No. 632,549. Patented Sept. 5, 1899.

J. J. CALLIHAN.

ROTARY ENGINE.

(Application filed Jan. 18, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig 1

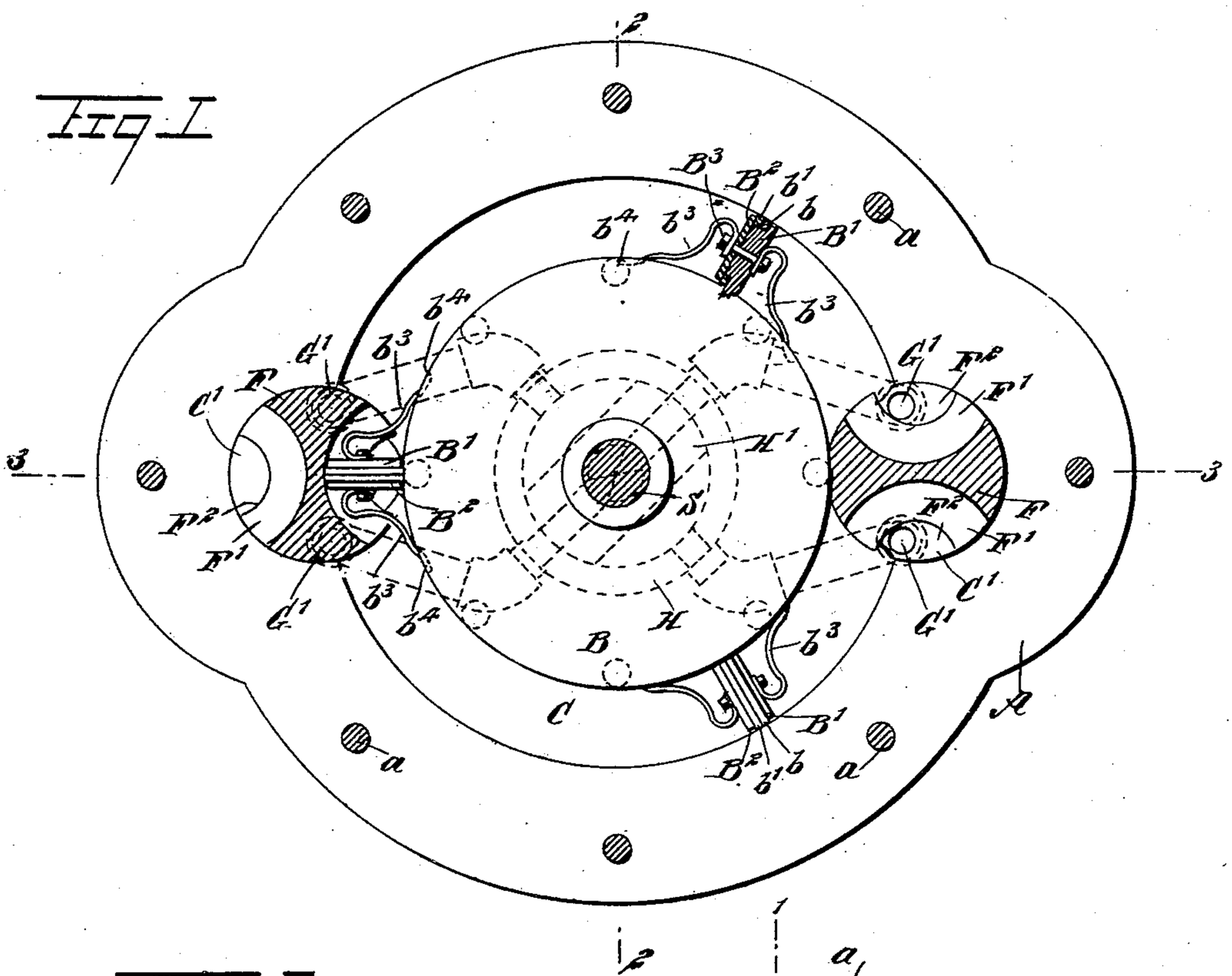

Fig 2

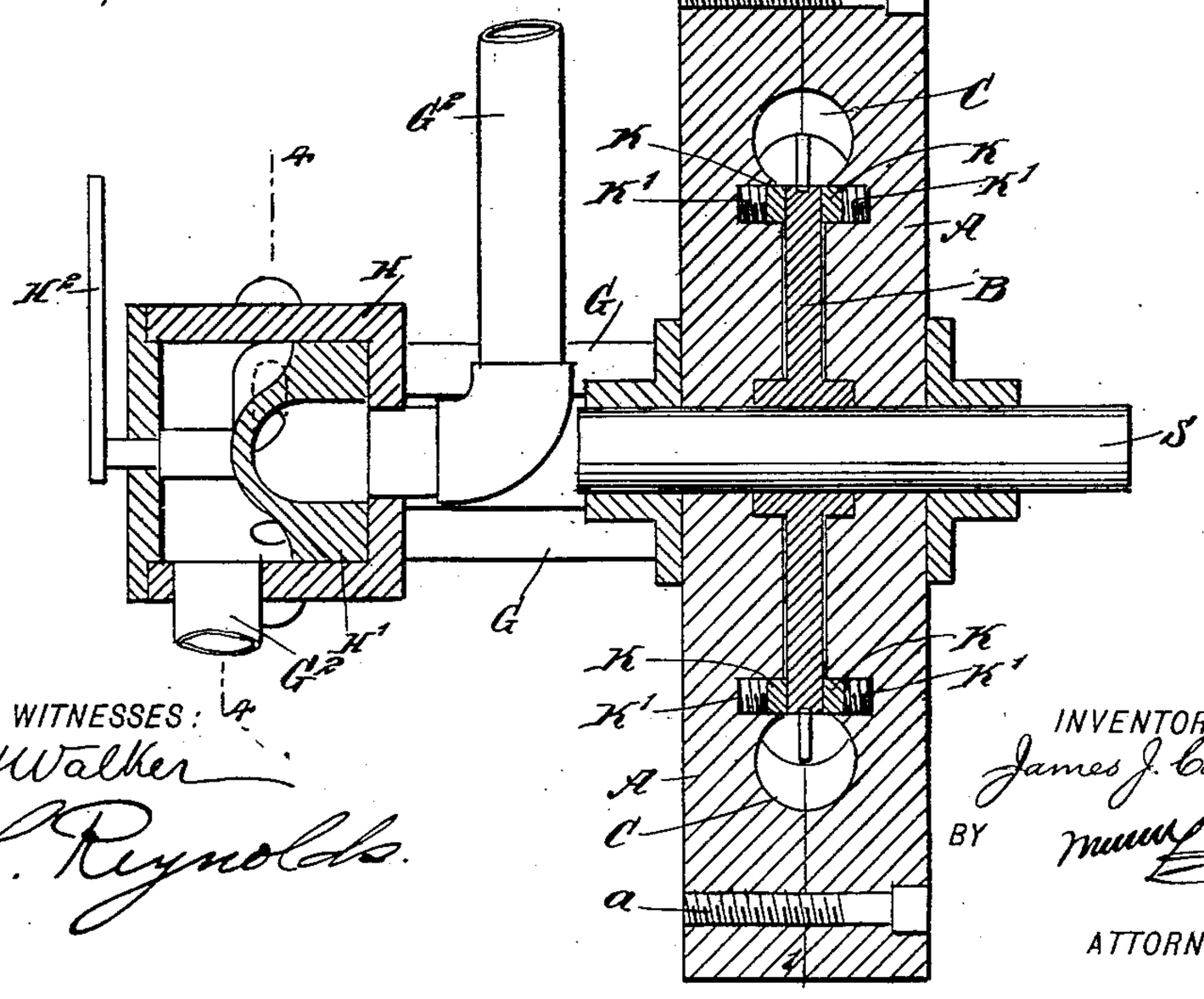

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Fig 3

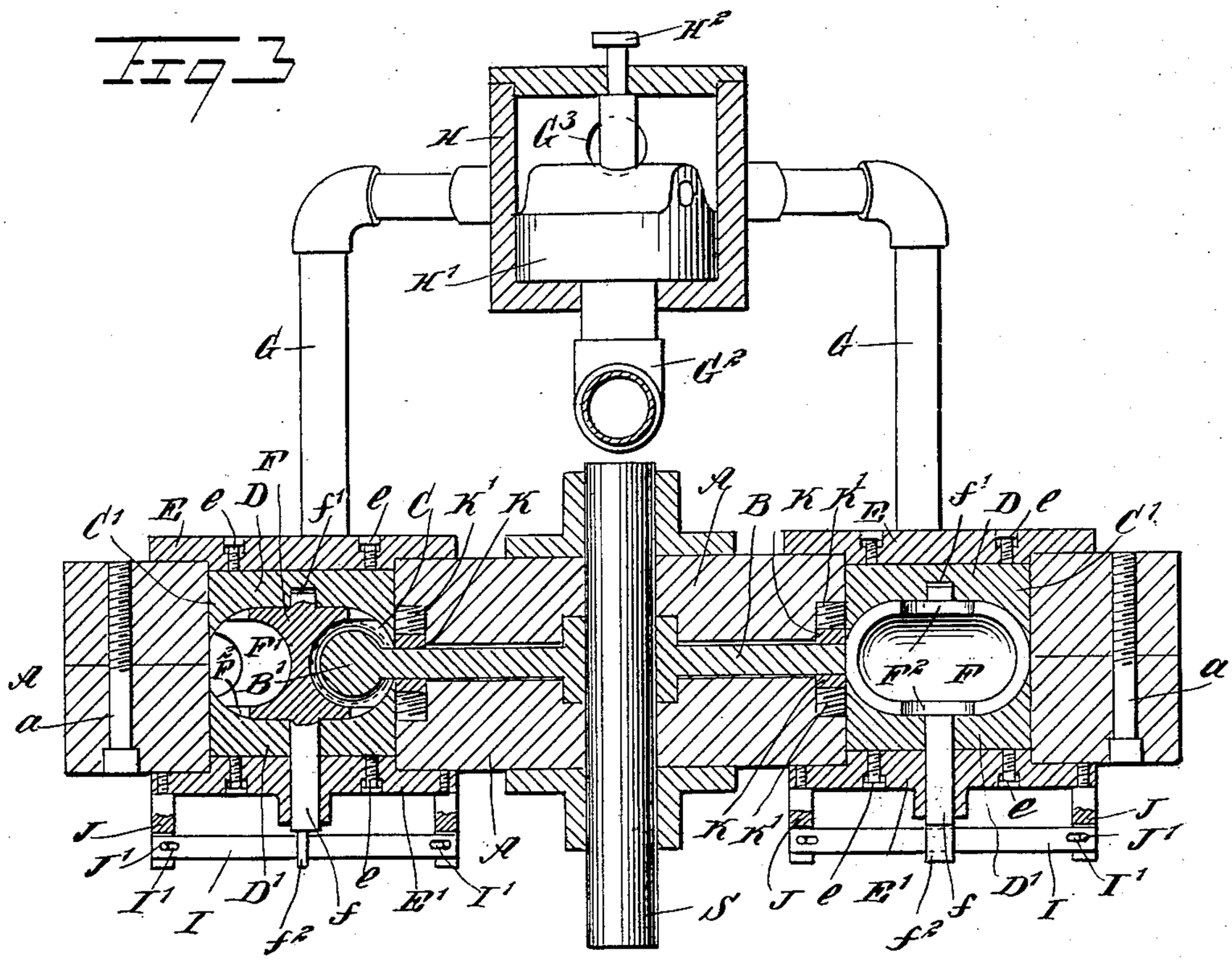


Fig 4

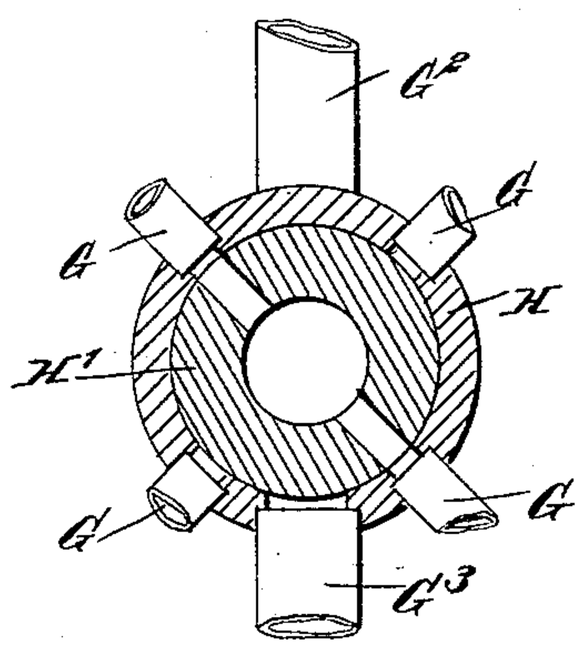
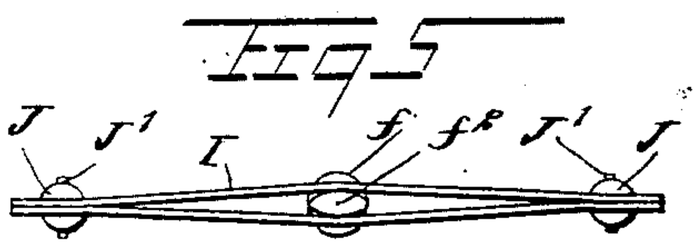


Fig 5



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JAMES J. CALLIHAN, OF NEW ORLEANS, LOUISIANA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 632,549, dated September 5, 1899.

Application filed January 18, 1899. Serial No. 702,494. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. CALLIHAN, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

My invention relates to an improvement in rotary engines, and comprises the novel features hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional elevation on the line 1 1 in Fig. 2. Fig. 2 is a transverse section on the line 2 2 in Fig. 1. Fig. 3 is a horizontal section on the line 3 3 in Fig. 1. Fig. 4 is a section on the line 4 4 in Fig. 2. Fig. 5 is a view showing in detail the means employed for holding the abutment-valves in their normal position.

My invention relates to an improvement in rotary engines of that kind shown and described in my Patent No. 618,781, dated January 31, 1899. Its general features of construction are similar to those of the engine shown and described in said application; but it is improved in details, notably in the manner of forming the chambers which receive the abutment-valves and in the manner of adjusting the two blocks forming said chambers to compensate for wear.

The cylinder of the engine is formed of two disks A, which are secured to each other by means of bolts *a* and have suitable cavities or recesses formed in their inner or adjacent surfaces, so as to form an annular steam-chamber C and a chamber which receives the body of the piston-disk B. The piston-disk B is secured upon a shaft S, said shaft passing through openings in the plates A concentric with the annular steam-chamber C and turning in bearings formed in or secured to said disk. The piston-disk has a series of projecting piston-heads B′ secured to its periphery and of such a size as to closely fit the steam-chamber C. The steam-chamber C and the piston-heads B′ are preferably made circular in cross-section, as shown in the drawings, although other forms might be used, if desired.

I have herein shown three piston-heads attached to each piston-disk. These piston-heads are made to fit tightly in the cylinder-chamber, so that the steam will not leak past them, by having their peripheries grooved, as shown clearly in Fig. 1, in which one of the piston-heads is shown in section. These grooves are then provided with packing-rings *b* and *b′*, which fit snugly against the piston-head and the inner wall of the cylinder-chamber. The groove which receives the ring *b* terminates at each side of the body of the piston-disk B. That portion of the groove which receives the ring *b′* passes entirely around the head, as the ring *b′* is a complete circle. The rings are held in place upon the head by means of the plate B^2, which is held in place upon the head by means of a bolt B^3, which passes through the two, and it also serves to hold the spring-bars b^3. These spring-bars are secured by one end. The body thereof then extends outward, then curves away from the head and inward until its inner or free end rests upon the periphery of the piston-disk. The piston-disk is provided with a recess, as shown at b^4, which receives this end of the bar b^3, so that its upper edge is flush with or slightly below the outer periphery of the disk at all times.

The two plates A, which form the body of the cylinder, are provided with cylindrical apertures passing through the same and so located that the apertures are tangent at their inner sides with the outer periphery of the piston-disk. These apertures are provided with blocks D and D′, which snugly fit therein, and the blocks are hollowed in their inner faces, so as to form chambers which receive the rotating abutment-valves F. These abutment-valves are clearly shown in Figs. 1 and 3, which are sections taken at right angles to each other, and the valves are mounted to revolve by having a lug *f′* secured upon one side and a shaft *f* upon the opposite side, the lug and shaft being located in the axis of the valve. The lug *f′* fits a recess in the inner surface of the block D, while the shaft *f* passes through the block D′ and extends outside the engine, where the outer end is flattened, as shown at f^2 in Figs. 3 and 5. The valves F are the same in construction as the abutment-valves shown in my former apparatus hereinbefore referred to, having grooves

F′ in opposite edges, which grooves extend to the side surfaces of the valves and form notches F^2, which permit the ports G′, hereinafter mentioned, to be uncovered at the proper time. The blocks D D′ are held within the apertures in the plates A by means of caps or plates E and E′, which are secured to the plates A. In these caps are placed adjusting-bolts *e*, which are screw-threaded therein and bear against the outer surfaces of the blocks D and D′, so that the blocks may be adjusted to fit snugly upon the abutment-valves F. The plates E upon one side of the engine are provided with means for securing the steam-pipes G thereto, while the plates E′ upon the opposite side are provided with a central aperture adapted to receive the shafts *f* of said valves. Arms J, projecting from one side of the cylinder, have their ends slotted to receive the ends of spring-plates I, which lie one upon each side of the flattened sections f^2 of the shafts of the abutment-valves F, so as to normally hold said valves in the position shown by the valve at the right in Fig. 1. When the abutment-valve is engaged by the piston-head in its revolution, it will be turned to permit the piston-head to pass, as is indicated by the valve at the left in Fig. 1. The spring-plates I will separate to permit this turning of the valve, but will close upon the flat sides of the shafts *f*′, so as to bring the valve to rest in its ordinary position. This construction is similar to that shown in the application previously referred to. To permit the longitudinal sliding of the spring-plates I, necessitated by the turning of the valve, they are provided with slots I′ in one or both ends, through which pass pins J′, which prevent the plates from being moved out of place and yet permit a slight longitudinal movement of the parts.

The steam enters the cylinder through ports G′, located upon opposite sides of the chamber which receives the abutment-valves. When the abutment-valves are in the position shown at the right in Fig. 1, said ports are open and the steam escapes through one of the ports into the cylinder, while through the other port the exhaust escapes from that portion of the cylinder on the opposite side of the abutment-valve. As the abutment-valve is turned by the passage of the piston-head the ports G′ are closed, as shown at the left in Fig. 1. The spring-bars b^3, secured to the sides of the piston-heads, form a buffer or cushion engaging the abutment-valve, so as to reduce the shock of contact.

A valve-chamber H is provided at one end of the engine, within which is placed a reversing-valve H′, which is operated by means of a crank or lever H^2. This valve is, however, similar in construction to the valve shown in the former application, its connection with the engine and its operation being exactly similar thereto. It is therefore thought to not be necessary to herein describe it in detail. The supply is by way of the pipe G^3, and the exhaust is carried away from the engine through the pipe G^2.

Packing-rings K lie within annular recesses in the plates A, which form the cylinder and bear against the outer side surfaces of the piston-disk B just within its periphery. These rings are held against the disk by spiral springs K′, which are held in suitable recesses. This maintains a tight joint, preventing escape of steam and allowing adjustment for wear.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A rotary engine, comprising a cylinder having an annular steam-chamber and circular valve-chambers extending outwardly from the periphery of the steam-chamber, revoluble abutment-valves in said valve-chambers, a revoluble piston-disk having piston-heads projecting into the steam-chamber, and spring cam-bars secured by one end to the piston-heads and curved inward with their other ends on the periphery of the disk, said bars being adapted to engage the revoluble abutment-valves to turn them, substantially as described.

2. A rotary engine, comprising a cylinder having an annular steam-chamber and circular valve-chambers extending outwardly from the periphery of the steam-chamber, revoluble abutment-valves in said valve-chambers, a revoluble piston-disk, and spring cam-bars secured by one end to the piston-heads and curved inward with their other ends on the periphery of the disk, said bars being adapted to engage the revoluble abutment-valves to turn them, the piston-disk having recesses in its periphery receiving the free ends of the spring-bars, substantially as described.

3. A rotary engine, comprising a cylinder having an annular steam-chamber, a piston-disk having projecting piston-heads, abutments moved by engagement with the piston-heads, and spring-bars secured by one end to the piston-heads and curving outward and then inward, the inner ends resting upon the piston-disk, substantially as described.

4. A rotary engine, comprising a cylinder having an annular steam-chamber, a piston-disk having projecting piston members, the cylinder having cylindrical apertures extending therethrough, tangent at their inner sides with the periphery of the piston-disks and with their centers outside of the piston-heads, blocks fitting said apertures and having their inner faces concaved to form a receiving-chamber for an abutment-valve, and abutment-valves mounted to turn in said chambers and having peripheral cavities receiving and passing the piston-heads, the cylindrical blocks having steam-ports which are controlled by the revolution of the abutment-valves, substantially as described.

5. A rotary engine, comprising a cylinder having an annular steam-chamber, a piston-disk having projecting piston-heads, the cyl-

inder having cylindrical apertures extending therethrough, tangent at their inner sides with the periphery of the piston-disk, their centers being outside of the piston-heads, blocks fitting said apertures and having their inner faces concaved to form a receiving-chamber for an abutment-valve, caps or plates covering the outer ends of said apertures and securing the blocks in place, screws in the caps engaging the blocks to adjust them in place, and abutment-valves mounted to turn in said chambers and having peripheral cavities receiving and passing the piston-heads, the cylindrical blocks having steam-ports which are controlled by the revolution of the abutment-valves, substantially as described.

6. A rotary engine, comprising a cylinder having an annular steam-chamber, a piston-disk having projecting piston-heads, the cylinder having cylindrical apertures extending therethrough, tangent at their inner sides with the periphery of the piston-disk, their centers being outside of the piston-heads, blocks fitting said apertures and having their inner faces concaved to form a receiving-chamber for an abutment-valve, abutment-valves in said chambers, having a central shaft journaled in the blocks, whereby the valve may turn, said valves having peripheral cavities receiving and passing the piston-heads, one end of the valve-journals extending outside of the engine and having a flattened portion, and flat plate-springs embracing said flattened section to hold the valves normally in position to act as an abutment, the cylindrical blocks having steam-ports controlled by the abutment-valves, substantially as described.

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