

G. W. COFFIELD.

WATER MOTOR.

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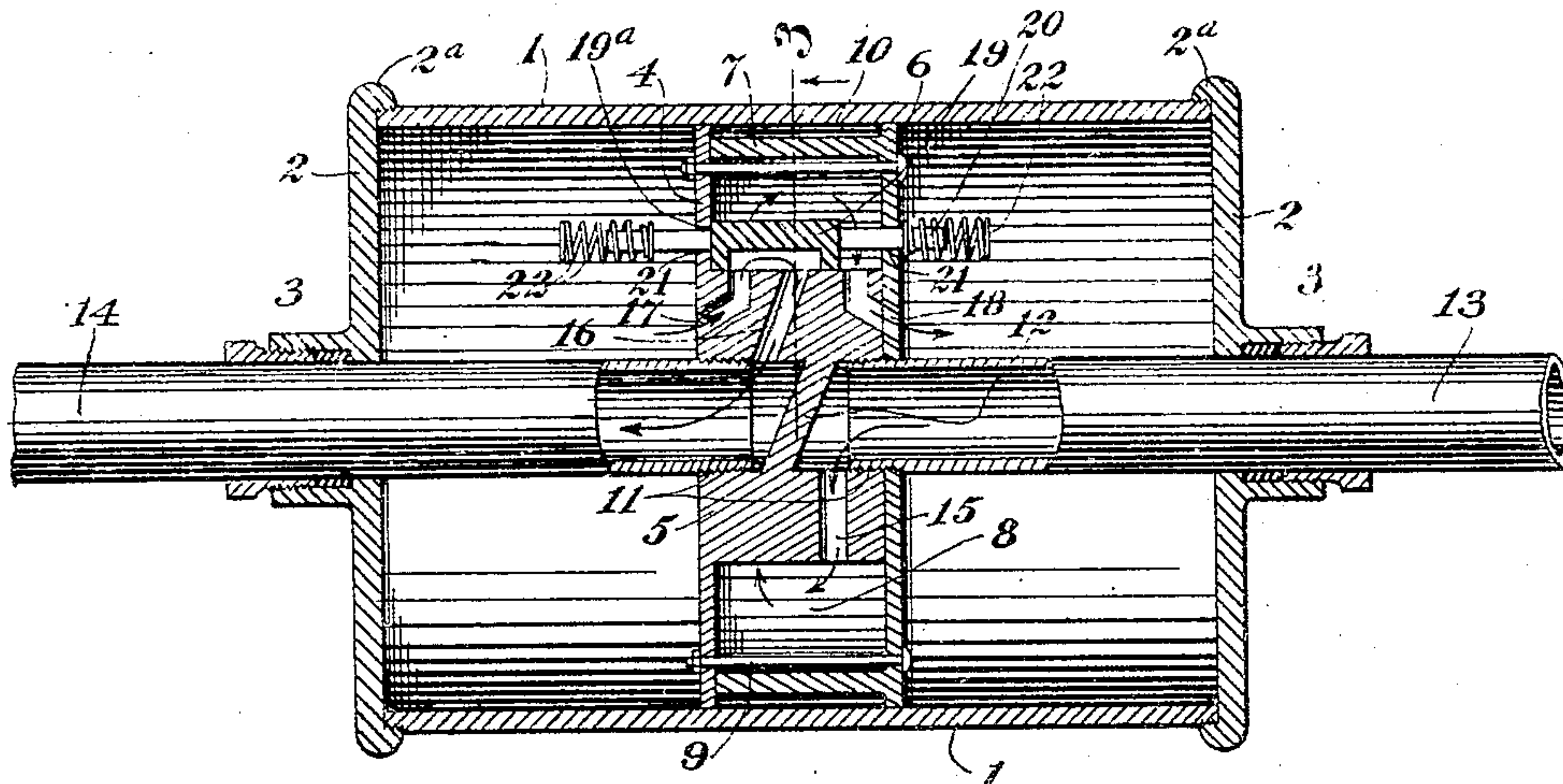


Fig. 1

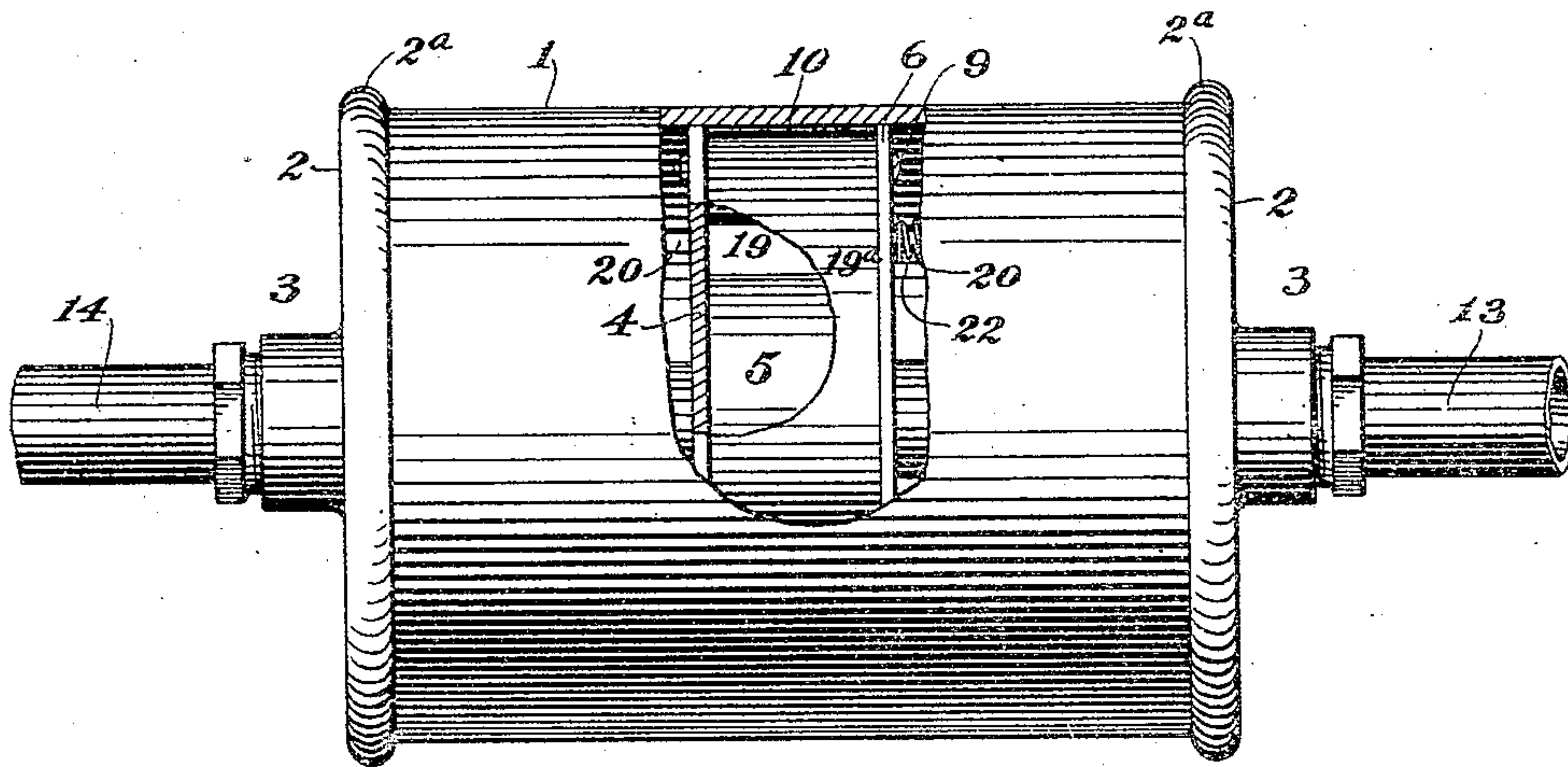


Fig. 2

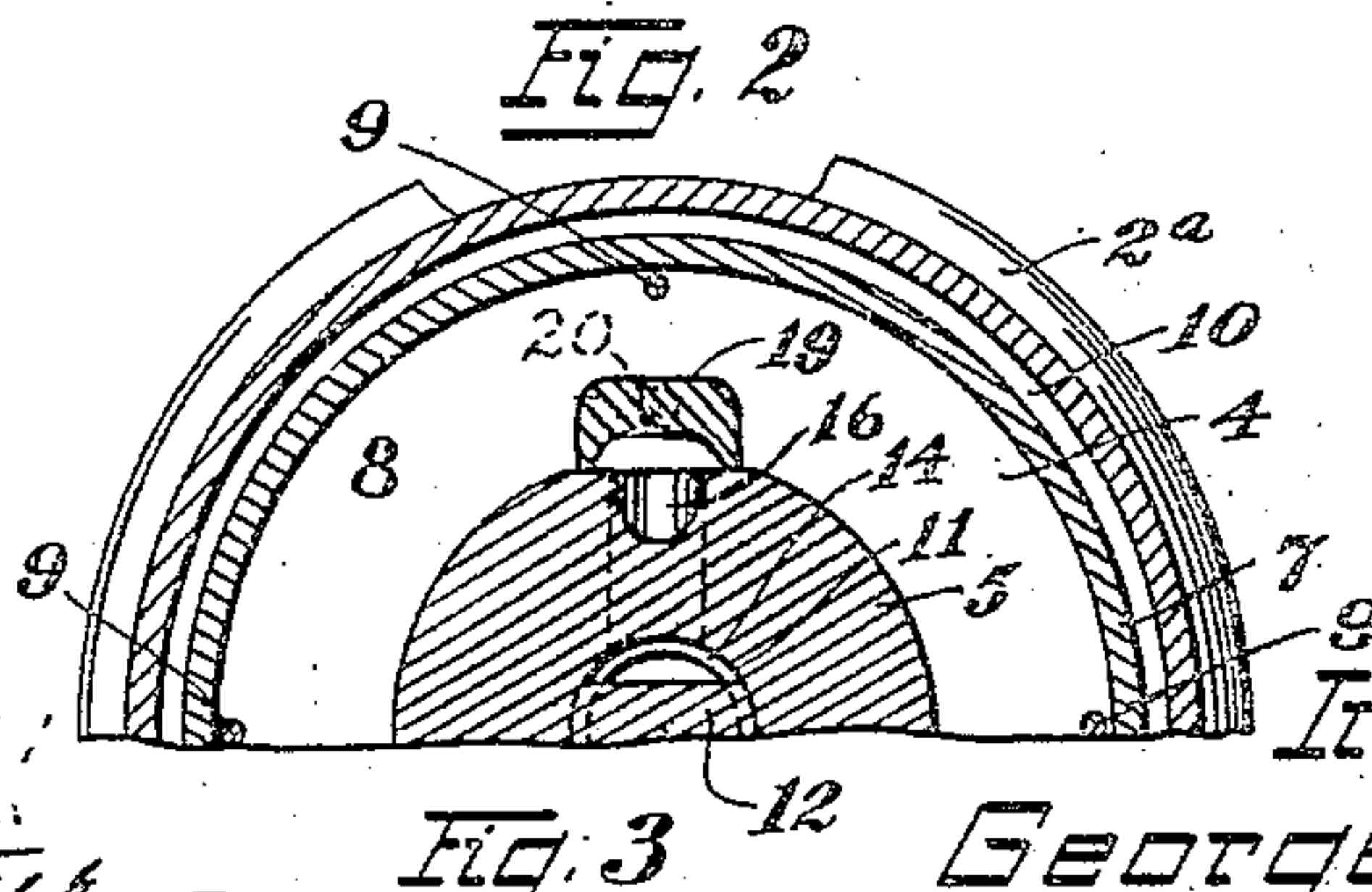


Fig. 3

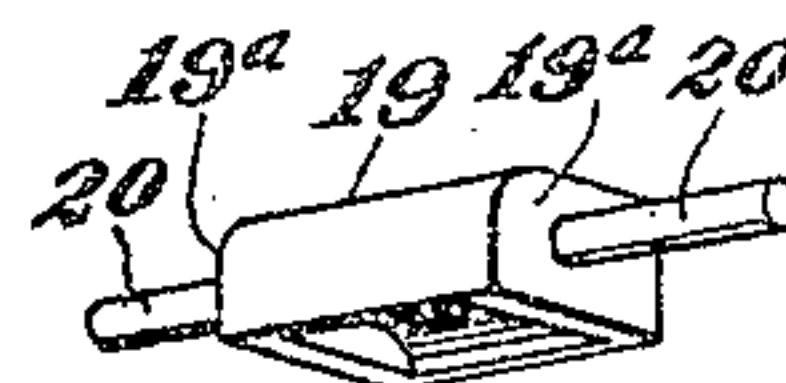


Fig. 4

Witnesses:  
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George W. Coffield  
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# UNITED STATES PATENT OFFICE.

GEORGE W. COFFIELD, OF CLEVELAND, OHIO.

## WATER-MOTOR.

955,501.

Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed April 22, 1909. Serial No. 491,415.

*To all whom it may concern:*

Be it known that I, GEORGE W. COFFIELD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

My invention relates to new and useful improvements in water motors.

The primary object of the invention is to provide a generally improved motor of this class which will be exceedingly simple in construction, cheap of manufacture and efficient in use.

The invention relates more particularly to piston-head and valve mechanism of simple, cheap and durable construction, reliable in its operation, and having its parts adapted to adjust themselves to the wear incident to use and reducing the liability of disarrangement or breakage of parts to a minimum.

The present embodiment of the invention is designed for use in driving light machinery, such as washing machines and the like.

With the above mentioned objects in view the invention consists in the novel construction, arrangement and combination of parts, hereinafter described, illustrated in one of its embodiments in the accompanying drawings, and particularly pointed out in the appended claim.

Referring to the drawings forming a part of this specification, Figure 1 is a longitudinal sectional view of a cylinder and reciprocating piston embodying this invention. Fig. 2, a side elevation of the same, a portion of the cylinder and piston head being broken away for the purpose of clearer illustration of the parts. Fig. 3, a cross sectional view taken through line 3 of Fig. 1. Fig. 4, a detail perspective view of the slide valve carried by and within the improved reciprocating piston-head.

Similar numerals of reference designate like parts throughout all the figures of the drawings.

The cylinder of the improved motor comprises the usual cylindrical main body portion 1, inclosed at its ends with cylinder heads 2, provided with piston pipe openings surrounded by stuffing boxes 3. The cylinder heads 2, are mounted and secured upon the ends of the cylinder body 1 by any suitable means.

The piston-head comprises a main disk 4,

provided with a port-head 5, and a second disk member 6, provided with a flanged rim or ring portion 7, adapted to abut against the main disk 4, and providing a fluid chamber 8, surrounding the port-head 5. When assembled, the disk member 6, abuts against one side of the port-head 5 and the main disk 4, and is removably secured to the main disk 4, by means of a plurality of connecting bolts or screws 9. An annular recess chamber 10, is formed about the rim or ring portion 7, for the reception of a suitable packing for the piston-head.

The port-head 5, is provided on opposite sides with openings 11, separated by means of a divisional or fluid-diverting wall 12 in the port-head, one of said openings 11 being adapted to receive and contain an inlet piston pipe 13 and the other an outlet piston pipe 14.

The cylinder of the improved motor may be mounted in any suitable and convenient manner and the outlet piston pipe 14 may be connected to the machinery to be operated by means of any suitable and convenient gearing such as a rack and pinion or the like. The inlet piston pipe conveys the water or other operating fluid into the piston head and cylinder as hereinafter described, and may be connected to the source of supply in any suitable and convenient manner.

The port-head 5, is provided with inlet and outlet ports 15 and 16, communicating with the inlet and outlet piston pipes 13 and 14, respectively, the inlet port 15 receiving the operating fluid from the inlet piston pipe 13, and conducting it into the fluid chamber 8, whence it is conducted alternately through the ports 17 and 18 into the cylinder chamber, the outlet port 16, receiving the ejected fluid alternately from the cylinder chamber through the ports 17 and 18, as the operating fluid is ejected through the latter by means of the valve mechanism hereinafter described. The valve ports 17 and 18, intersect or extend through the face ends of the piston-head and are formed adjacent to the initial inlet portion of the outlet port 16, and, in the present instance, in horizontal alinement with the latter so as to be thrown into and out of communication alternately with the outlet port 16, by means of the slide valve to be now described.

The slide valve 19, is mounted within the fluid chamber 8, and upon the outer periphery of the port-head 5, and is provided



with oppositely-disposed valve stems 20, which pass loosely through openings 21, formed in the opposite walls or faces of the piston-head, said valve stems projecting 5 through and beyond said openings so as to alternately engage the cylinder heads 2. As a means of preventing leakage or passage of the operating fluid through the openings 21, to the exhaust fluid, the slide valve 19, 10 has its face ends 19<sup>a</sup> entirely surrounding the valve stems 20, so that the face ends 19<sup>a</sup> will abut against the inner walls of the piston head surrounding the openings 21 and thus securely close or seal them, while the 15 piston is traveling from one end of the stroke, or extreme position to the other, as shown in Fig. 1 of the drawings.

It will be understood that the movement of the valve shall be free from as little friction as possible between the faces of the piston head and the stems of the valve; therefore the openings in the piston walls through which the valve stems project, are necessarily somewhat larger than the diameters 20 of the valve stems. In order to provide means for sealing these openings around the valve stems, the ends of the valve are faced or made parallel throughout with the inner sides of the piston walls 4 and 6 to act as a 30 valve to close said openings.

Springs 22, which assist in reversing the valve, thereby reversing the piston at the end of the stroke or extreme movement, are located in any convenient, operative position, preferably on and extending beyond 35 the valve stems 20, as shown in Fig. 1 of the drawings in the present instance.

In Fig. 1 the piston is represented as moving from right to left, the valve abutting against the inner forward wall of said piston thus throwing the chamber 8 in communication with the cylinder chamber to the right of or behind said piston through the port 18, and establishing communication 40 between the cylinder chamber to the left or in front of said piston and the exhaust piston pipe 14, through the ports 17 and 16, as will readily be observed from the drawing. As the piston approaches the extreme end of 50 its stroke, the valve spring 22 compresses

until the end of the valve stem comes in contact with the cylinder head, directly or indirectly, when the valve is moved from its extreme position. The valve is then in a balanced position on account of the equality 55 of pressure on both face ends and is prevented from maintaining said balanced position between the ports 17 and 18, by the compressed spring which now acts independently of the moving piston to throw 60 said slide valve to the opposite side of the piston head, thus completing its movement and thereby reversing the piston. Arrows indicate the direction of the flow of the operating fluid, both inlet and exhaust, while 65 the valve is in the position indicated by the drawings.

Having thus described an embodiment of my invention, what I claim and desire to secure by Letters Patent is:— 70

In a water motor, a piston head comprising a main disk provided with a port-head, a second disk member abutting with said port-head and having an integral rim abutting with said main disk and forming, conjointly with said main disk and port-head, 75 an annular fluid chamber surrounding said port-head, said port-head being provided with inlet and outlet pipes and inlet and outlet ports communicating with said pipes, 80 said port-head being provided with valve port openings leading from said fluid chamber and extending through the walls of the piston head to the cylinder chambers, a slide valve seated on the port-head, said slide 85 valve having stems projected from the ends thereof loosely through openings in the walls of the piston, the ends of said valve surrounding the stems being faced to lie parallel with the inner sides of the walls of 90 said piston and adapted to seal the openings in the piston walls surrounding the valve stems when the valve is moving to either of its extreme positions.

In testimony whereof I have affixed my 95 signature, in presence of two witnesses.

GEORGE W. COFFIELD.

Witnesses:

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