(No Model.) 2 Sheets—Sheet 1.

A. McFARLAND.

ROTARY MOTOR.

No. 411,827. Patented Oct. 1, 1889.

Fig: 1.

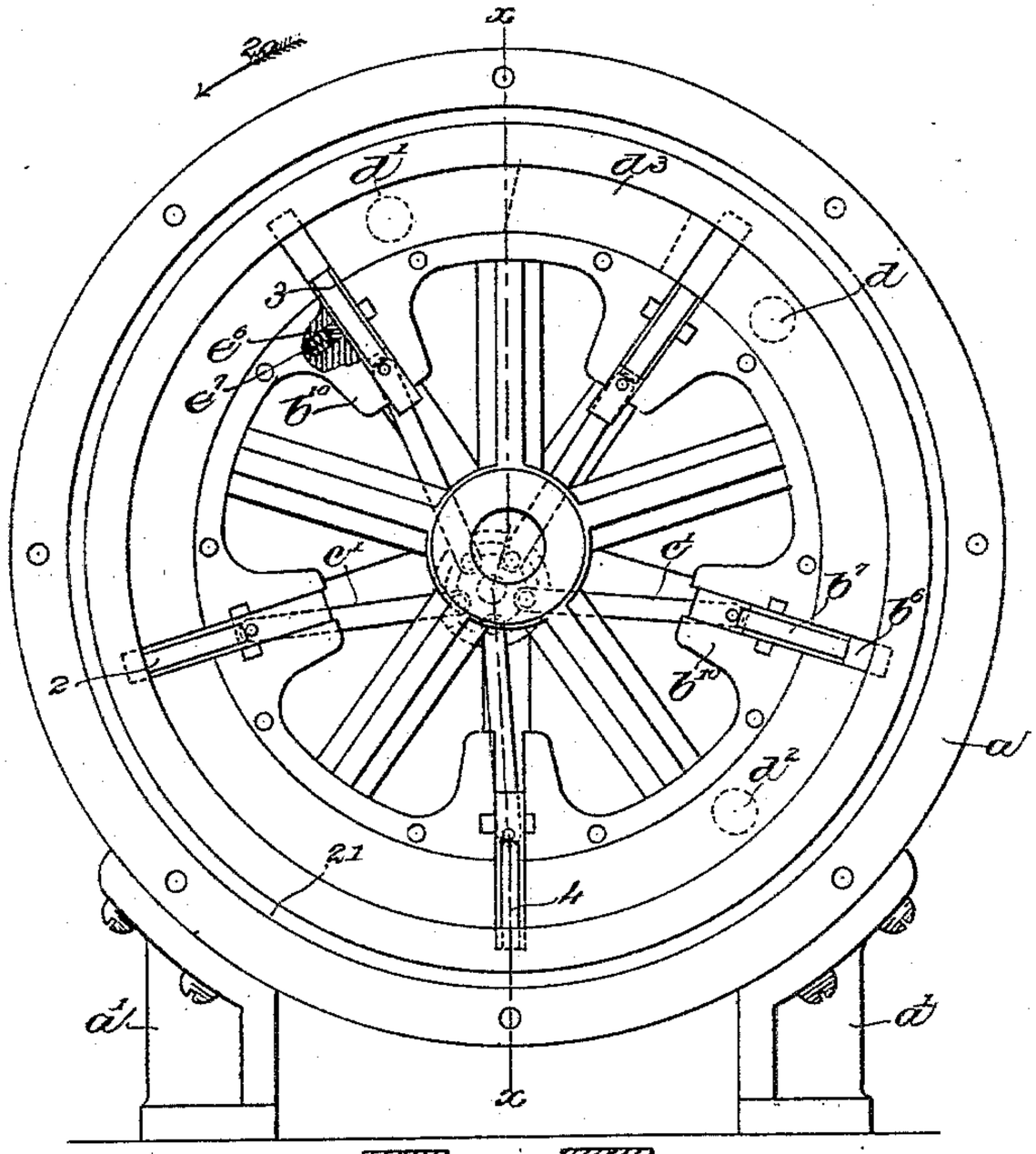
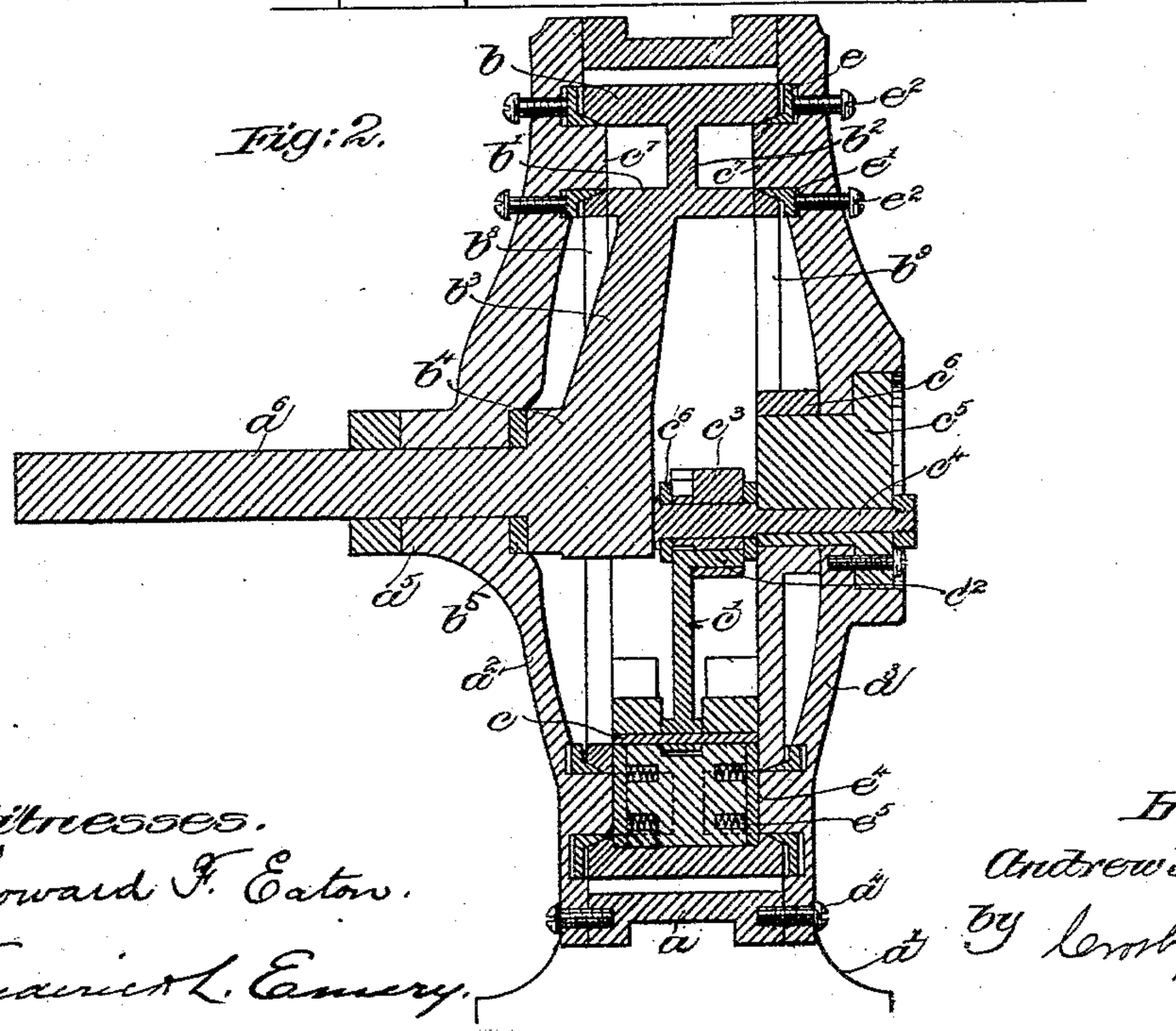


Fig: 2.



Witnesses.
Howard F. Eaton.
Frederick L. Emery.

Inventor.
Andrew McFarland,
by Crosby Gregory
Attys.

(No Model.) 2 Sheets—Sheet 2.

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Fig: 3.

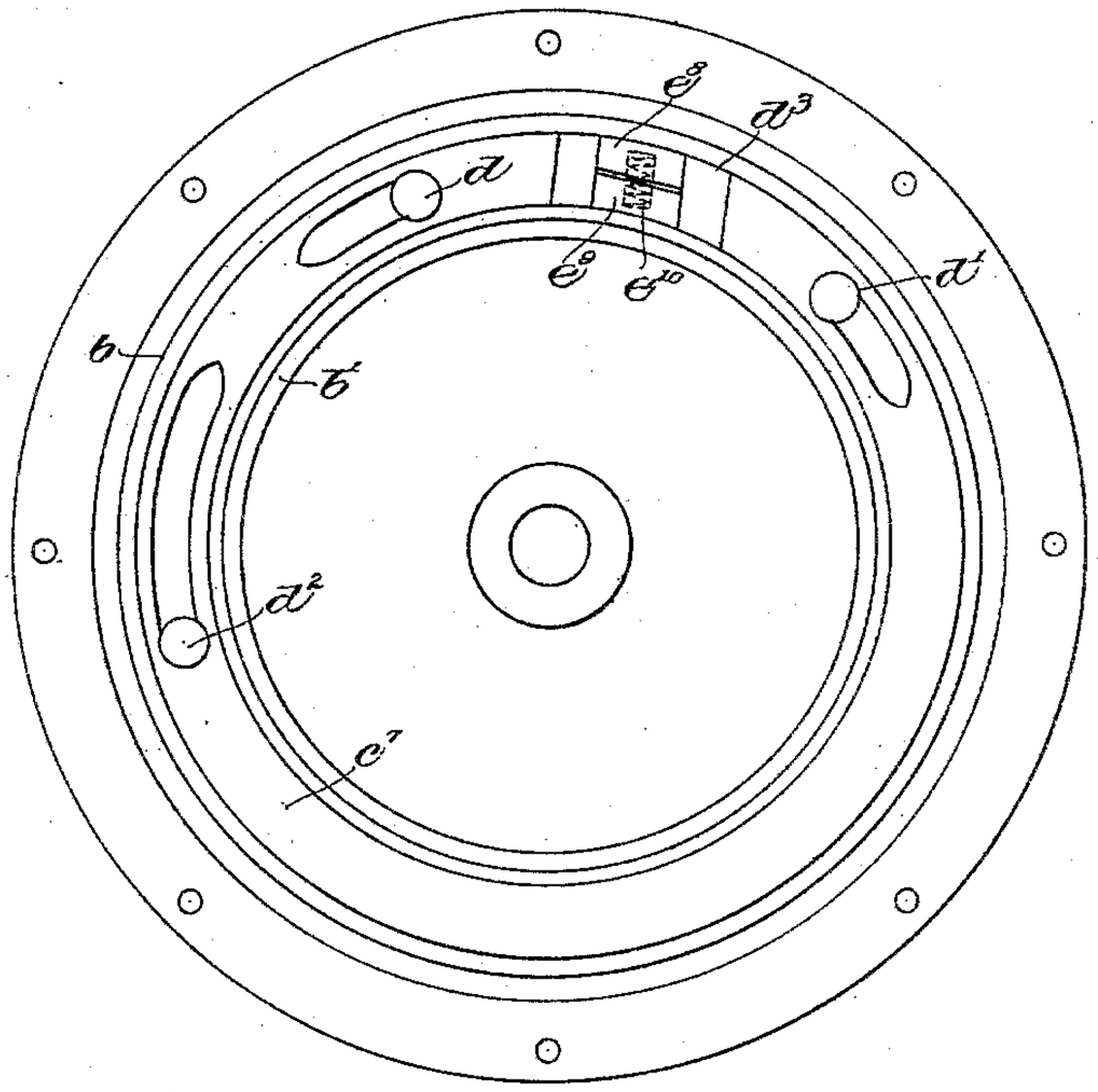
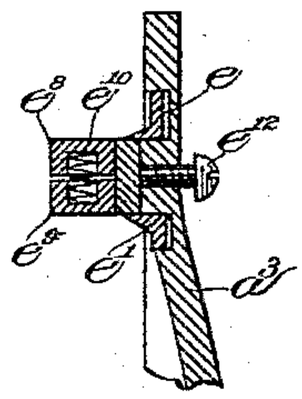


Fig: 4.



Witnesses.
Howard F. Eaton.
Frederick L. Emery.

Inventor.
Andrew McFarland,
by Lemby & Gregory Attys

UNITED STATES PATENT OFFICE.

ANDREW MCFARLAND, OF THOMASTON, MAINE.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 411,827, dated October 1, 1889.

Application filed August 3, 1888. Serial No. 281,854. (No model.)

To all whom it may concern:

Be it known that I, ANDREW MCFARLAND, of Thomaston, county of Knox, State of Maine, have invented an Improvement in Rotary Motors, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to rotary motors, and has for its object to provide a simple, compact, and efficient motor.

In accordance with my invention the piston of my improved motor is composed of two concentric rings joined by preferably a central web to form with a valve-seat annular chambers, into which the steam, water, or other medium or power is admitted continuously. The concentric rings referred to are connected, as shown, by radial arms, to a hub on a shaft or arbor having a bearing in one head or cover of the motor. The inner ring and connecting-web, as herein shown, are provided with radial slots, in which are reciprocated sliding abutments or wings having their inner ends pivotally connected to rods pivotally secured, as shown, to a hub having a pin or arbor eccentrically mounted in a boss on one of the covers, so that when the piston is revolved the wings are reciprocated, for a purpose as will be described, by the eccentric referred to.

The particular features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation of a rotary motor embodying my invention, one of the covers or heads being removed; Fig. 2, a section of the motor shown in Fig. 1 on line xx. Fig. 3 an under side view of one of the heads removed, and Fig. 4 a detail to be referred to.

The shell or cylinder in which the rotary piston is located is composed, as shown, of a ring a, mounted upon legs or supports a', and heads or covers a^2 a^3, firmly secured to said ring, as by bolts a^4. The head or cover a^2 is provided, as shown, with a hub a^5, forming a bearing for the shaft a^6 of the rotary piston, constructed as will be described.

The rotary piston referred to is composed of two concentric rings b b', connected together, as shown, by a web b^2, the ring b' being connected to arms b^3, extended radially from a hub b^4, herein shown as cast integral with the shaft a^6, a washer b^5 being shown interposed between the hub b^4 and head or cover a^2, the said ring, radial arms b^3, hub b^4, and shaft being preferably cast in one piece. The ring b' and web b^2 are provided with a series of slots b^6, extended radially with relation to the center of the rotary piston, the said slots receiving within them, as herein shown, flat pieces of metal b^7, constituting sliding abutments or wings, the ring b' having ears b^{10} extended from its inner periphery to afford increased bearing-surfaces for the wings b^7. The wings b^7 are connected, as by pivot-rod c, to one end of a rod c', provided at its other end, as shown, with a stud or projection c^{12}, (see Fig. 2,) fitted into a socket in a cylinder c^3, mounted on a spindle or rod c^4, eccentrically supported in a hub or boss c^5, herein shown as secured to the head or cover a^3, the said hub or boss forming the second bearing for the rotary piston, a flange c^6 on a ring b^9, forming one of the covers for the piston, being fitted over said hub or boss. The rods c' are held in the sockets or openings in the cylinder c^3, as shown, by a washer c^6.

The heads or covers a^2 a^3, on their inner sides, near their periphery, are provided with annular ribs or projections c^7, constituting guiding-surfaces for the sliding abutments or wings, the said ribs or projections extending between the piston-rings. Each head or cover is provided, as shown in Fig. 3, with ports d d' d^2, and when steam is to be used as the motive power the ports d d' alone will be used, the port d^2 being omitted; but when water or fluid is to be used the port d will be omitted and the ports d' d^2 employed, the port d' constituting the inlet for the water and the port d^2 the outlet therefor. Each rib or projection c^7 has secured to or forming part of it a metallic block d^3, which in practice is fitted steam-tight into the space between the piston-rings b b', as will be described, and forms an abutment or stop for the steam, water, or other medium employed to drive the motor.

The block d^3 is shown in Fig. 3 as fitted between the ports d d', whereby the direction of

rotation of the motor may be reversed when desired, the supply of steam or other medium to the ports being controlled by a suitable cock or valve in a pipe. (Not shown.)

In operation let it be supposed that the piston is rotating in the direction of arrow 20, Fig. 1, and that steam is used as the motive power. In this case the port d^2 is cut off and steam or other medium admitted into the space between the rings through the inlet-port d', the sliding abutments being in substantially the position shown in Fig. 1. The steam admitted into the passage or space between the piston-rings acts on the sliding abutment b^7 (marked 2) and turns the rotary piston in the direction of arrow 20. As the piston moves in the direction of arrow 20 the sliding abutments are reciprocated, the sliding abutment marked 2 being moved farther forward into its slot until it reaches the highest point of throw of the eccentric, which, as represented in the drawings, may, for sake of clearness, be supposed to be when the point 21 on the piston-ring and the center of the stud connected to said sliding abutment and the center of the spindle c^4 are substantially in the same line. As the piston is rotated the next succeeding sliding abutment in rotation (marked 3) is being moved into its slot to gradually close the passage or space until it reaches the position in the drawings occupied by the abutment marked 4, it being entirely closed and steam confined between the abutments 2 and 3. On the further rotation of the piston the abutment 2, which is supposed to be in the position now occupied by the abutment marked 4, will gradually be opened, permitting the steam to exhaust through the port d. Thus it will be seen that each sliding abutment in its turn is closed and opened during one revolution of the piston.

The piston may be rendered steam and water tight, as herein shown, by packing-rings e e', preferably made adjustable to take up wear by screws e^2, or it may be springs.

To compensate for wear of the sliding abutments b^7, each abutment on its opposite sides is recessed to receive an independent plate e^4, (see Fig. 2,) the said plate being pressed forward by springs e^5 in sockets in the said abutment, and so, also, the face of the ring b' on opposite sides of the abutment may be provided with an independent piece or bearing-surface e^6, located in a recess in the ring, and within which is located a spring e^7. So, also, to compensate for wear upon the block or abutment d^3, the latter is preferably made as shown in Fig. 3, the said block being cut out or recessed to receive two smaller pieces e^8 e^9, provided with sockets, in which is located a spring e^{10}, acting to normally force the said pieces against the piston-rings b b', and to compensate for wear upon the web b^2 the block d^3 may be adjusted, as shown, by push-screws e^{12}, (see Fig. 4,) only one of which is shown.

When water or other fluid is to be used as the motive power, the steam-port d may be omitted or cut off by a suitable valve, (not shown,) and the water or other fluid, when the engine is used for a motor, be admitted through the port d' and exhausted through the port d^2; but when used for a pump the port b^2 would constitute the inlet and the port d' the outlet.

When used with steam as a motor, rotation of the piston may be reversed—that is, so as to run in a direction opposite to that indicated by arrow 20—and in this case the port d would form the inlet and the port d' the outlet.

I do not desire to limit myself to the particular form of packing shown.

By constructing the piston with two rings excessive pressure upon the bearing of the shaft is relieved, thereby diminishing the friction upon the same.

The ring b has secured to its sides rings b^8 b^9, constituting covers for the piston to keep the sliding abutments in place, and the said covers form the bearing-surface for the inner ring b' of the piston.

I claim—

1. In a rotary motor, the combination, with a shell or cylinder provided with an inlet and exhaust port, of a rotary piston therein consisting of concentric rings b b', connected by a web b^2 and provided with a series of substantially radial slots, a block or abutment d^3, secured to the said shell, a main shaft to which the said concentric rings are connected, and a series of sliding abutments or wings b^7, connected to a hub eccentrically mounted with relation to the said piston, substantially as described.

2. In a rotary motor, the combination, with the shell or cylinder composed of the ring a and heads a^2 a^3, provided with the annular projections c^7 and having an inlet and exhaust port, and a block or abutment d^3, secured to said annular projections, of a rotary piston consisting of concentric rings b b' on opposite sides of the said block or abutment, a web b^3, connecting said rings and forming with the said annular projections steam-spaces, a main shaft to which the said rings are connected, a series of substantially radial slots in said rings, and a series of sliding abutments or wings b^7, fitted into said slots and connected to a hub eccentrically mounted with relation to the said main shaft, substantially as described.

3. In a rotary motor, the combination, with the shell or cylinder composed of the ring a and heads a^2 a^3, provided with the annular projections c^7 and having an inlet and exhaust port, and a block or abutment d^3, secured to said annular projections, of a rotary piston consisting of concentric rings b b' on opposite sides of the said block or abutment and provided with substantially radial slots, ears b^{10}, secured to the ring b', a web b^2, connect-

ing said rings and forming with the said annular projections steam-spaces, a main shaft to which the said rings are connected, and a series of sliding abutments or wings fitted into said radial slots and connected to a hub eccentrically mounted with relation to the said main shaft, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW McFARLAND.

Witnesses:
JAS. H. CHURCHILL,
B. DEWAR.