

(No Model.)

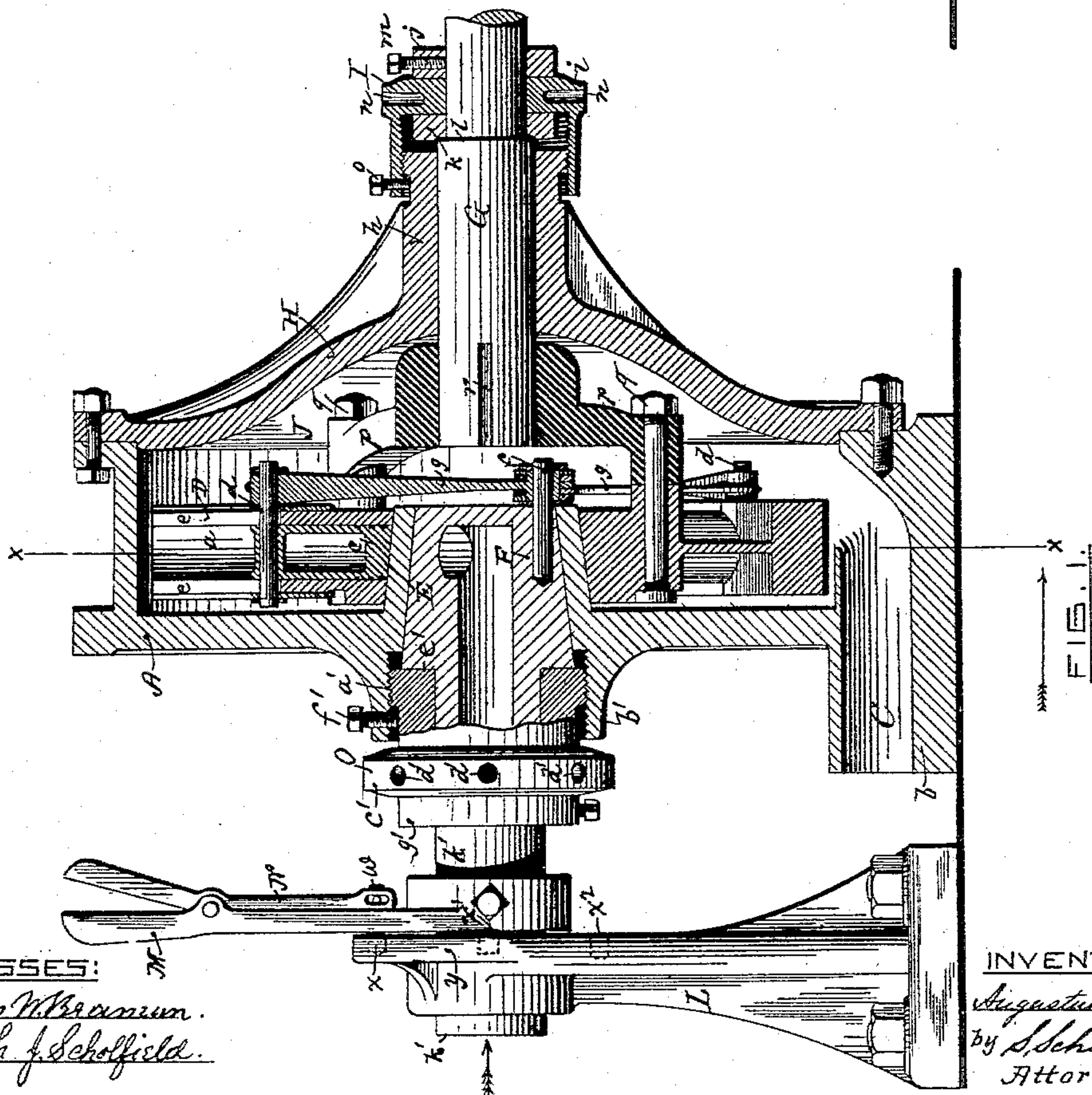
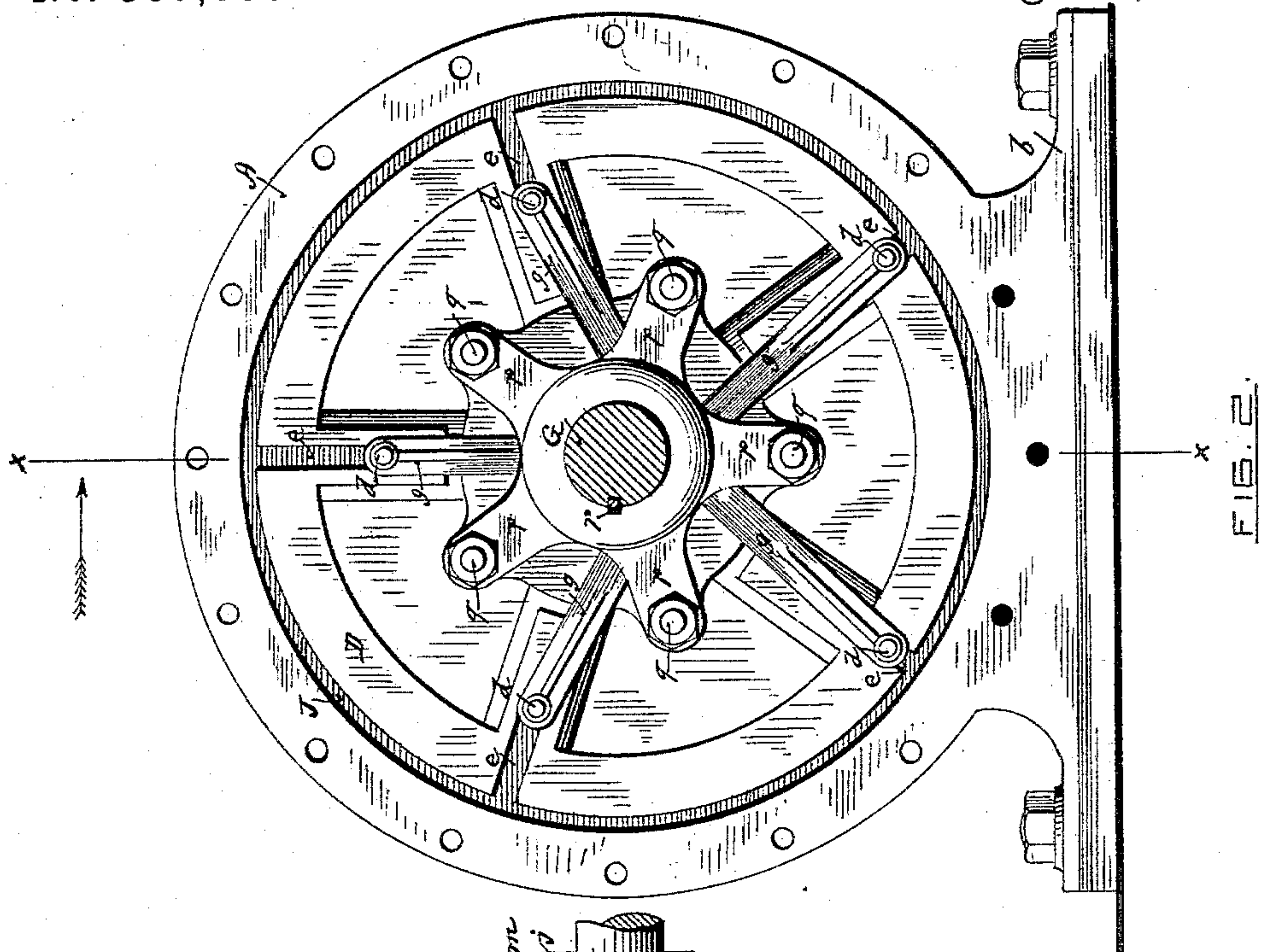
2 Sheets—Sheet 1.

A. L. CASE, Jr.

REVERSING VALVE FOR ROTARY ENGINES.

No. 387,858.

Patented Aug. 14, 1888.



WITNESSES:

James W. Brannan.
Joseph J. Scholfield.

INVENTOR:

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Attorney.

(No Model.)

2 Sheets—Sheet 2.

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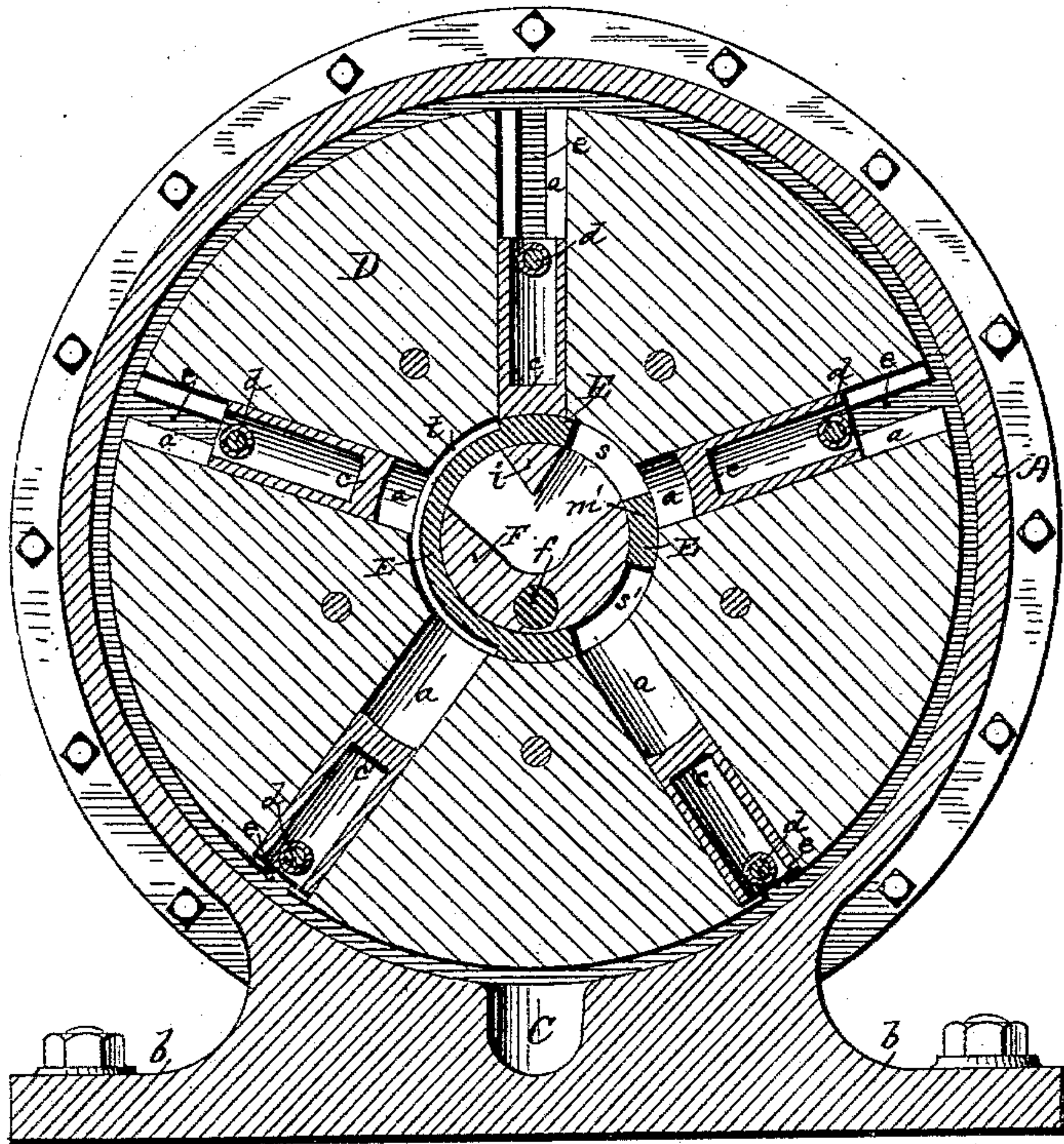


FIG. 3.

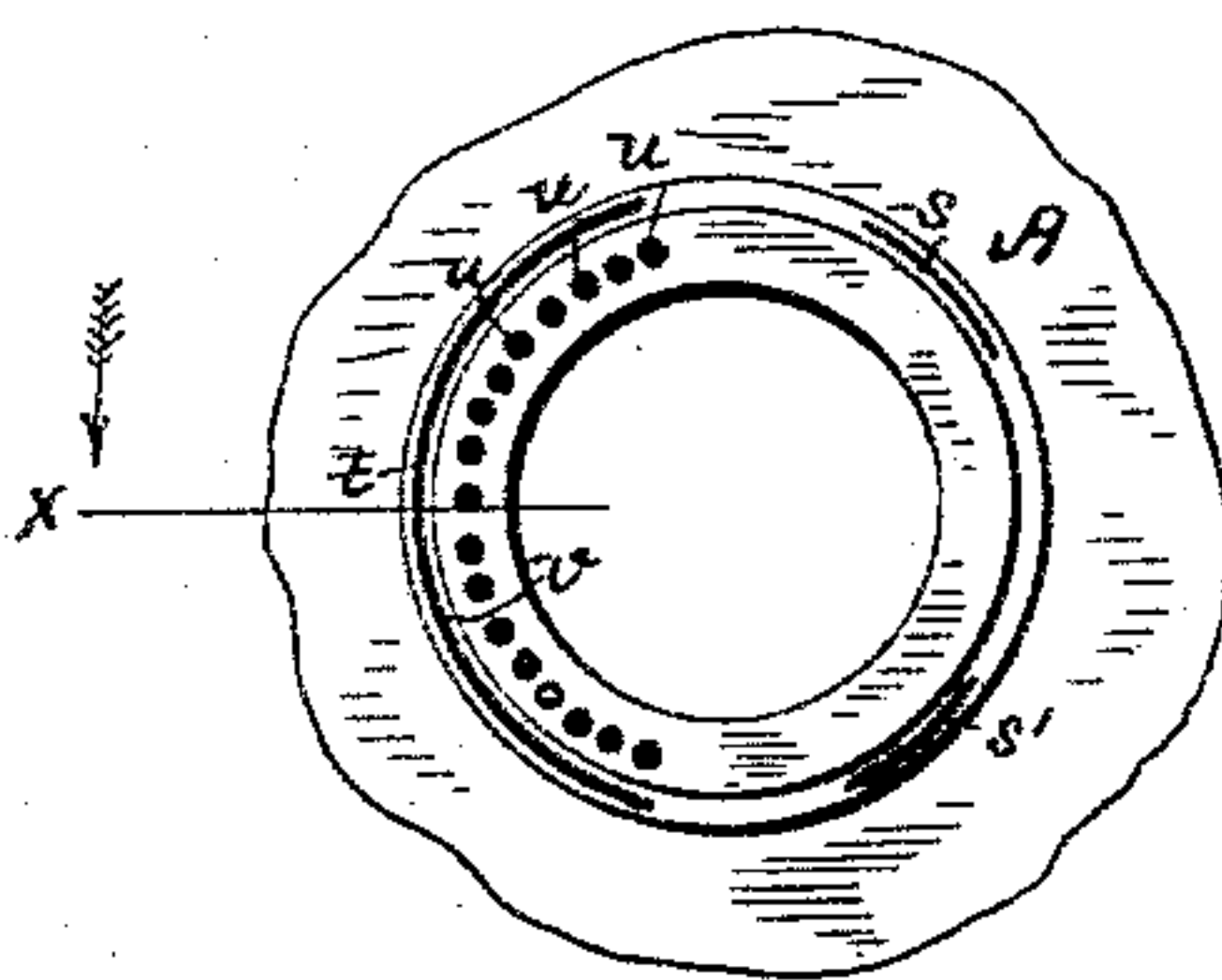


FIG. 4.

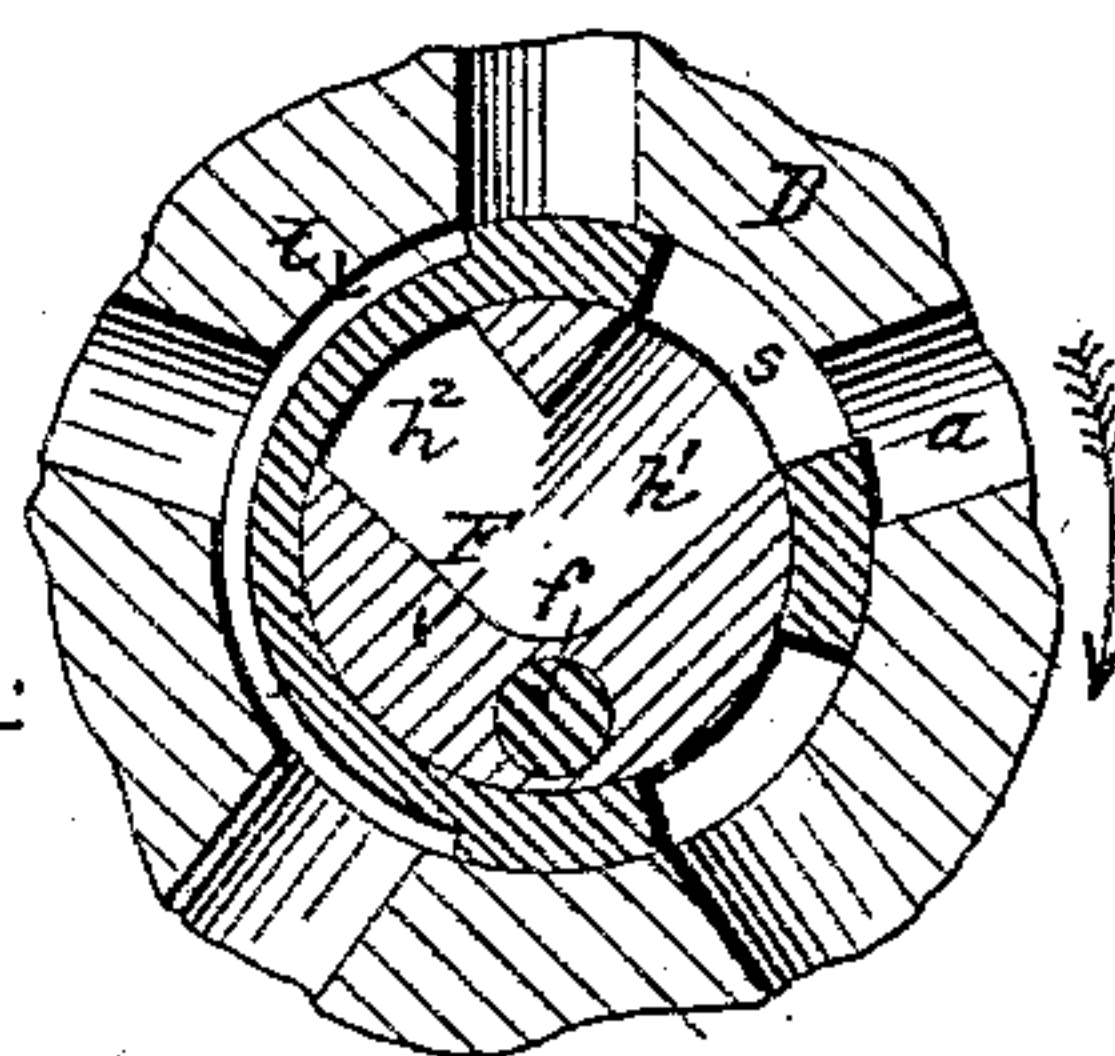


FIG. 6.

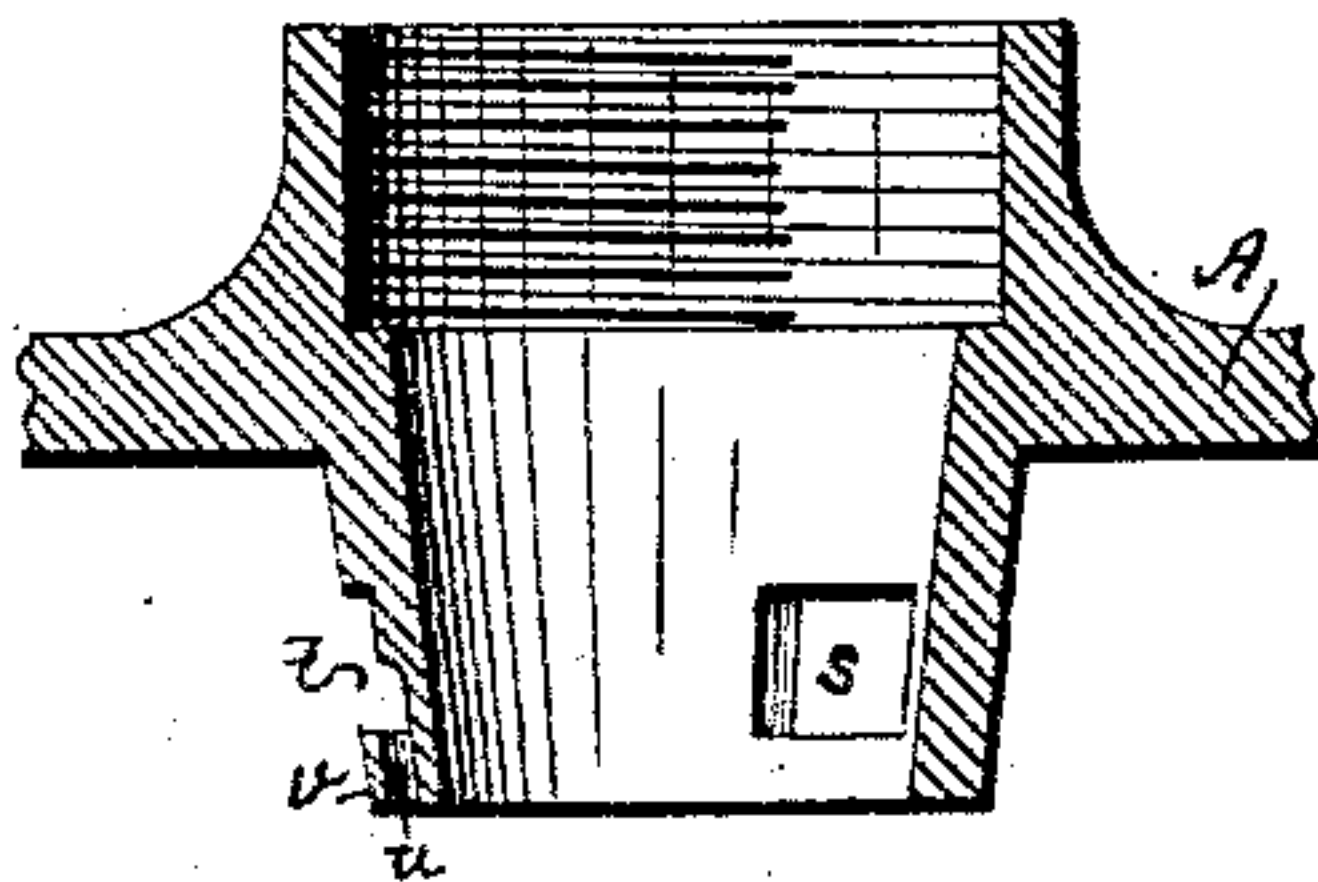


FIG. 5.

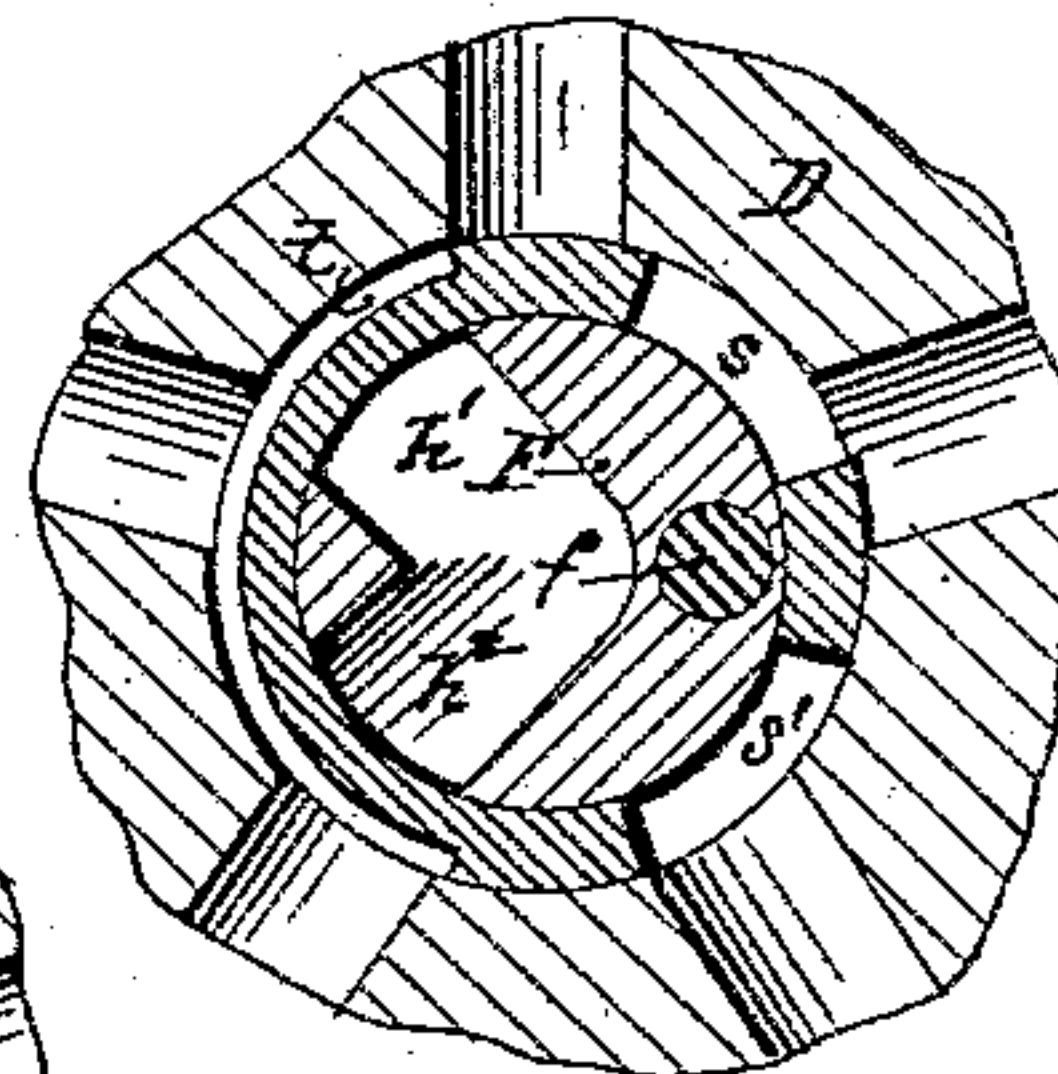


FIG. 7.

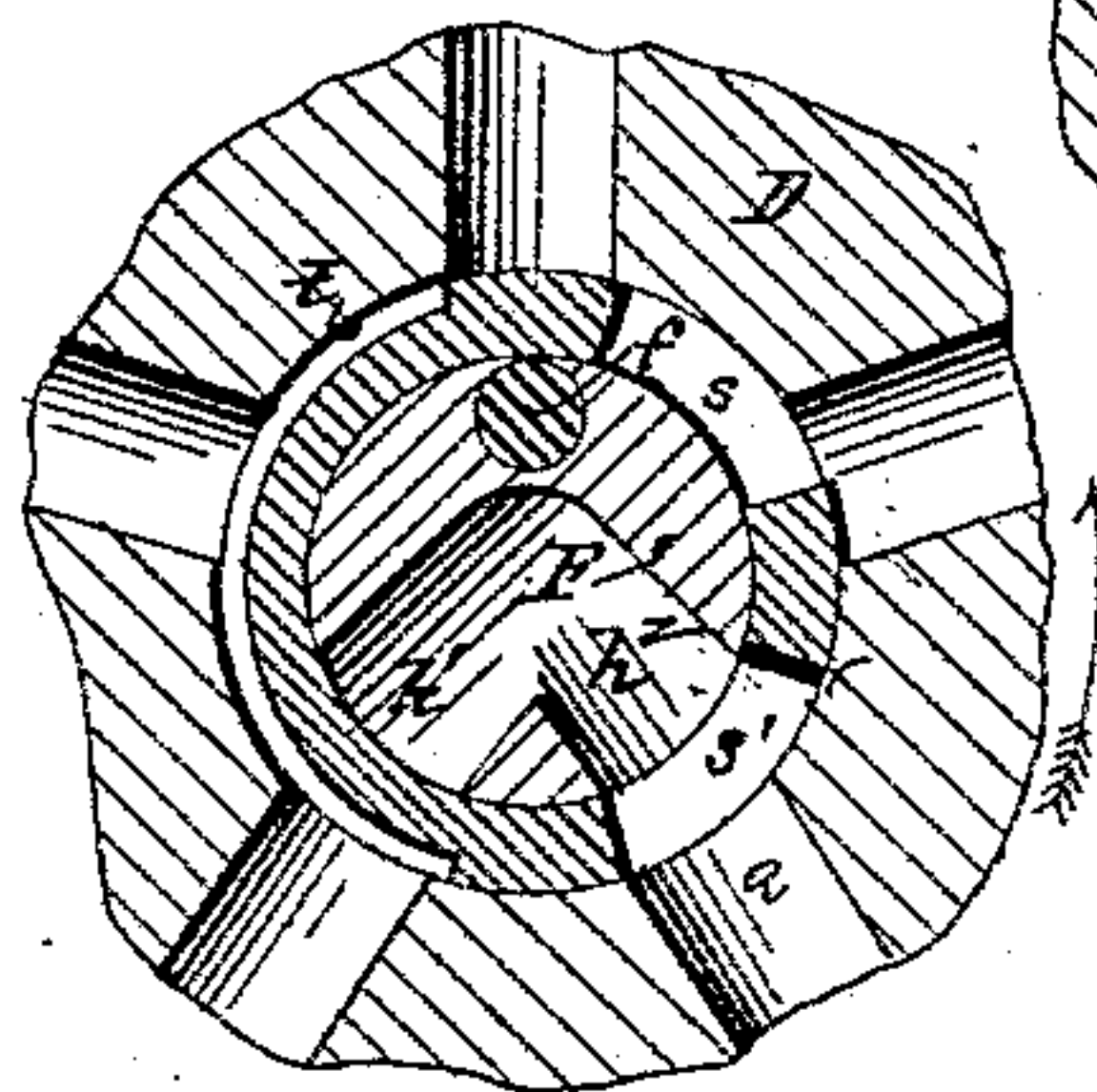


FIG. 8.

WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

AUGUSTUS L. CASE, JR., OF BRISTOL, RHODE ISLAND.

REVERSING-VALVE FOR ROTARY ENGINES.

SPECIFICATION forming part of Letters Patent No. 387,858, dated August 14, 1888.

Application filed October 7, 1887. Serial No. 251,772. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS L. CASE, JR., of Bristol, in the county of Bristol and State of Rhode Island, have invented a new and useful Improvement in Reversing-Valves for Rotary Engines, of which the following is a specification.

My invention relates to that class of rotary engines in which the rotary motion of the shaft is derived from reciprocating pistons operating within the radial chambers of a rotary head; and it consists in the improved construction and arrangement of the reversing-valve gear for such engines.

Figure 1 represents a vertical axial section of a rotary engine provided with my improved reversing-valve, taken in the line $x x$ of Fig. 2. Fig. 2 is a side view with the head of the case removed. Fig. 3 is a vertical section taken in the line $x x$ of Fig. 1. Figs. 4 and 5 are detail views of the stationary valve upon which the rotary-head revolves, Fig. 5 being a section taken in the line x of Fig. 4. Figs. 6, 7, and 8 are sectional views showing the various positions of the reversing-valve within the stationary valve.

In the accompanying drawings, A represents the fixed portion of the outer case, having an attaching-base, b , an exhaust-passage, C, and a stationary tapered valve, E, on which the rotary head D is made to revolve. Within the radially-directed cylindrical chambers $a a$ of the rotary head are placed the pistons $c c$, which are provided at their outer ends with the transverse pins $d d$, passing through the guiding-slots $e e$ at each side of the piston-chamber, and connection is made from the pins d to the pin f , located eccentrically upon the inner end of the reversing-valve F, by means of the connecting-rods $g g$.

The shaft G passes through the hub h of the removable head H of the case, the said hub being provided at its outer end with the screw-cap I, the head i of which is held between the collars j and k upon the shaft G, the inner collar, k , resting against the shoulder l upon the shaft, and the outer collar, j , being secured to the said shaft by means of the set-screw m . The head i of the screw-cap I is provided with the radial holes n , adapted for the insertion of a pin, which is to be used as a lever for turning the cap, the said cap being held in a set

position by means of the set-screw o . The shaft G is secured to the rotary head D by means of the spider-arms p , which are secured by means of the bolts q to the side of the rotary head, the said spider-arms being secured to the shaft G by means of the key r . The valve E being made slightly tapering, the inward movement of the screw-cap I will serve to tighten the bearing-joint between the rotary head D and the valve E. The valve E, as shown in Fig. 3, is provided with the inlet-ports $s s'$, which serve to admit the steam or other fluid into the piston-chambers to operate the pistons.

The periphery of the valve E is cut away at t to provide for the exhaust of the steam or other operating-fluid subsequent to its operation upon the piston, and in order to provide for the proper passage of the exhaust-steam from the peripheral opening t into the chamber J of the outer case, and to provide a proper bearing between the surfaces of the valve E and the bore of the rotary-head, I make a series of holes, u , in the flange v at the inner end of the valve, thus providing for the exhaust without destroying the bearing-surface of the said valve, and the operating-fluid can pass first through the valve outward into the piston-chamber, and from thence, after actuating the piston, passes inwardly to the space t and out at the holes u into the chamber J, from which it will also pass outward into the open air through the exhaust-ports of the said valve.

The reversing-valve F, provided with the ports $h' h''$, or with an equivalent single port, passes inwardly through the center of the stationary valve E, and is also made slightly tapering, in order to provide a tight joint, the hollow stem k' of the said reversing-valve being supported at its outer end by means of the stand L, and to the said hollow stem k' is attached the hand-lever M, provided with a hand-operated catch-lever, N, having a catch-pin, w , which is adapted to enter suitable holes, $x x' x''$, made in the flange y of the standard L.

In order to provide suitable means for holding the reversing-valve F to its seat, I provide a screw-sleeve, O, which engages with the internal thread, a' , of the projecting hub b' of the case, the said screw-sleeve being provided with the head c' , having the radial open-

ings d' , which are adapted to receive the pin employed to turn the same, and bearing at its inner end against the shoulder e' , being also secured in its set position by means of the set-screw f' , and against the outer end of the said sleeve O is placed the collar g' . The screw-sleeve O will thus be held loosely between the shoulder e' and the collar, so that movement of the sleeve O in either direction will impart a corresponding movement to the reversing-valve.

Suitable pipe-connection is to be made with the outer end of the hollow valve-stem h' , so that the operating-fluid will be caused to pass into the engine through the ports of the said valve.

The relative position of the ports of the reversing and stationary valves, when the hand-lever M is held in an upright position, is shown in the detail section, Fig. 6, the eccentric-pin f being located at the lower side of the reversing-valve, which is so arranged that the operating-fluid will pass through the ports h' and s into the piston-chamber a , to cause movement of the rotary-head D in the direction of the arrow, and upon bringing the hand-lever M to a horizontal position, so that the catch-pin w will enter a hole at x' in the side of the flange y of the stand L, the reversing-valve will be turned to the position shown in Fig. 7, in which the operating-fluid is entirely shut off from the piston-chambers of the rotary-head, so that no movement can be produced by the engine in either direction; but upon the continued movement of the hand-lever M to a pendent position, so that the pin w will enter a hole at x'' in the side of the stand L, the reversing-valve will be turned to the position shown in Fig. 8, in which position the eccentric-pin f will have been moved through a space of one hundred and eighty degrees from the opposite position shown in Fig. 6; and the resulting passage of the operating-fluid through the ports $h^2 s'$ into the piston-chamber a will cause a movement of the rotary head in the direction of the arrow, which is the reverse of that shown in Fig. 6.

Any desirable number of piston-chambers may be employed in the rotary head D, and it

is evident that the two ports $h' h^2$ of the reversing-valve F can be joined in one by removing the partition i . Therefore I do not restrict myself to the double construction shown in the drawings, and if it is desired to allow the steam which operates the engine to follow the pistons at full pressure for the whole length of the stroke, it will not be necessary to employ the two ports $s s'$ in the stationary valve, the said ports being in that case made into one by the removal of the intervening partition m' .

I claim as my invention—

1. In a rotary engine, the combination, with the stationary valve having an inlet and exhaust port, of the rotary head provided with radially-directed piston-chambers and adapted to revolve upon the stationary valve, the reversing-valve arranged within the stationary valve and provided with the eccentric-pin, means for holding the reversing-valve and eccentric-pin in a set position, and connections from the eccentric-pin to the several pistons, substantially as described.

2. In a rotary engine, the combination, with the rotary head provided with radially-directed piston-chambers, of the pistons, the stationary valve having duplicate inlet-ports and a port which exhausts into the chamber of the case at the end of the valve, and an axially-arranged reversing-valve provided with the eccentric-pin operatively connected to the pistons, and the hand-lever for reversing the position of the eccentric-pin and the inlet-port of the reversing-valve, substantially as described.

3. In a rotary engine, the combination, with the outer case and the rotary head provided with radially-directed piston-chambers, of the reciprocating pistons, the stationary valve having an inlet-port, and also an exhaust-port leading into the chamber of the outer case, and a reversing-valve provided with the eccentric-pin and arranged within the stationary valve, substantially as described.

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Witnesses:

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