of said receptacle, straps pivotally secured to the sides of said tub and arranged to extend over said trunnions, means for locking said straps in position, a gear wheel mounted on one of said trunnions, an operating cylinder, a piston mounted in said operating cylinder and provided with a piston rod at each side thereof, a rack mounted on the piston rods, and arranged to engage with the gear wheel on the trunnion of the clothes drum, a valve chamber, passageways extending from said valve chamber to each side of said operating cylinder, an intake chamber and a drainage chamber communicating with said valve chamber, a valve arranged in said valve chamber, an operating arm secured to said

valve, a controlling cylinder, a piston arranged in said controlling cylinder, a piston rod secured to said piston and connected at its outer end with the arm for operating the
5 valve, an auxiliary valve casing communicating with said controlling cylinder at the top and bottom thereof, passageways connecting said auxiliary valve casing with said intake chamber and said drainage chamber,
10 a valve rod arranged in said valve casing and having two valves mounted thereon, a passageway formed in said valve rod and communicating with the upper and lower

ends of the valve chamber, a roller mounted on the upper end of said valve rod and 15 oppositely disposed cams mounted at opposite ends of said rack and arranged to come in contact with said roller.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses. 20

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