No. 750,337. PATENTED JAN. 26, 1904.

J. F. BENTZ.

FLUID MOTOR.

APPLICATION FILED JUNE 19, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

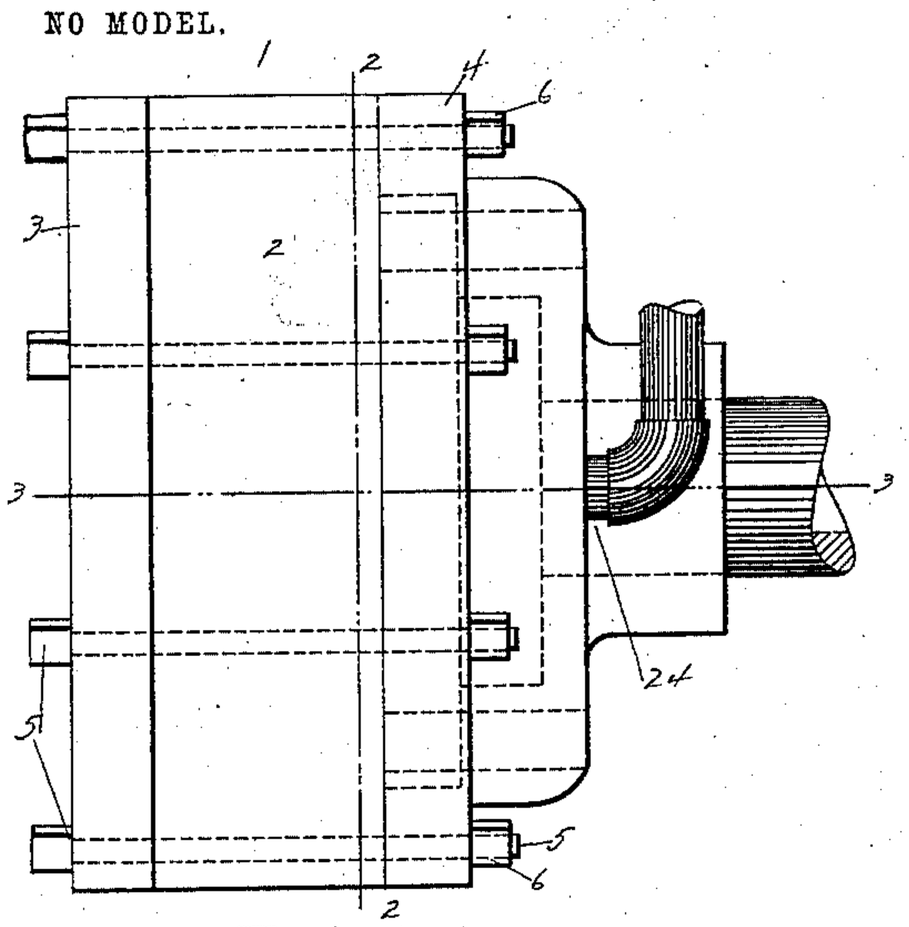

FIG. 1.

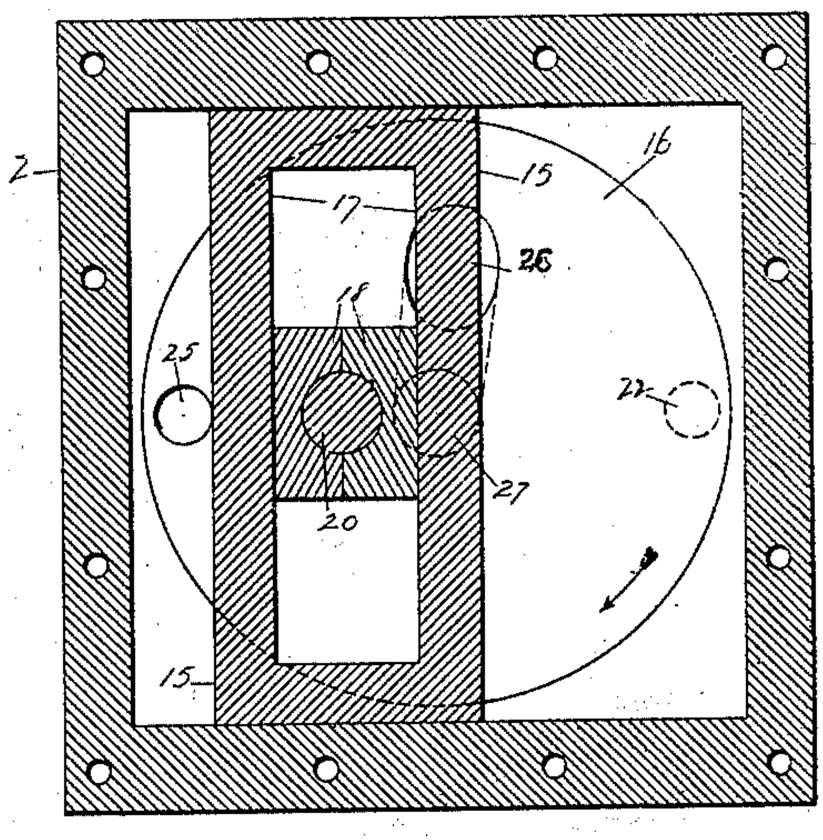

FIG. 2.

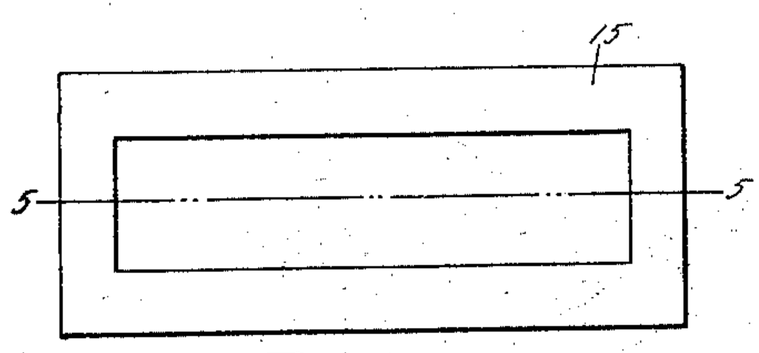

FIG. 4.

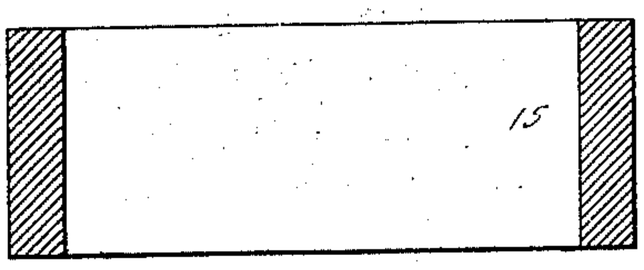

FIG. 5.

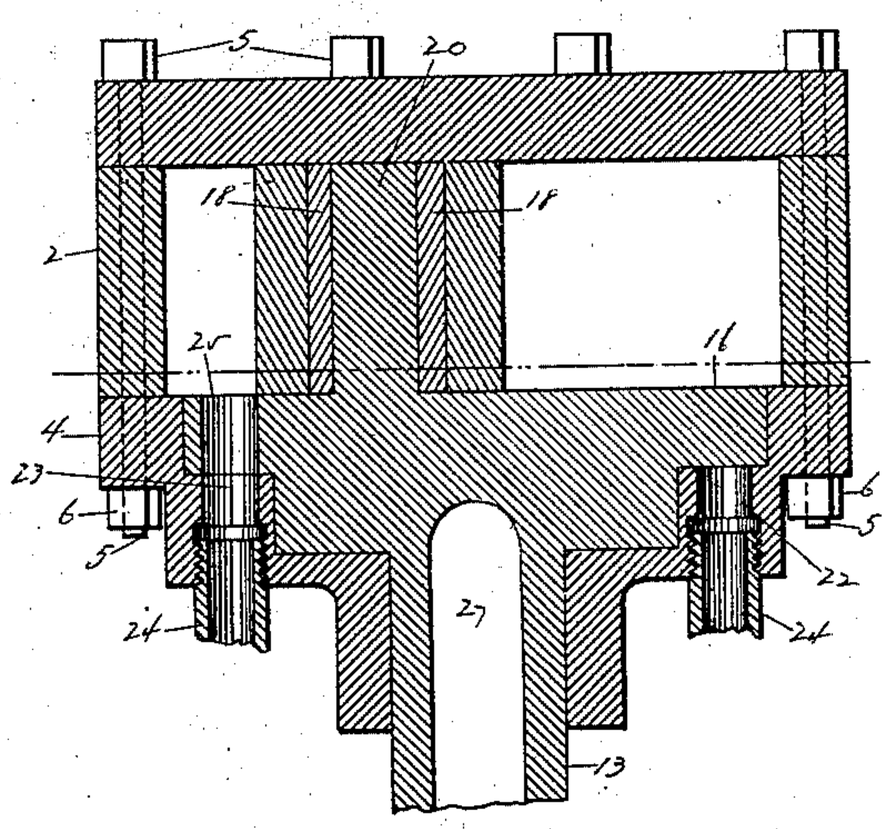

FIG. 3.

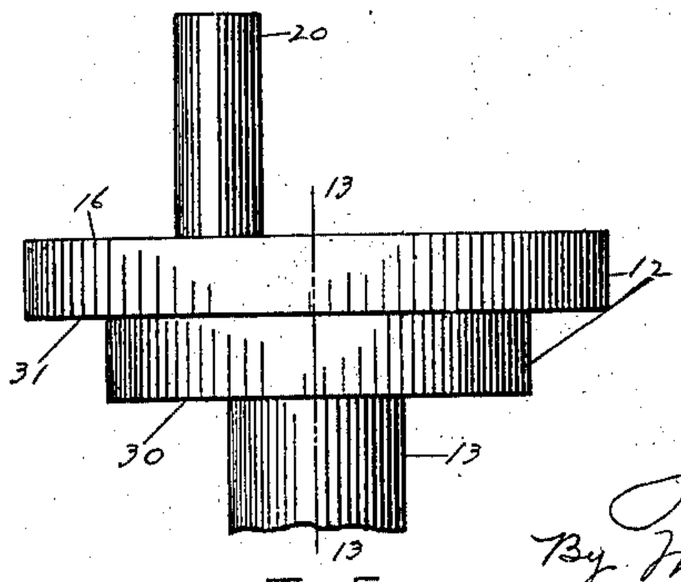

FIG. 6.

WITNESSES.

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FLUID MOTOR.

APPLICATION FILED JUNE 19, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

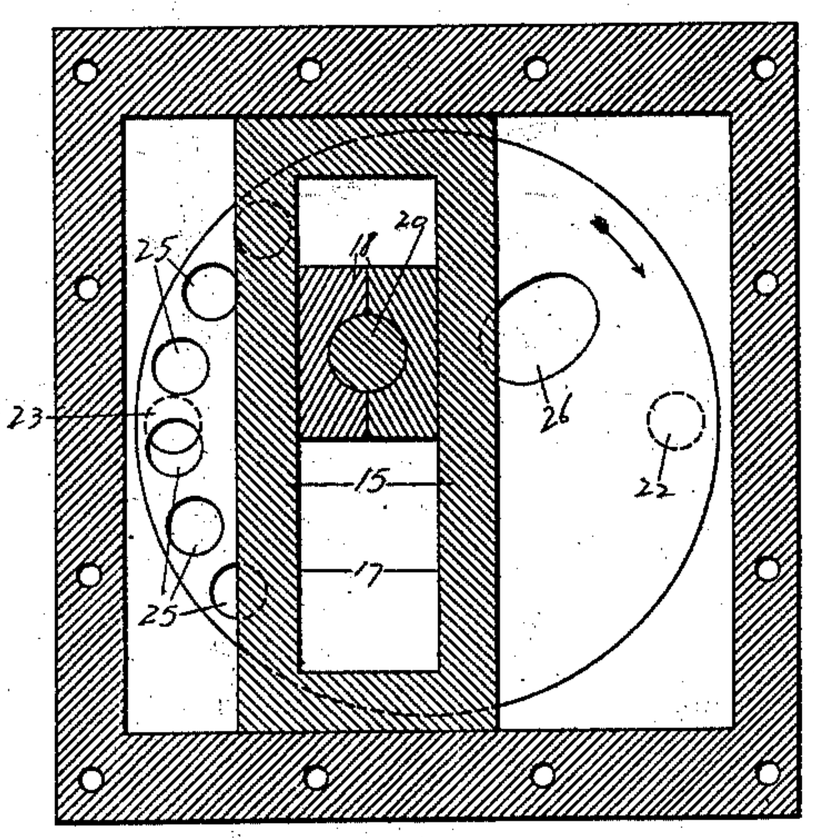

FIG. 7.

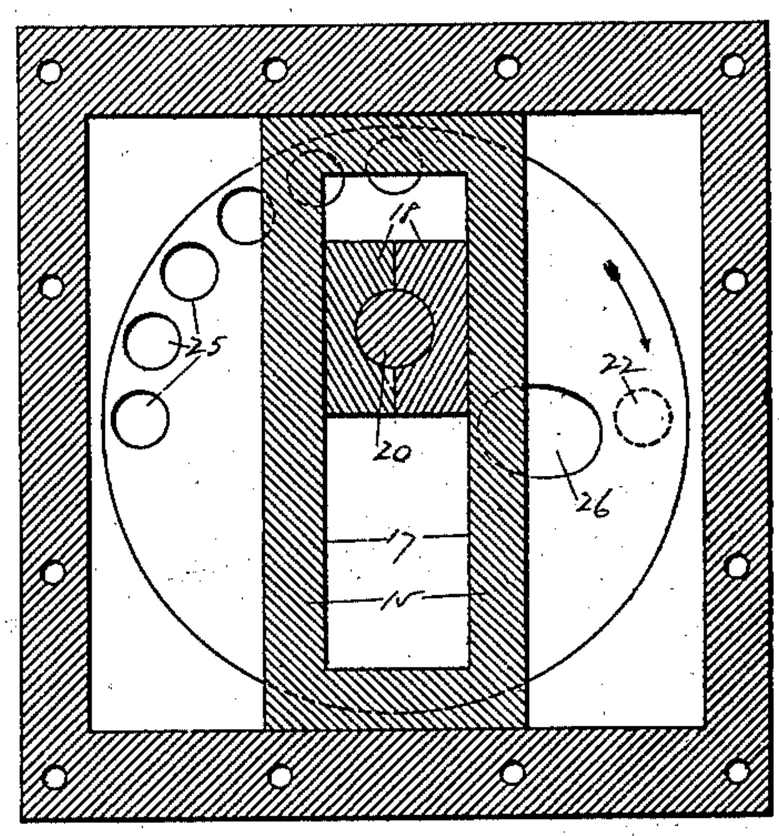

FIG. 8.

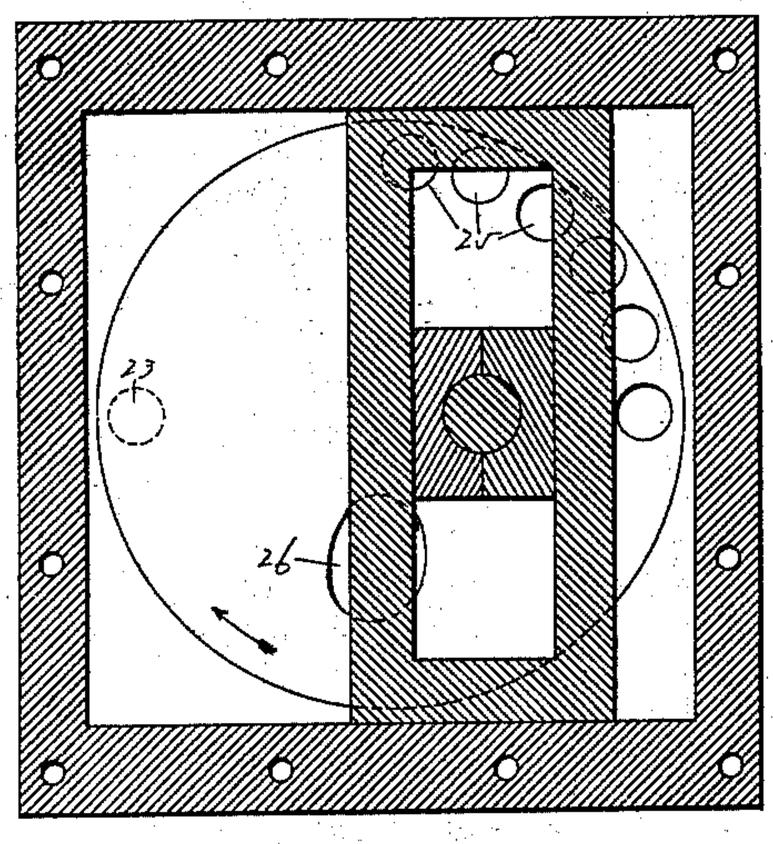

FIG. 9.

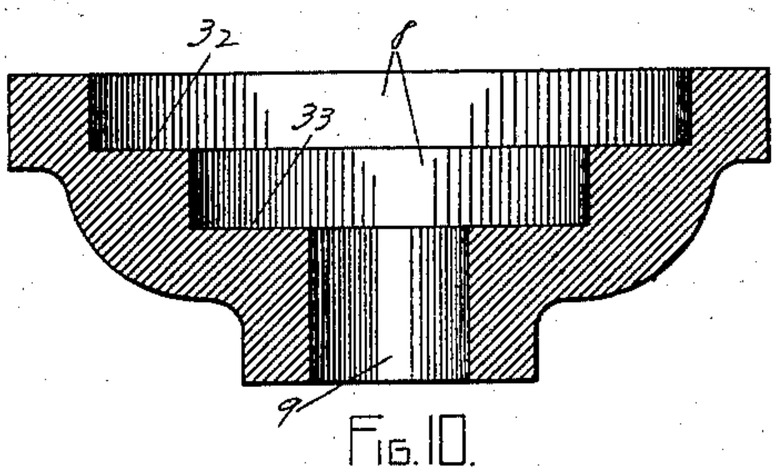

FIG. 10.

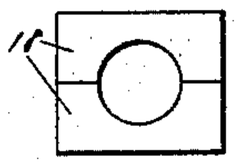

FIG 11

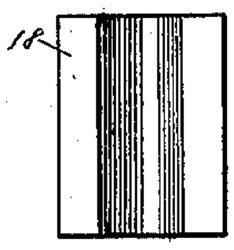

FIG 12

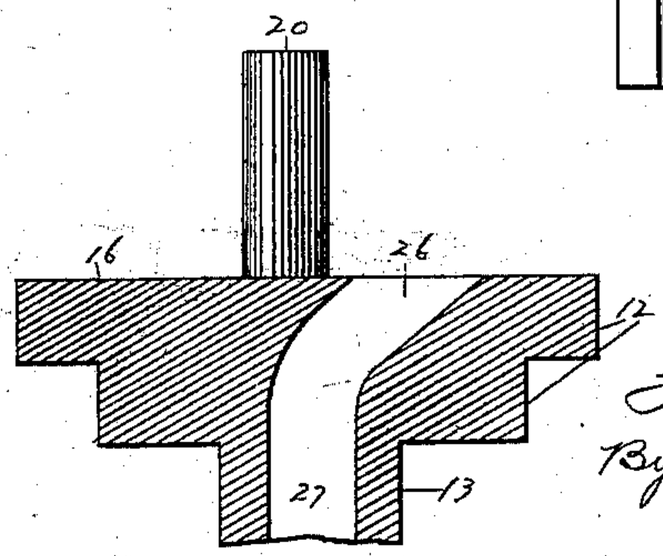

FIG 13

WITNESSES.

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No. 750,337. Patented January 26, 1904.

UNITED STATES PATENT OFFICE.

JACOB F. BENTZ, OF SCHENECTADY, NEW YORK.

FLUID-MOTOR.

SPECIFICATION forming part of Letters Patent No. 750,337, dated January 26, 1904.

Application filed June 19, 1903. Serial No. 162,212. (No model.)

To all whom it may concern:

Be it known that I, JACOB F. BENTZ, a citizen of the United States, residing at Schenectady, county of Schenectady, and State of New York, have invented certain new and useful Improvements in Fluid-Motors, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification.

Similar characters refer to similar parts in the several figures.

Figure 1 of the drawings is a view in end elevation of the improved fluid-motor. Fig. 2 is a vertical cross-section of the same, taken on the broken line 2 2 in Fig. 1. Fig. 3 is a horizontal section of the same, taken on the broken line 3 3 in Fig. 1. Fig. 4 is a plan view of the piston detached. Fig. 5 is a vertical section of the same, taken on the broken line 5 5 in Fig. 4. Fig. 6 is a side view of the crank-disk, crank-pin, and a portion of the crank-shaft shown detached. Figs. 7, 8, and 9 are sections similar to that shown in Fig. 2, illustrating the movements of the piston and crank-disk. Fig. 10 is a central section of the countersunk wall of the piston-inclosing case detached and similar to the section shown in Fig. 3, but slightly modified in exterior form. Fig. 11 is an end view of the slide bearing-blocks for the crank-pin. Fig. 12 is an inner side view of one of the bearing-blocks detached from the other. Fig. 13 is a section of the disk, taken on the broken line 13 13 in Fig. 6.

In the cross-sectional views shown in Figs. 2, 7, 8, and 9 the screw-threaded bolts are omitted.

The case 1, which forms the piston-chamber, is composed of a rectangular frame 2 and side plates or walls 3 and 4, clamped upon opposite sides of the frame by means ot the screw-threaded bolts 5 and nuts 6 so as to form a steam-tight chamber within the rectangular frame.

The side wall 4 is provided with a countersink 8 and a bearing-aperture 9, extending from the countersink through the wall, as shown in Figs. 3 and 10, adapted to receive the crank-disk 12 and crank-shaft 13, shown detached in Fig. 6, and inserted in the countersunk wall in Fig. 3.

The piston 15 is composed of a rectangular frame (shown in Figs. 4 and 5) which is adapted to reciprocate in the piston-chamber, forming practically a steam-tight connection with the end walls 3 and 4 and two opposite sides of the frame 2, also with the inner face 16 of the disk, which is flush with the inner surface of the wall 4, as shown. The inner surface 17 of the sides of the piston form a slideway for the bearing-blocks 18, inclosing the crank-pin 20.

The end wall 4 is provided with oppositely-disposed openings 22 and 23, forming portions of inlet-ports for the motor. The openings are each provided with a pipe 24, leading to a steam-supply or a supply of other fluid under pressure. (Not shown.)

The crank-disk is provided near one edge with an aperture 25, adapted to register alternately with the openings 22 and 23 during the rotary movements of the disk and complete the inlet-ports alternately on opposite sides of the piston.

As shown in Fig. 2, the inlet-port leading from pipe 24 is open and steam will be admitted at that side of the piston, while the passage-way from the oppositely-disposed pipe at 22 is closed.

As a means for exhausting the steam or other fluid under pressure I provide an aperture 26 in the face of the disk leading along the passage-way 27 (shown in Fig. 13) out through the shaft 13 to the atmosphere. This passage-way forms an eduction-port which is always open to the atmosphere at its outer end.

I prefer to provide the disk with a series of apertures 25, as shown in Figs. 7, 8, and 9.

By increasing the number of apertures steam will be admitted to the piston-chamber during a longer period and in an increased quantity.

When it is desired to have a quick "cut-off" and operate the motor by means of the expansive force of the admitted steam during the greater part of the piston-stroke, a small number of apertures would be required.

By varying the number of apertures the cut-off can be correspondingly changed.

The advantage of employing separate apertures instead of a single slot having the capacity of several apertures is that no passage-way is formed from one side of the piston to the other through which the steam can escape, as that part of the disk which lies between the apertures engages with the piston on one side and with the countersunk wall on the opposite side to form a steam-tight connection.

In Fig. 7 is shown a partial rotary movement of the piston from the position shown in Fig. 2. As each successive port-aperture 25 passes the port-aperture 23 steam is admitted to that side of the piston, and the steam which was contained in the piston-chamber on the opposite side of the piston exhausts through the eduction-port 26. At the position shown in Fig. 8 the last one of the port-openings 25 registers with the aperture 23, so that steam is still admitted. The farther movement of the piston and disk cuts off the supply of steam and permits its expansive force to complete the movement of the piston approximately to the position shown in Fig. 9. In Fig. 9 the piston has reached its limit of movement to the right and the most advanced aperture 25 registers with the port-aperture 22, so that steam is admitted on that side of the piston and the steam which had been admitted on the opposite side exhausts through the eduction-port 26.

The outer surfaces 30 and 31 of the disk bear upon the contiguous surfaces 32 and 33 of the wall of the countersink, and the inner face 16 of the disk is located along the path of the piston in the same plane with the inner surface of the wall having the countersink, so that the piston engages the disk and countersunk wall to form a steam-tight connection, preventing the passage of steam from one side of the piston to the other. This form of construction dispenses with the use of separate valves to control the induction and eduction ports, the induction-ports being controlled by the disk and the eduction or exhaust port being controlled by the piston which in every position of the parts always separates the eduction-port form an open induction-port.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a fluid-motor, the combination with the piston; and chamber-case provided with induction-ports; of a crank-shaft projecting exteriorly of the case; a crank-disk let into a case-wall along the path of the piston and provided with an eduction-port leading to the atmosphere through the disk and shaft; and operative connections between the disk and piston, substantially as described.

2. In a fluid-motor, the combination with the chamber-case; and piston; of a crank-shaft projecting exteriorly of the case; an apertured crank-disk let into a case-wall along the path of the piston and provided with a piston-controlled eduction-port leading to the atmosphere through the disk and shaft; a disk-controlled induction-port leading into the chamber; and operative connections between the disk and piston, substantially as described.

3. In a fluid-motor, the combination with a reciprocatory piston; and a chamber-case having a countersink on the inner side of one of its side walls and a pair of induction-ports opening into such countersink on opposite sides thereof; a crank-disk rotary in such countersink with its inner face located along the path of the piston and having a port-aperture, opening into the piston-chamber, adapted to alternately register with the induction-ports during the rotary movements of the disk; and an eduction-port leading from the chamber to the atmosphere; and operative connections between the disk and piston, substantially as described.

4. In a fluid-motor, the combination with a reciprocatory piston; and a chamber-case having a countersink on the inner side of one of its side walls and a pair of induction-ports opening into such countersink on opposite sides thereof; a crank-disk rotary in such countersink with its inner face located along the path of the piston and in engagement therewith and having a plurality of port-apertures opening into the piston-chamber adapted to successively register with the induction-ports, alternately, during the rotary movements of the disk; and the eduction-port leading from the chamber to the atmosphere; and operative connections between the disk and piston, substantially as described.

5. In a fluid-motor, the combination with the chamber-case and crank-shaft; of a crank-disk; a piston; connections between the disk and piston all located within the case and so disposed relatively to each other that the piston reciprocates across the face of the disk, in engagement therewith, and causes a full rotation of the disk at every back-and-forth movement of the piston; and ports having eduction and induction openings in the face of the disk movable into and out of connection with the ports and so disposed that one is continually separated from the other by the piston, substantially as described.

In testimony whereof I have hereunto set my hand this 15th day of June, 1903.

JACOB F. BENTZ.

Witnesses:

JOHN C. HAMILL,

GEO. A. MOSHER.