(No Model.) 2 Sheets—Sheet 1.

B. B. BOWER.

FLUID MOTOR.

No. 422,495. Patented Mar. 4, 1890.

Fig. 1.

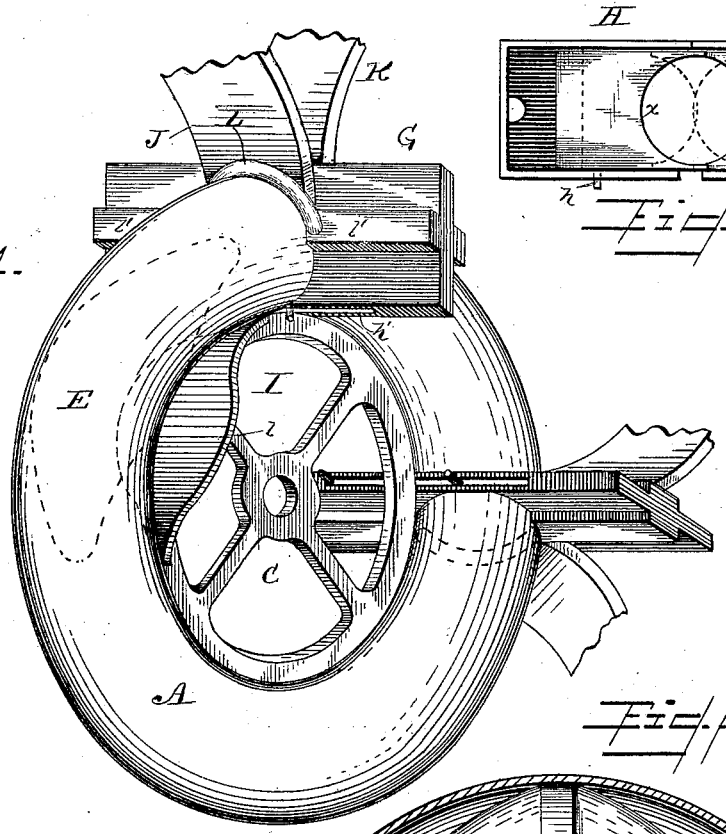


Fig. 3.

Fig. 2

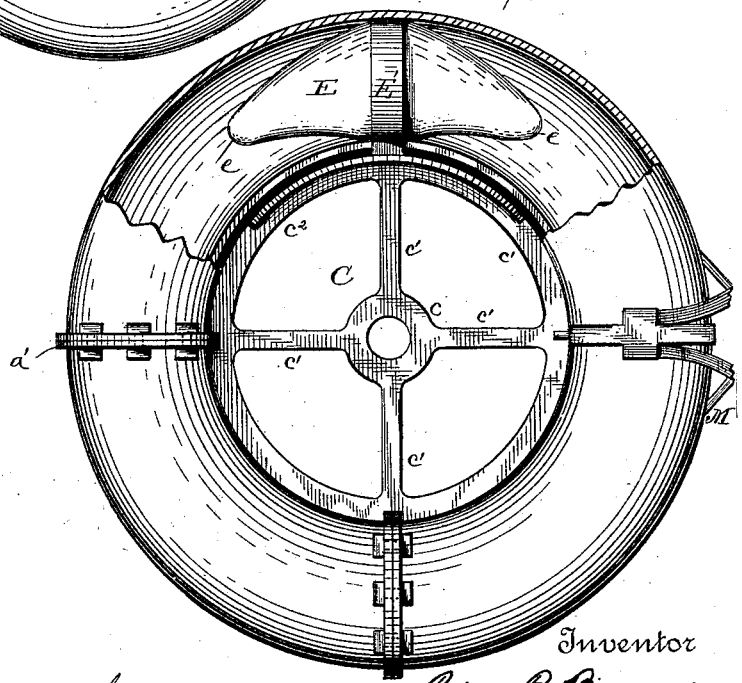
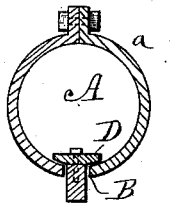
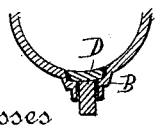


Fig. 4.



4a



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

B. B. BOWER

FLUID MOTOR.

No. 422,495. Patented Mar. 4, 1890.

Fig. 5.

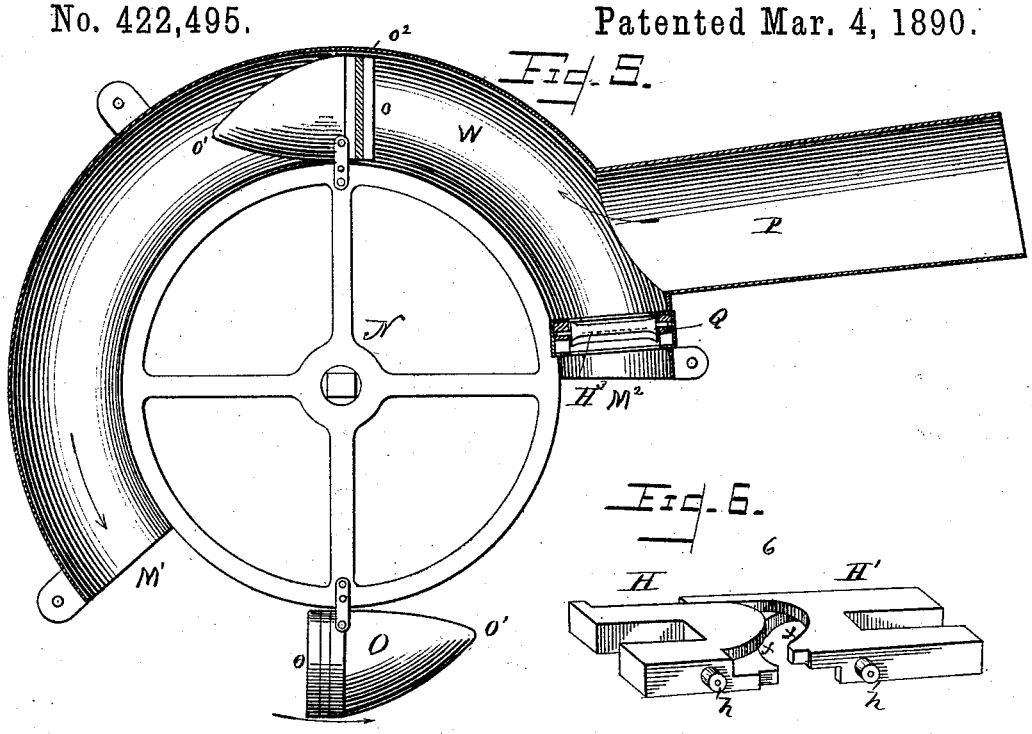


Fig. 6.

Fig. 8.

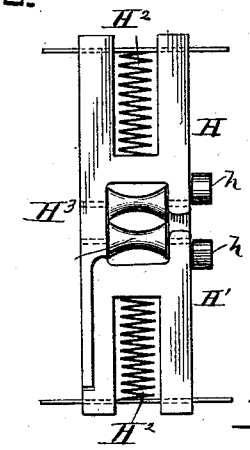


Fig. 7.

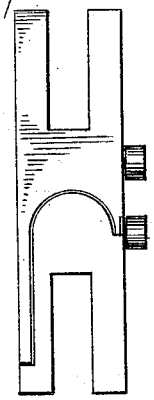


Fig. 10.

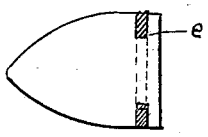
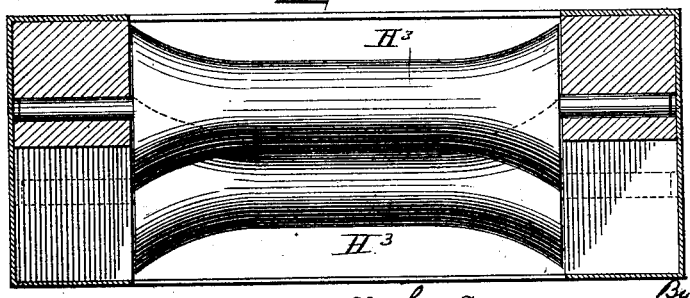


Fig. 2.



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BYRON B. BOWER, OF BAINBRIDGE, GEORGIA.

FLUID-MOTOR.

SPECIFICATION forming part of Letters Patent No. 422,495, dated March 4, 1890.

Application filed August 5, 1889. Serial No. 319,738. (No model.)

To all whom it may concern:

Be it known that I, BYRON B. BOWER, a citizen of the United States, residing in Bainbridge, county of Decatur, and State of Georgia, have invented certain new and useful Improvements in Fluid-Motors, of which the following is a specification.

My invention is especially designed to be run by steam or water. The apparatus herein shown and described is specially adapted to be run by steam; but so far as part of my invention is concerned the apparatus may be run by water or similar fluid-pressure.

My invention relates to that class of motors known as "rotary engines," in which a piston mounted on a disk, wheel, or circular framework moves in a tubular chamber, to which fluid-pressure is admitted.

My invention contemplates improvements in the general construction of the engine, in certain improved valve-operating mechanism, and in certain details of construction, which will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of one form of my improved motor, showing the valve-operating mechanism and the general construction of the apparatus. Fig. 2 is a side elevation, partly broken away, of the main body of the apparatus, showing the piston within the annular chamber. Fig. 3 is a detail view within the valve-casing, the top plate being removed. Fig. 4 is a transverse section of the annular chamber in which the piston moves. Fig. 4^a is a detail view showing a modified way of forming the casing of the annular chamber. Fig. 5 is an elevation, with parts in section, of a modified form of the apparatus. Fig. 6 is a perspective view in detail of the valve. Fig. 7 is a plan view of the same. Fig. 8 is a plan view of the valve, showing certain modifications. Fig. 9 is a section, on an enlarged scale, of part of the valve mechanism; and Fig. 10 is a detail view of the piston, showing the groove in which the wearing-ring is seated.

Referring first to Figs. 1 to 4 of the drawings, the annular chamber A is preferably made circular in cross-section, as shown in Fig. 4, and may be made of semicircular flanged sections *a*, bolted together, as shown in said figure. The annular casing may also be made up of sections in the arc of a circle, as shown in Fig. 2, the abutting end flanges *a'* being bolted together, as illustrated. The annular casing of the chamber thus constructed is also provided with an annular slot B on its inner side, through which extends the outer edge or rim of the wheel, disk, or spider C. The wheel, disk, or spider C may be made in any suitable way, but preferably as shown in Figs. 1 and 2, where it is shown as constructed of a hub *c*, adapted to fit on an axle, and spokes *c'*, which connect with the annular rim c^2. This rim, as above described, extends through the slot B, and to its outer edge is preferably secured an annular steel ribbon D, which serves to form a tight joint where the rim c^2 enters the chamber A, and may be removed and replaced when desired. As shown in Fig. 4, the under side of this ribbon is curved to conform to the curvature of the casing.

To the rim of the spider C is rigidly secured a piston E, which is located within the annular chamber A. This piston may be made in any suitable way. In cross-section, at its middle portion, it is about equal to the diameter of the annular chamber. On each side of the middle portion the piston is tapered toward opposite ends and curved, as shown, presenting rounded, curved, or inclined ends *e*, for a purpose hereinafter described. The piston is preferably formed with a steel band E', which takes the wear as the piston moves in the chamber A.

I have shown in Fig. 1 of the drawings two valves and two sets of ports for the entrance and exit of steam to and from the chamber A; but the apparatus may be operated with only one set. They are similar in construction and operation, so that a description of one will suffice.

A valve-casing G, arranged transversely to the annular chamber A, is provided with an opening corresponding in size to the diameter of the chamber A and the piston E, and incloses sliding valves H H', as shown in Fig. 3. The valve H' works over the valve H, and the two valves may be so moved as to come together and close the opening in the case, as shown by dotted lines, or to form an opening for the piston E, as shown by full lines. Each

valve is provided with a semicircular opening x and with a pin h, projecting through the casing and working in a slot h'.

Upon each side of the rim of the spider is formed a cam I, the edge of which is inclined from each end outwardly, forming a raised portion i between its extreme ends. As the spider revolves, the cam I engages with the pins h and moves them outwardly, so as to open the valves in advance of the piston E. It will be observed that the piston is so formed as to readily find its way between the valves and rollers thereon, and may be employed to open them after they have been partially opened by the cam I. The portion being inclined, as shown, enters the opening formed by the separation of the valves gradually, so as to at all times fill the opening and prevent leakage. An entrance-pipe J connects with one side of the valve-chamber G, and exit-pipe K with the opposite side. A pipe L carries steam, by means of passages I', into the valve-chamber, and acts as a cushion for the valves. The steam also serves to close the valves when the piston E and cam I have been withdrawn. As the piston passes, the steam is cut off from the pipes I', so as to allow the valves to be readily opened. A pipe L', similar to L, extends from the opposite side of the valve-casing to the exhaust-pipe K.

The entrance and exhaust pipes K may be provided with braces M, as shown in Fig. 2.

In operation steam is admitted through the entrance-pipe J behind the piston E, Fig. 1, and causes it to revolve in the chamber A, and the steam will exhaust through the pipe K as soon as the piston passes through the sliding valve. As the piston E and spider C revolve, the valves are automatically opened and closed, so that a continuous rotary motion is effected. Should the piston happen to stop within the valve-chamber, the second set of valves and entrance and exhaust pipes may be employed to start the apparatus.

The apparatus, with slight modifications, may be run by water instead of steam, and instead of employing a steam-cushion to return the valves springs may be used. I have shown the annular chamber A as circular in cross-section; but it may be made in any other form.

My improved motor is adapted to be reversed—that is, to run in either direction. The piston is similarly formed on opposite sides to admit of this operation. When the apparatus is propelled by water, the chamber A need not necessarily be continuous.

Referring now to Figs. 5 to 10, inclusive, which illustrate certain modifications, the tubular chamber W is only partially annular, its ends M' M^2 being left open. The spider N may be of any suitable construction, and its edge extends into the chamber M, as in Figs. 1 and 2 of the drawings. In this instance the piston O is made flat on one side o and tapered on its opposite side o', and is provided with a wearing-ring o^2.

P indicates the entrance-pipe for the water, which takes the direction indicated by the arrows. The valves are located at Q, and may be constructed and operated substantially in the same way as that shown in Figs. 1 to 4 of the drawings; but a modified construction is here indicated and shown in detail in Figs. 6 to 9, inclusive.

In Fig. 6 a valve specially adapted for the apparatus shown in Fig. 1 is shown. h indicates rollers, which are operated by the cam I in Fig. 1. This valve is mounted in its casing and operated as set forth in describing Fig. 1 of the drawings.

In Fig. 8 a slight modification is shown, in which the parts H H' of the valve are normally closed by springs H^2, and the adjacent ends of the valve are provided with concave rollers H^3. The tapered end of the piston working between these rollers opens the valve without undue friction.

As shown in Fig. 10, the piston-head is provided with an annular groove e, in which the wearing-ring is seated.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of the annular chamber, the piston having inclined or tapered ends, the disk, wheel, or spider to which the piston is secured and which projects through an annular slot in the annular chamber, the valve-casing, the sliding valves, the rim, the the cam on the disk or spider, and the pins or studs and rollers thereon which engage with the cams, and the concave rollers on the sliding valves.

2. The combination, substantially as hereinbefore set forth, of the annular casing, the piston having an inclined or tapered end, the disk, wheel, or spider to which the piston is secured and which projects through an annular slot in the annular chamber, the valve-casing projecting in opposite directions from the annular chamber and communicating therewith, the spring-actuated valves within the casing, cams on opposite sides of the disk, wheel, or spider, and pins secured to the valves which engage with the cams to open them or partially open them before the piston engages with the valves.

3. The combination, substantially as hereinbefore set forth, of the annular chamber, the disk, wheel, or spider, the piston having an inclined or tapered end and secured to the spider, the valve-casing, the valves sliding transversely in the casing, concave rollers in the inner or adjacent ends of the valves, and springs for normally holding the valves closed.

In testimony whereof I have hereunto subscribed my name.

BYRON B. BOWER.

Witnesses:
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C. W. WIMBERLEY.