

(No Model.)

E. F. RANKS.
WATER MOTOR.

No. 376,610.

Patented Jan. 17, 1888.

Fig. 1.

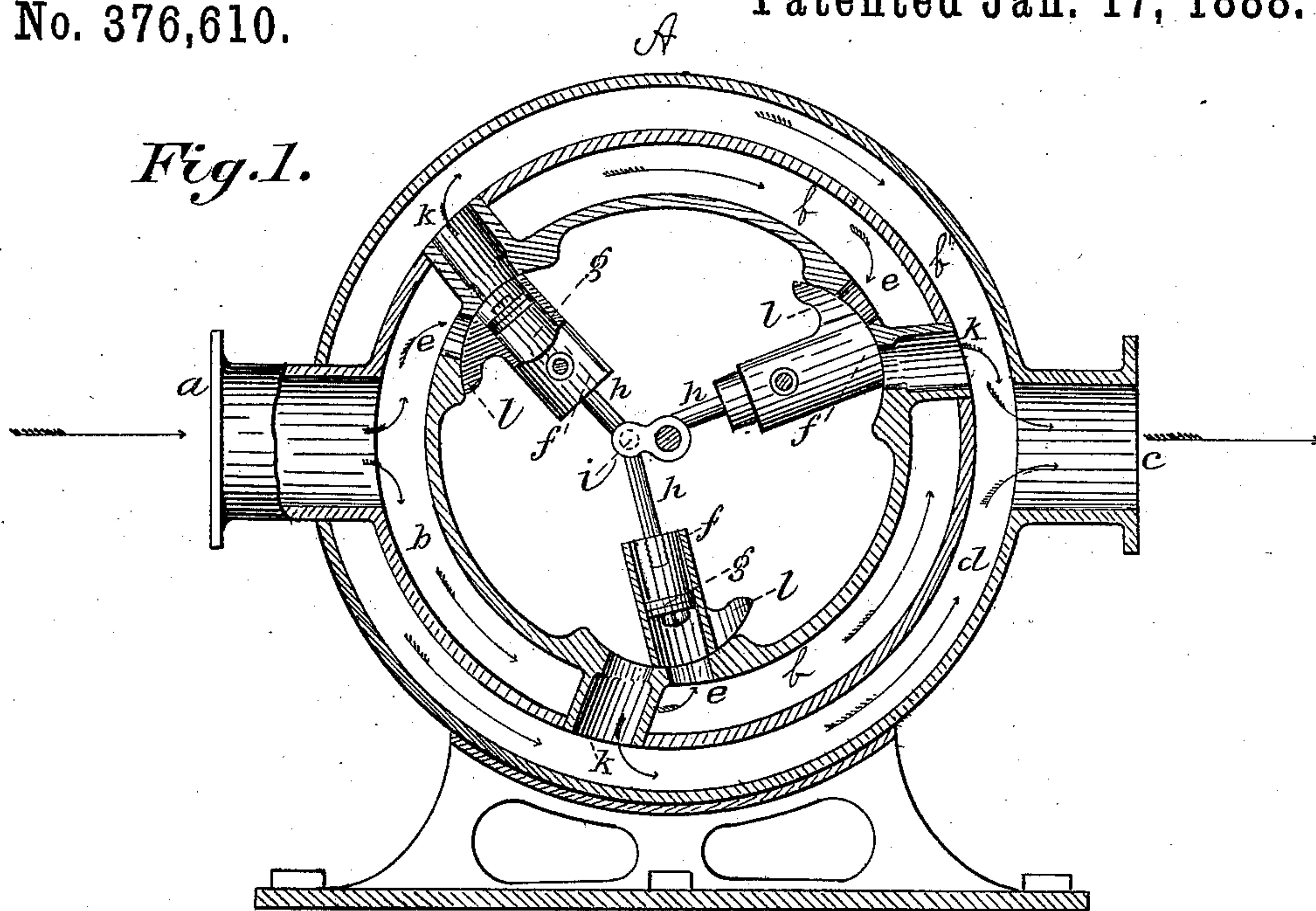
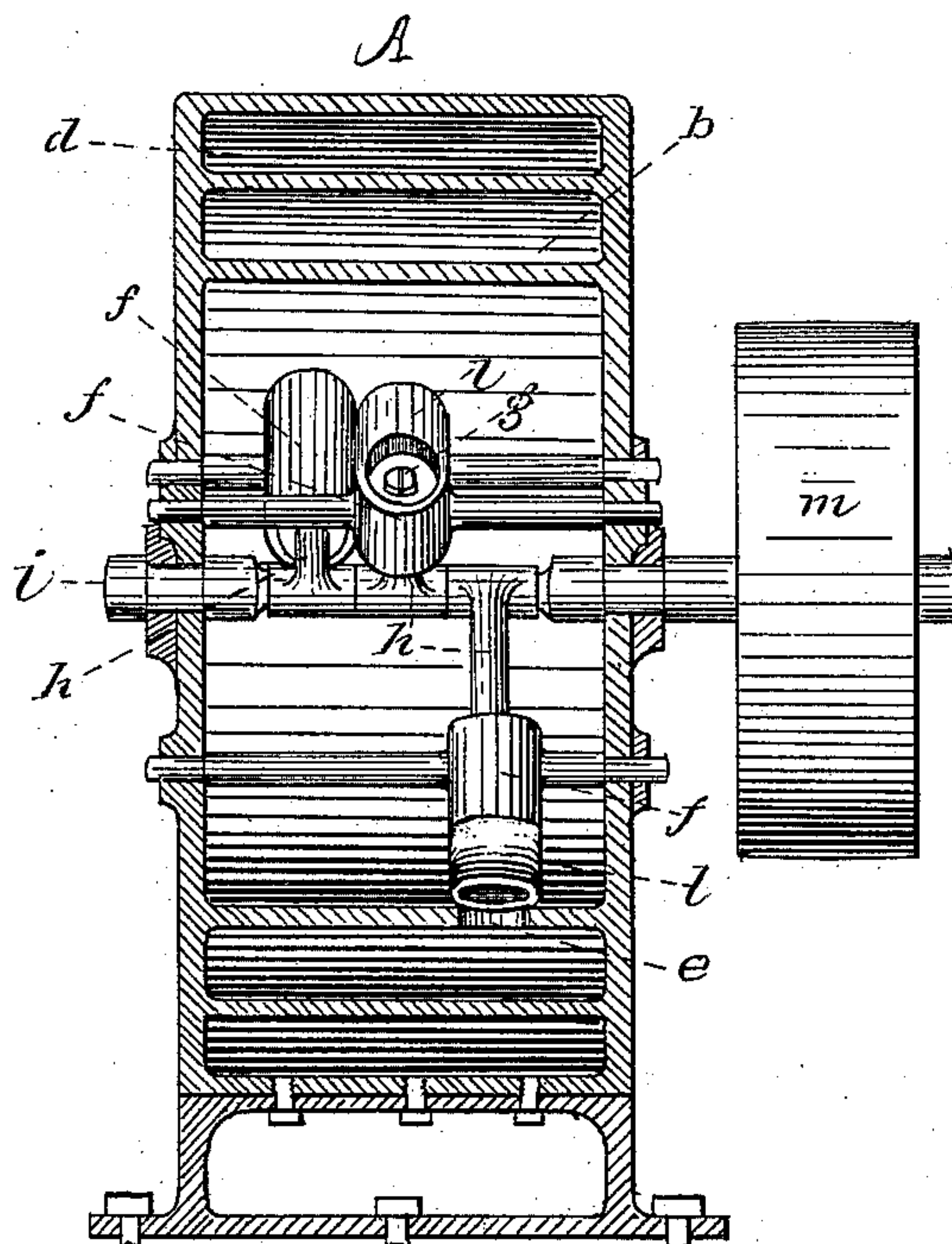


Fig. 2.



Witnesses:
John B. Kenigan.
E. B. Cummings

Inventor.
E. Bridge & Rankin

UNITED STATES PATENT OFFICE.

ELBRIDGE F. RANKS, OF LEWISTON, MAINE.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 376,610, dated January 17, 1888.

Application filed April 1, 1886. Serial No. 197,474. (No model.)

To all whom it may concern:

Be it known that I, ELBRIDGE F. RANKS, of Lewiston, in the county of Androscoggin and State of Maine, have invented certain new and
5 useful Improvements in Water-Motors; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to
10 which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to water-motors; and the object of my invention is to provide a motor
15 which shall be simply and durably made, and which shall develop a high rate of speed with an economical use of water.

My invention consists of an annular chamber, a crank-shaft passing centrally through
20 said chamber and a series of oscillating cylinders with their pistons and piston-rods arranged radially around said shaft and connected therewith. The annular chamber has on its inner
25 surface supply-ports and exhaust-ports arranged to supply water to and take from said cylinders, a main water-inlet with closed chambers or passages leading therefrom to said supply-ports, and a main water-outlet connecting
30 by like chambers with the exhaust-ports. The water in entering and passing through the motor is confined strictly within the annular chamber, and leaves the central space, which contains the crank-shaft and all the working
35 parts, free, so that they run in air.

I am aware that water-motors have hitherto been constructed in which oscillating cylinders were arranged radially about a central shaft, said cylinders taking their water from an exterior casing; but in such motors the ex-
40 haust was vented into the space containing the shaft and the oscillating cylinder, so that all the working parts were of necessity obliged to run under water.

I am also aware that steam-engines have
45 been constructed having within an annular steam-chest a single oscillating cylinder which oscillates on a central shaft. I am also aware that steam-engines have been constructed having four fixed cylinders arranged radially about
50 a central shaft, the pistons having a system of slots or grooves which act as valves to pass

the steam and exhaust to the succeeding cylinders and having its piston-rods hinged to its pistons, so that there is no direct push at right angles to the crank. These constructions I
55 disclaim.

My invention is illustrated by the accompanying drawings, in which—

Figure 1 represents a vertical transverse-section. Fig. 2 is a vertical section parallel with
60 the shaft.

A is an annular casing, through the center of which extends the shaft having a pulley, *m*, and crank *i*. Within the annular casing A and arranged radially around the shaft *j* is a
65 series of oscillating cylinders, *f*. These cylinders have plungers *g*, which connect with the crank *i* by the connecting-rods *h*. The cylinders are pivoted to the sides of the machine at suitable points, and their outer ends are
70 curved to form a water-tight joint with the inner surface of the casing A during the oscillations of the cylinder. Opposite the end of each of the cylinders *f* is a supply-port, *e*, and an exhaust-port, *k*, so arranged that during
75 the oscillations of the cylinder when one port is open the others will be closed.

The casing A contains a series of closed chambers or passages, *b b*, which conduct the water from the inlet to the several supply-
80 ports *e*, and a like series of chambers, *b'*, which connect the exhaust-ports *k* with the main water-outlet *c*. The relation of the ports and the oscillating cylinders is such that each cylinder takes the supply in turn and forces the plunger
85 inward as the crank revolves, thereby causing a continual revolution of the shaft.

When three or more cylinders are used, there are no dead-centers formed, and the machine is always ready to start with full or
90 nearly full force in whatever position the shaft may stop.

By confining both my supply and my exhaust to the closed passages within the casing A, I am enabled to have all the working parts
95 of my machine running in air.

I claim—

1. In a water-motor, the combination of an annular case, a crank-shaft passing centrally through it, a series of oscillating cylinders ar-
100 ranged radially about said shaft and within the central space formed by said case, and hav-

ing pistons and piston-rods connecting with said shaft, supply-ports on the inner surface of said case for supplying water to said cylinders and connecting by closed passages in said case
5 with the main water-inlet, and exhaust-ports on the inner surface of said case for taking water from said cylinders and connected by closed passages passing through the annulus of said case with the main water-outlet, substantially as described.
10

2. In a water-motor, the combination of a closed annular casing, an induction-opening and an eduction-opening to said casing, a chamber within said casing, a series of contiguous entrance and exhaust ports to said
15 chamber, ducts wholly within the annulus connecting the ports with the induction and eduction openings, respectively, at points without the central chamber, a series of rocking cylinders pivoted in the chamber in water-tight engagement with the ports, a side extension to
20 each cylinder to shut the entrance-port when

the discharge-port is open, pistons to the cylinders, and connections between the pistons and a central crank-shaft, as and for the purpose set forth. 25

3. In a water-motor, the combination of three concentric chambers, the outer chamber containing the eduction-opening, the middle chamber containing the induction-opening, the
30 inner chamber containing a series of pivoted rocking cylinders, pistons moving in said cylinders, a central crank-shaft connected to the pistons, and entrance and exhaust ports for the cylinders, said ports connected with the
35 middle and outer chambers, respectively.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ELBRIDGE F. RANKS.

Witnesses:

OSGOOD SMITH,
JOHN P. KERRIGAN.