

No. 688,233.

Patented Dec. 3, 1901.

R. M. BLACKMER.
WATER MOTOR.

(Application filed Oct. 10, 1900.)

(No Model.)

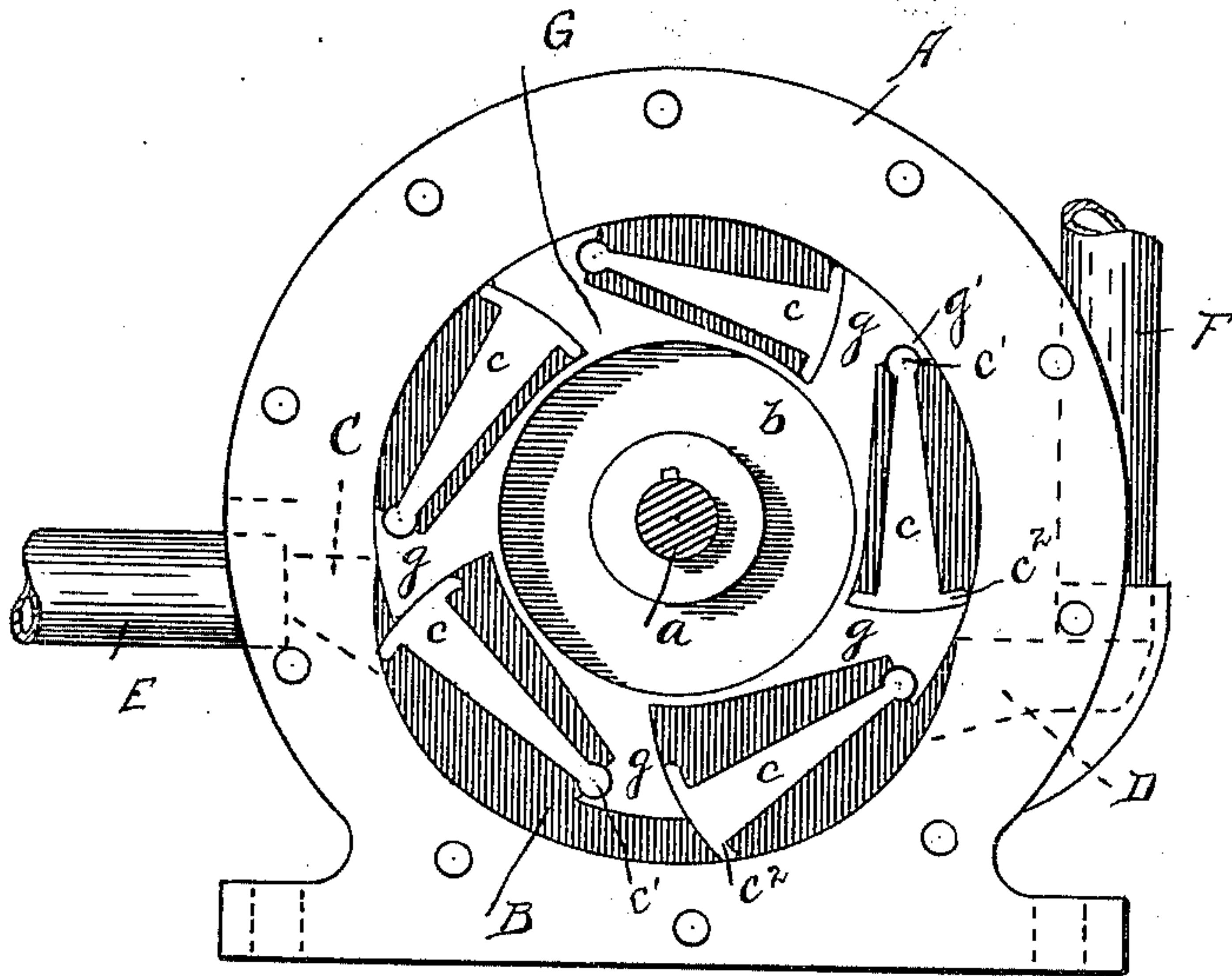


Fig. 1.

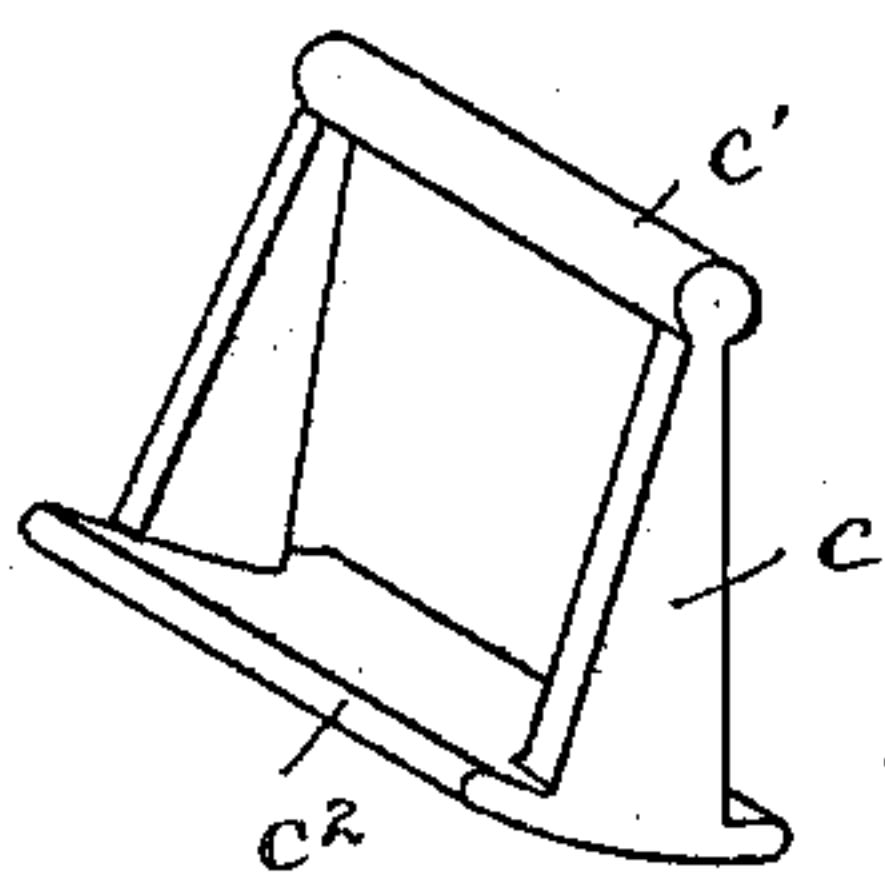


Fig. 5.

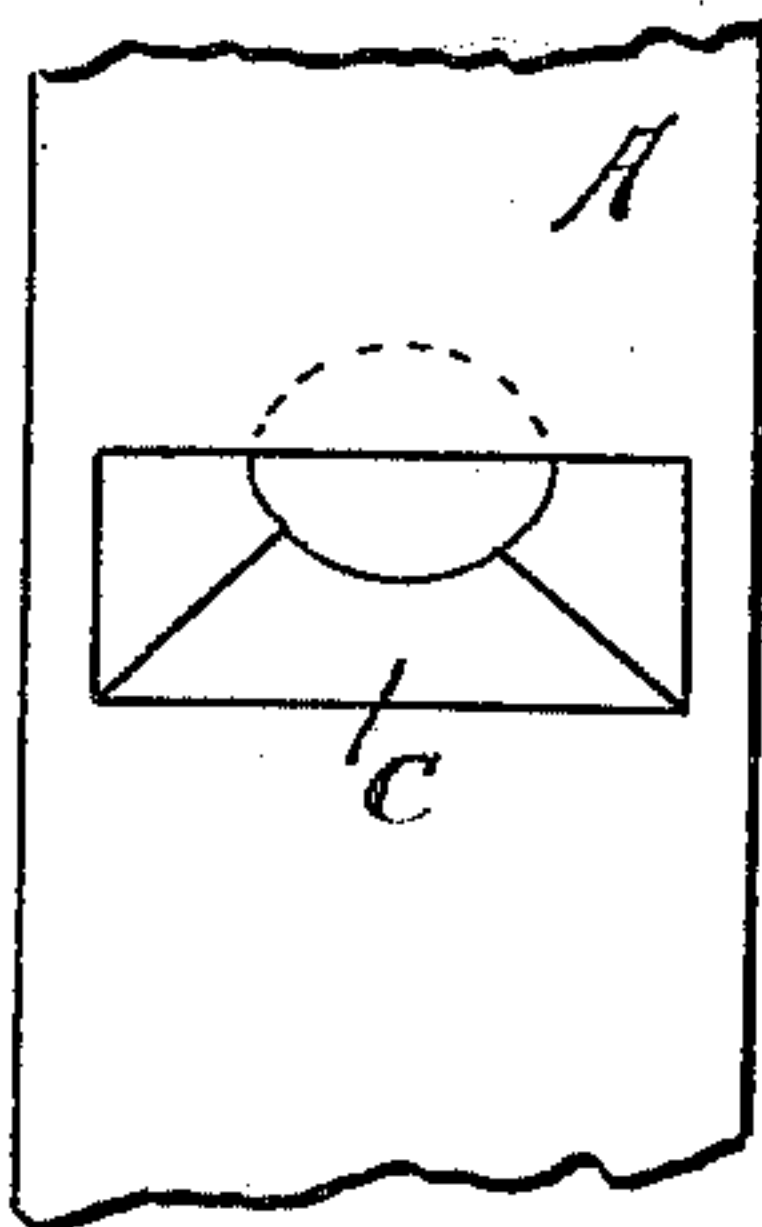


Fig. 6.

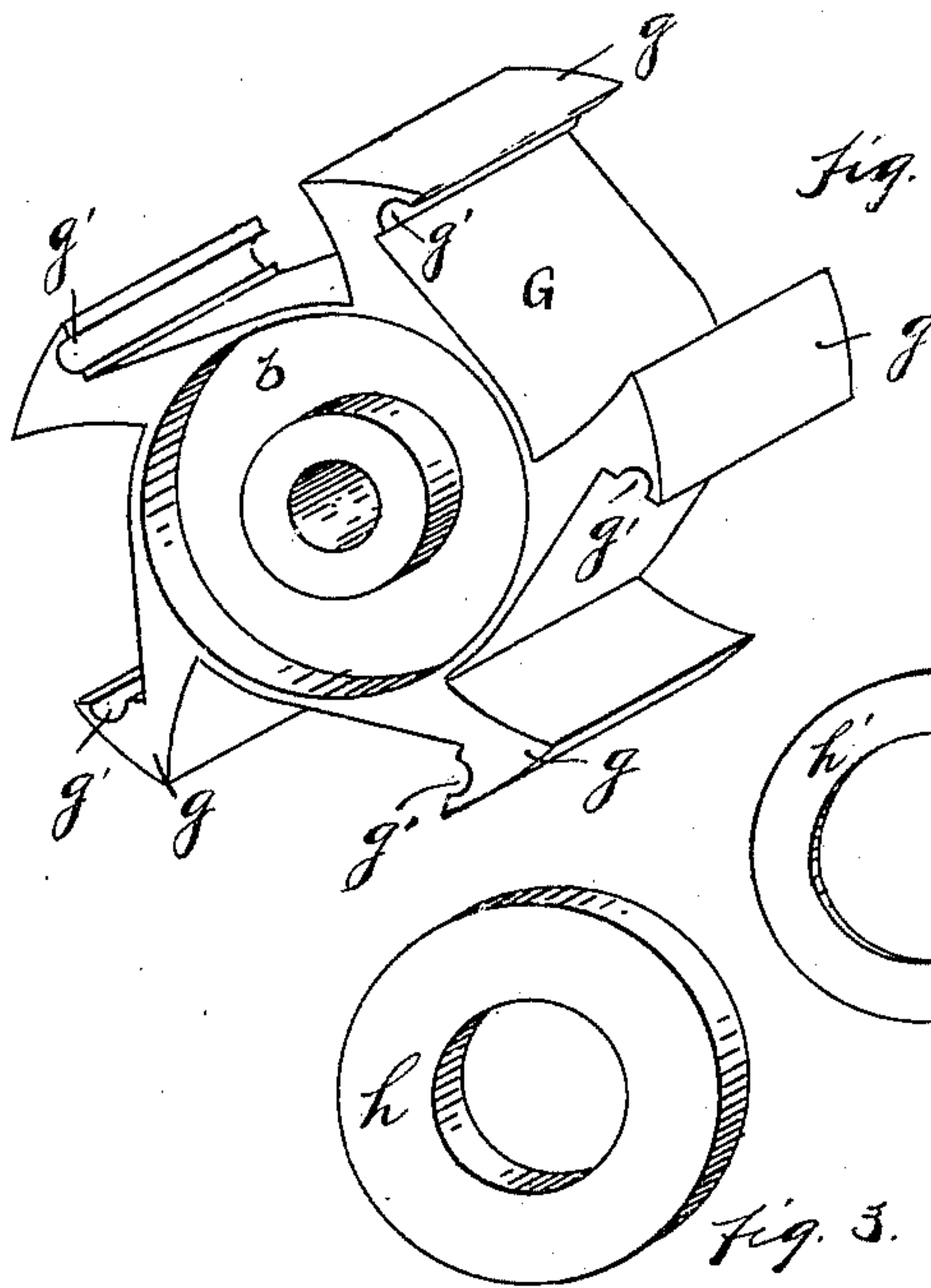


Fig. 2.

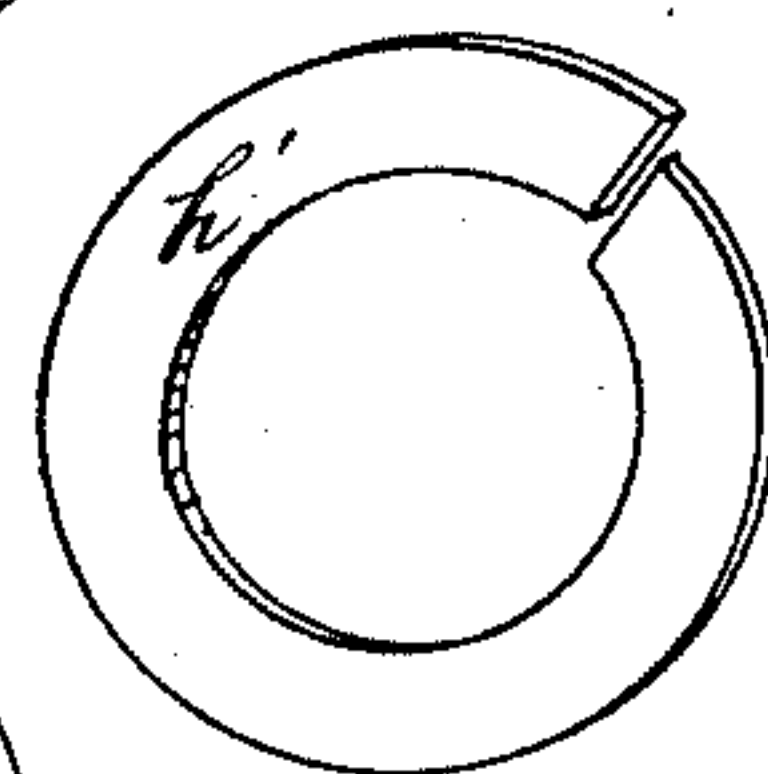


Fig. 4.

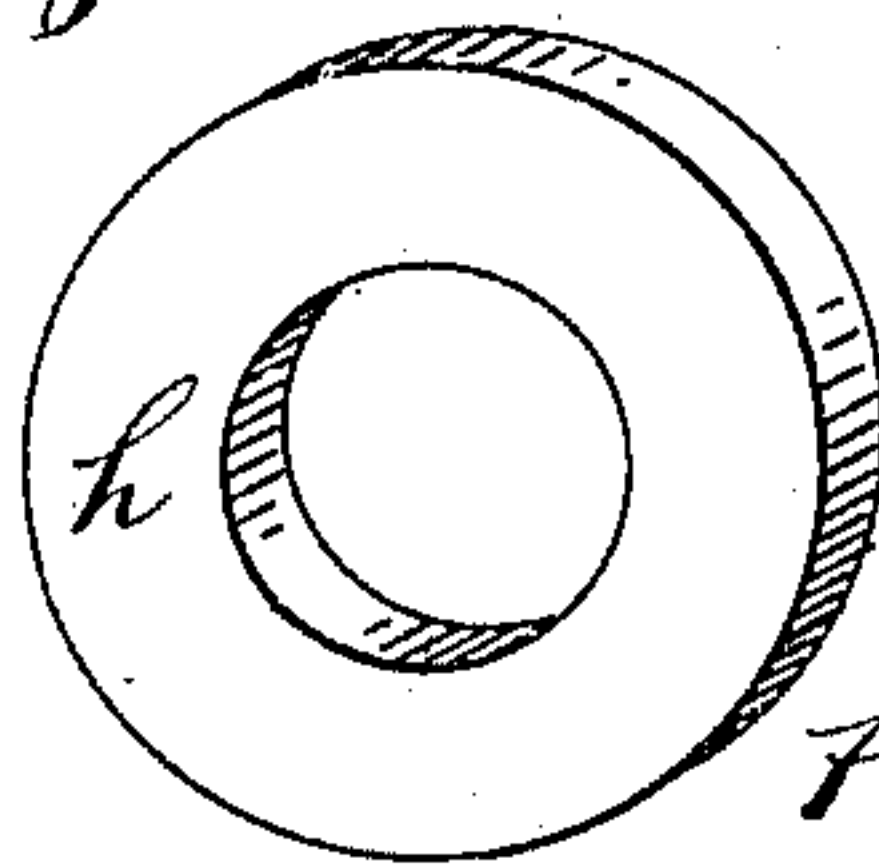


Fig. 3.

WITNESSES

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WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 688,233, dated December 3, 1901.

Application filed October 10, 1900. Serial No. 32,656. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. BLACKMER, a citizen of the United States, residing at Detroit, in the county of Wayne, in the State of Michigan, have invented certain new and useful Improvements in Water-Motors; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to water-motors, and has for its object an improvement in the buckets and in the bucket-carrier to be used in a chamber similar to that shown in the patent for a water-motor granted to me December 12, 1899, and numbered 639,011.

The bucket and carrier which form the subject of this invention utilize the force and weight of the water to actuate the bucket in swinging toward and from the center of the carrier, and it overcomes a difficulty found in the structure of my above-mentioned patent in the resistance by inclosed or confined water to the free action of the bucket.

In the structure of my patent above referred to the bucket was shown as a slide which traveled toward and away from the center of the bucket-carrier and into and out from or partially out from a recess or seat into which the bucket fitted somewhat closely; but when the bucket was projected the cavity behind the bucket became filled with water, and when the bucket was again returned toward the center of the carrier into the seat the water had to be displaced. If the bucket fitted so loosely as to enable the water to be displaced easily, there was difficulty in packing the bucket and carrier against an excessive leakage. On the other hand, if the bucket fitted the seat so closely as to prevent excessive leakage the resistance to the return of the bucket when it was once out and the resistance to the outward travel of the bucket were both augmented to an undesirable extent; and my present invention overcomes these difficulties. A small amount of leak-

age back from one bucket to another, while it detracts from the effective force of the motor, is not a serious detriment, and it is desirable that such leakage should be reduced to a minimum, not, however, to so great an extent as to produce a frictional resistance to the action of the several parts, all of which should be free to move in their appropriate way.

In the drawings, Figure 1 is a side elevation with one side plate removed and with the shaft shown in section. Fig. 2 is a perspective of the bucket-carrier. Fig. 3 is a packing-ring. Fig. 4 is a split spring. Fig. 5 is a perspective of the bucket. Fig. 6 is a diagram showing the mouth of the inlet as seen from within the chamber.

A indicates the casing, within which is a chamber closed in between parallel side walls and a curved wall by which the chamber is formed as parts or segments of two cylindrical chambers, the bases of the segments being placed together. The center of the cylinder of which one of said chambers forms a segment is at the center of the driving-shaft *a*. The center of the cylinder of which the other chamber forms a part is located on a radial line of the first-mentioned cylinder, which radial line is approximately perpendicular to a straight line between the two ports, and the last-mentioned center is nearer to said line between the ports than is the first-mentioned center. For brevity I will call this a "double-centered" chamber. One of the parallel faces is indicated at B.

C indicates the passage leading into the chamber from the pipe E.

D indicates the passage leading into the chamber from the pipe F.

It may be said that the motor will work in either direction either as a motor or pump, acting as a motor when actuated by the weight of water and acting as a pump when actuated by external force to lift water. It works best for pump purposes when the bucket-carrier, having the position shown in Fig. 1, rotates with a left-hand motion. In this case the water enters the pipe E and discharges

through pipe F. It works best for motor purposes when the bucket-carrier, positioned as shown in Fig. 1, has a right-hand motion and the water enters through pipe F and dis-
 5 charges through pipe E; but it will work with efficiency in either direction.

The bucket-carrier G comprises a central hub, through which the shaft a engages, and a barrel connected to the hub by a web.
 10 From the outer periphery of the barrel project a number of arms g , one face of which is nearly, though not quite, radial and is curved concentric to a bearing-socket on the op-
 15 posed face of the next adjacent arm g . The other face of this arm is on a line very nearly tangent to the circle which bounds the inner surface of the barrel, but is provided with a
 20 socket g' , opposed to and concentric with the bucket-seat of an adjacent arm g . Between each bucket-seat and the socket which is
 25 used in connection with it is a cavity, the bottom of which is on a line substantially tangent to the barrel and which is free from any obstacle which will prevent the free ac-
 30 tion of the water therein. That part of the arm g which lies between the socket on the one side and the bucket-seat on the other side terminates with an arched face that corre-
 sponds with the arched surface of the cham-
 ber concentric to the shaft a .

The bucket which engages in each pocket is shown in Fig. 5, and it is composed of a bucket-blade c^2 , the outer face of which is
 35 arched to correspond with the bucket-seat in the arm g . Opposed to the plate is a pivot c' , arranged to engage in the socket g' . Its curvature is concentric with the outer curva-
 40 ture of the blade c^2 . The pivot c' is connected to the blade c^2 by arms c , which unite the pivot and the blade, but offer a minimum ob-
 45 struction to the free swing of the bucket into the pocket and out from the pocket to the extent of its proper travel. It is immaterial
 50 whether the arms c engage closely against the walls of the chamber or not. The blade c^2 should be long enough so that its ends will extend from side to side and engage both walls
 55 of the chamber; but there need be no frictional contact whatever between the arms c and any part of the mechanism.

Between the hub and the barrel of the carrier is an annular cavity b , in the bottom of
 60 which is placed a spring h' , and over this a packing-ring h . The packing-ring h may en-
 65 gage closely against the hub. It is immaterial whether it engages closely against the barrel or not. Its function is to prevent the leakage along the face of the chamber toward
 the shaft and also to prevent any water which
 may have passed behind it from escaping
 along the walls of the hub and thence to the
 shaft. Consequently the contact-surface be-
 tween the packing-ring and the moving parts
 may be small and the frictional resistance
 correspondingly small.

In the structure thus described the bucket has freedom to swing practically unimpeded
 70 by any confined water in the pocket in which the bucket is located. The moving parts of the bucket-carrier may be so closely fitted to the stationary parts as to nearly prevent leak-
 75 age, while they are so far spaced from them as to afford little or no frictional resistance; the only part of the device which needs to be made actually tight against leakage being the
 80 face of the ring h which engages against the hub and the face of the ring h which engages against the flat surface of the chamber, and this face generally remains at rest, allowing
 the hub to rotate in the packing-ring h .

There is always a downward pressure ex-
 85 erted by the water in the pipe F, and this pressure is exerted whether the machine be used as a motor or for pump purposes. There is always a less pressure exerted in the pipe
 90 E. If the device be in use for a motor, the pressure in the pipe E is only a back pres-
 95 sure, due to the fact that the water cannot escape with absolute freedom. If the device be in use for a pump, pressure of the water in the pipe E is due to the outside atmospheric
 100 pressure and to the lifting of the water or the partial vacuum formed by the pump ac-
 105 tion, and it follows that there is always a tend-
 110 ency to flow from the pipe F toward the pipe
 115 E. There is also always a greater pressure exerted downward against the blade c^2 than the opposing pressure which is exerted up-
 120 ward against it, and especially is this the case when the blade has passed toward the open-
 125 ing D to or beyond the lowermost part of the chamber. The force of the water just con-
 sidered tends to actuate the bucket to swing the blade c^2 out from its seat and against the
 circular walls of the chamber.

What I claim is—

1. The combination of a casing having a double-centered chamber, a bucket-carrier ar-
 130 ranged to rotate with the shaft that passes through one center of said chamber, said
 135 bucket-carrier being provided with open bucket-pockets between arms that move in contact with the portion of the curved wall of said chamber that is concentric with said
 140 shaft, a pivot-seat in one side of each of said
 145 arms, a blade-seat in each arm opposite the pivot-seat arched concentric with the pivot-
 150 seat of the adjacent arm, buckets provided with pivots and with blades and with connec-
 155 tions therebetween, said blades, pivots and
 160 connections forming a frame which is open in a direction radial to the bucket-carrier, so
 165 as to permit an equal fluid-pressure at all times upon the surfaces of said bucket which are
 toward and away from said shaft, substan-
 tially as described.

2. The combination with a bucket-carrier having an open bucket-pocket substantially
 170 as described, a bucket having a bearing-pivot and an opposed arched blade, the outer face

of which is concentric with the pivot and a connection between the pivot and the blade, said blade, connection and pivot forming a frame which is open in a direction radial to
5 the bucket-carrier, so as to permit an equal fluid-pressure at all times upon the surfaces of said bucket which are toward and away from said shaft, substantially as described.

In testimony whereof I sign this specification in presence of two witnesses.

ROBERT M. BLACKMER.

Witnesses:

JNO. C. TOBIAS,

T. JEFFERSON BUTLER.