

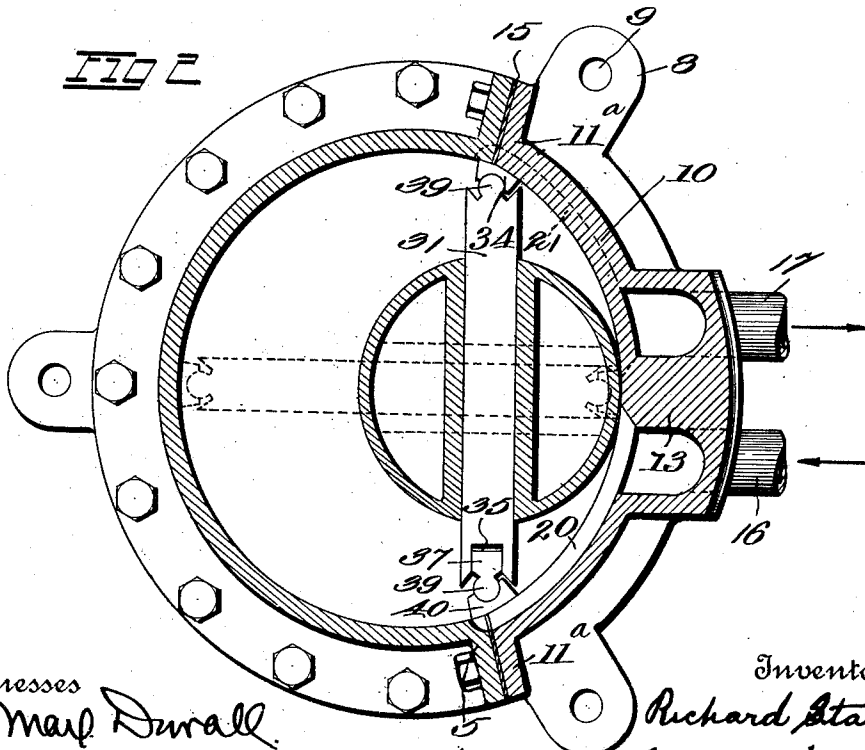
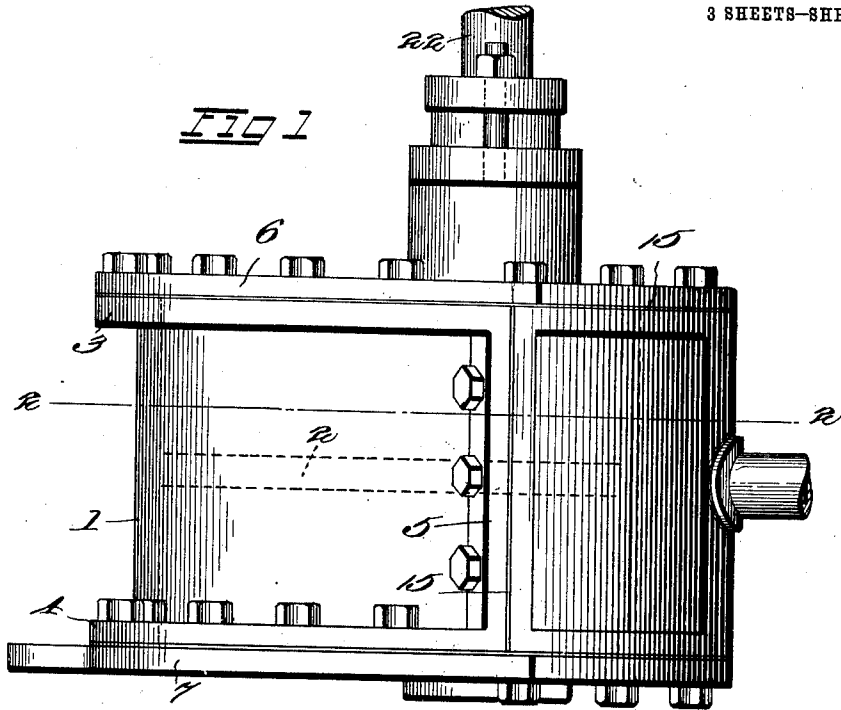
R. STAR.
MOTOR.

APPLICATION FILED DEC. 6, 1909. RENEWED DEC. 16, 1910.

997,159.

Patented July 4, 1911.

3 SHEETS—SHEET 1.



Witnesses
N. (Mar) Durrall
Byron B. Hollings.

Inventor
Richard Star,
By Wilkinson, Fisher & Witherspoon
Attorneys.

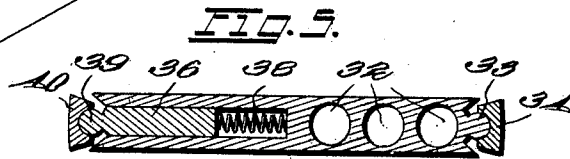
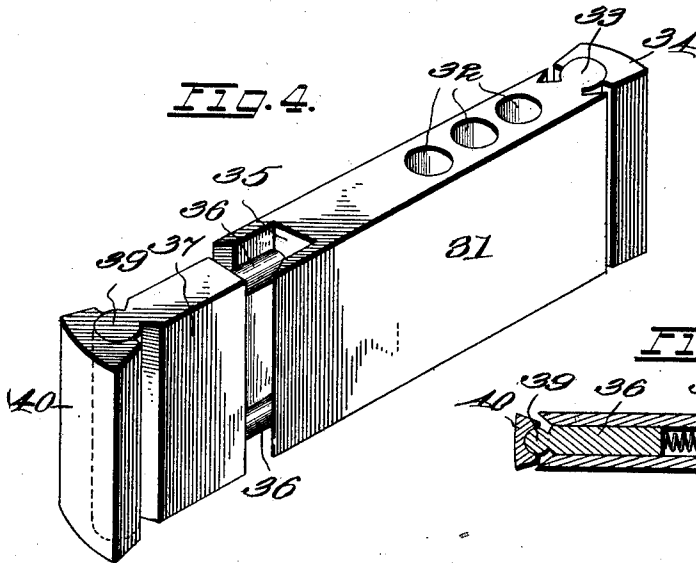
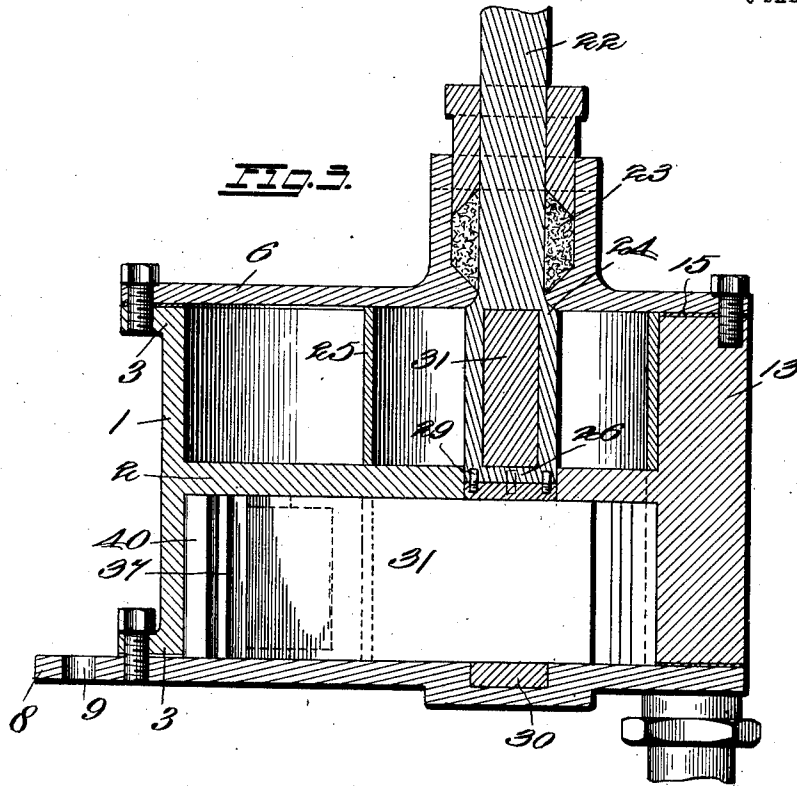
R. STAR.
MOTOR.

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3 SHEETS—SHEET 2.



Witnesses
W. Map. Durrall.
Geo. A. Byrne.

Inventor
Richard Star.
By Wilkinson, Fisher & Witherston
Attorneys.

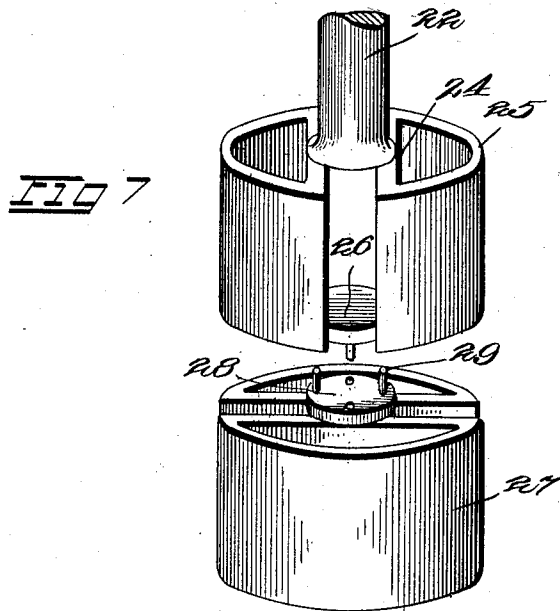
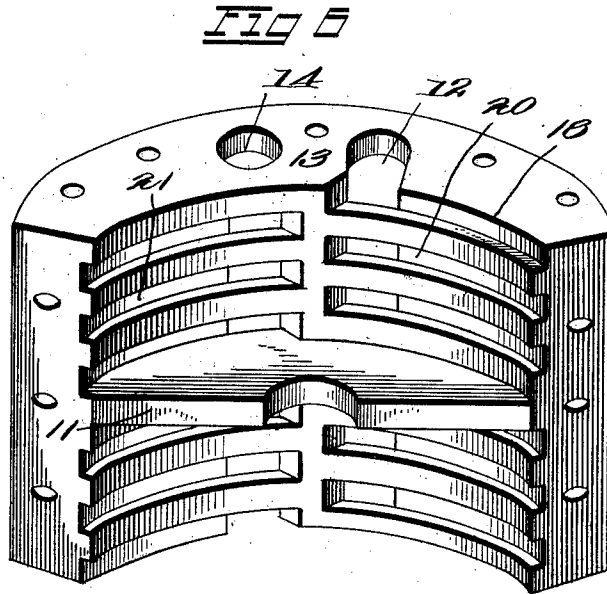
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3 SHEETS—SHEET 3.



Witnesses
W. May Duvall
Byron B. Collings

Inventor
Richard Star.
By William, Fisher & Witherston
Attorney S.

UNITED STATES PATENT OFFICE.

RICHARD STAR, OF NEW YORK, N. Y.

MOTOR.

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Specification of Letters Patent.

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Application filed December 6, 1909, Serial No. 531,600. Renewed December 16, 1910. Serial No. 597,721.

To all whom it may concern:

Be it known that I, RICHARD STAR, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Motors; and I do 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 appertains to make and use the same.

My invention relates to improvements in motors and is primarily intended to act as a water motor for the indicator apparatus shown in my application Serial No. 496,022, filed May 14, 1909, but is not restricted to this use or to the nature of the operating fluid.

The object of my invention is to produce a fluid operated motor with a plurality of pistons so arranged that the pressure thereon of the operating fluid will be practically constant all the time.

With this object in view, my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a side elevation of my improved motor. Fig. 2 is a cross section thereof on the line 2—2 of Fig. 1. Fig. 3 is a longitudinal section of a modified form. Fig. 4 is a perspective view of one of the sliding pistons. Fig. 5 is a cross section of the same. Fig. 6 is a view, in an inverted position, showing the casting inclosing the water ports, of the modification shown in Fig. 3, and Fig. 7 is a view of the parts in which the pistons slide, the parts being shown separated from each other.

1 represents a casing formed in the segment of a cylinder and divided by the partition 2 into two substantially equal chambers. The casing 1 is provided with horizontal flanges 3 and 4 and vertical flanges 5.

6 represents a top plate adapted to be fitted over the top of the casing 1, and 7 represents a bottom plate, the latter being provided with a plurality of projections 8, having perforations 9 therein, through which bolts may be passed to secure the device on a suitable support.

10 represents a casing, which casing is provided with a central partition 11, said casing being made of two similar parts separated by the division plate or bar 13. The

casing 10 is provided with vertical flanges 11^a secured by bolts to the flanges 5. The top and bottom plates 6 and 7 are secured to the horizontal flanges of the casing 1 and to the part 10, the division planes being supplied with suitable packing, as indicated at 15.

The casting 10 is bolted to the casing 1, forming with the partitions 2 and 11 and the top plates 6 and 7, two chambers of the same capacity, each of which is nearly cylindrical. The casting 10 is provided with an inlet pipe 16 and an outlet pipe 17 for the operating fluid, usually water. A number of long ports, such as 20, are provided in the casting 10, a series of such ports being located both above and below the partition 11 and on each side of the bar 13. The inlet ports 20 and the corresponding outlet ports 21 are staggered in relation to each other, as shown in Fig. 6, so as to prevent the outer surfaces of the plates 34 and 40 from wearing unevenly and to prevent the operating fluid from leaking past the plates 34 and 40. In the form shown in Figs. 1 and 2, the inlet and outlet pipes are centrally located in relation to the casing 1, while in the modified form shown in Figs. 3 and 6, the inlet and outlet pipes are at the bottom. The ports 20 are connected by a vertical passage 12 and the parts 21 by a similar passage 14.

22 represents the driven shaft which passes through a suitable stuffing box 23 in the top plate 6, and which is enlarged as shown at 24. Below this enlargement, the shaft is provided with two hollow segments 25, joined together at the bottom by a circular plate 26, having pins projecting downward therefrom. The shaft and the parts 25 operate in the upper chamber. In the lower chamber are two segmental hollow castings 27, united at the top by a circular casting 28, and having pins 29 projecting upwardly therefrom. The pins in the parts 26 and 28 are adapted to enter corresponding perforations in the other disk or plate, as shown in Fig. 3. On the lower side, the parts 27 are united by a circular plate or disk 30, which fits in a circular recessed extension of the bottom plate 7, the disks or plates 26, 28 and 30 being of the same size as the enlarged portion of the shaft 22 in the upper chamber.

Between the two parts 25 is arranged a sliding piston, and between the parts 27 is

arranged another sliding piston of exactly the same shape, but these pistons are located at right angles to each other. These pistons are shown in perspective and cross section in Figs. 4 and 5.

Each piston consists of a body portion 31, preferably provided with a series of holes 32 to make the construction lighter. At one end, the piston is cut away, leaving a head 33 rounded in cross section, over which a vibratory plate 34 is adapted to slip, said plate being curved on its outer face and adapted to fit against the inside of the casings 1 and 10. At the other end, the piston is cut away as shown at 35, and is provided with a number of holes into which pins 36 project, said pins being carried on a movable end piece 37. Springs 38 pressing against the ends of the pins 36, normally tend to thrust the end-piece 37 outward. This end-piece is provided with a head 39, rounded in cross section, and on this is adapted to slide an end plate 40, having its outer face curved, as shown in Fig. 4.

The partitions 2 and 11 are cut away, as shown in Figs. 3 and 6, to receive the disks 26 and 28.

It should be noted that the springs 38 always insure a close fit of the end plates 34 and 40 against the interior of the casings 1 and 10, and that just as the inlet ports are fully uncovered the outlet ports are also opened, as shown in Fig. 2, thus avoiding friction. It should also be noted that the outside of the parts 25 and 27 is curved and that the curvature of the end plates 34 and 40 is the same as the curvature of the parts 25 and 27, thus insuring that a close fit always exists between the revolving parts and the inner part of the bar 13.

The operation is as follows:—Water, being admitted through the pipe 16, enters the passage 12 and rushes out through the ports 20, striking against the pistons in the upper and lower chambers, these pistons being at right angles to each other. (Or the water may be admitted at the bottom, if desired.) The incoming water, or other fluid, forces the pistons around in the direction of the hands of a clock in Fig. 2, until the ports 21 are uncovered, when the water escapes through the ports 21, passage 14 and outlet pipe 17 (or through a similar pipe leading from the bottom of the device). The operation is continuous as long as the flow of water, or other fluid, is allowed to pass unimpeded through the inlet pipe.

I claim:—

1. In a motor, the combination of a casing, one part of which is provided with a series of inlet and outlet ports, abutting partitions dividing said casing into two substantially equal chambers, a shaft passing through said chambers and said partition, said shaft being provided in each chamber

with a circular enlarged portion, having a slot therein, and a piston having movable ends arranged to slide in the slot in said shaft in each chamber, said pistons being arranged at right angles to each other, substantially as described.

2. In a motor, the combination of a casing provided with inlet and outlet pipes and a partition dividing said casing into two substantially equal chambers, one part of said casing being provided with a double series of inlet and outlet ports, one series above and one series below the partition, said inlet and outlet ports being staggered in relation to each other, a shaft passing through said chambers and said partition, said shaft being provided with a circular enlarged portion in each chamber, and each of said enlarged portions being provided with a slot, said slots being arranged at right angles to each other, and sliding pistons having movable ends, one of said pistons being mounted in the slot in each of said enlarged portions of the shaft, substantially as described.

3. In a motor, the combination of a casing provided with inlet and outlet pipes, a perforated two-part partition dividing said casing into two equal chambers, one part of said casing being provided above and below said partition with a series of inlet ports and a series of outlet ports, said ports being arranged staggered in relation to each other, a shaft passing through said chambers and said partition, said shaft having a circular enlargement in each chamber, each of said enlargements being provided with a vertical slot, said slots being arranged at right angles to each other, disks provided with perforations and pins, and sliding pistons having flexible ends, one mounted in the slot of the enlarged portion of said shaft in each chamber, substantially as described.

4. In a motor, the combination of a casing having a two-part perforated partition forming two equal chambers, top and bottom plates, the top plate being provided with a perforation, and the bottom plate being provided with an extension having a circular slot cut therein, one part of said casing being provided with a vertical bar and with inlet ports and outlet ports located in communication with the chambers, respectively, on each side of said bar, said inlet and outlet ports being staggered with respect to each other, a shaft passing through said top plate and said partition, said shaft being provided with an enlarged circular portion in each chamber, each of said circular portions having a central slot, disks provided with perforations and pins, whereby said circular portions may be united together with the slots therein at right angles to each other, the lower enlargement of the shaft being provided with a circular disk fitting in the

slot of the bottom plate, and pistons slid-
ably mounted, one in each chamber in the
slot of the enlarged portions of the shaft,
each piston consisting of a body portion
5 having a rounded end, an end plate flexibly
mounted thereon, an end-piece detachably
connected to the other end of the piston,
springs normally tending to press said end-
piece away from the body of said piston,
10 said end-piece terminating in a rounded

portion, and an end plate flexibly mounted
on said rounded portion, substantially as de-
scribed.

In testimony whereof, I affix my signa-
ture, in presence of two witnesses.

RICHARD STAR.

Witnesses:

JOHN LUTHY,

CHARLES WM. RUGG, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
