

No. 706,158.

Patented Aug. 5, 1902.

A. P. CHARLES.
ROTARY ENGINE.

(Application filed Feb. 24, 1902.)

(No Model.)

2 Sheets—Sheet 1.

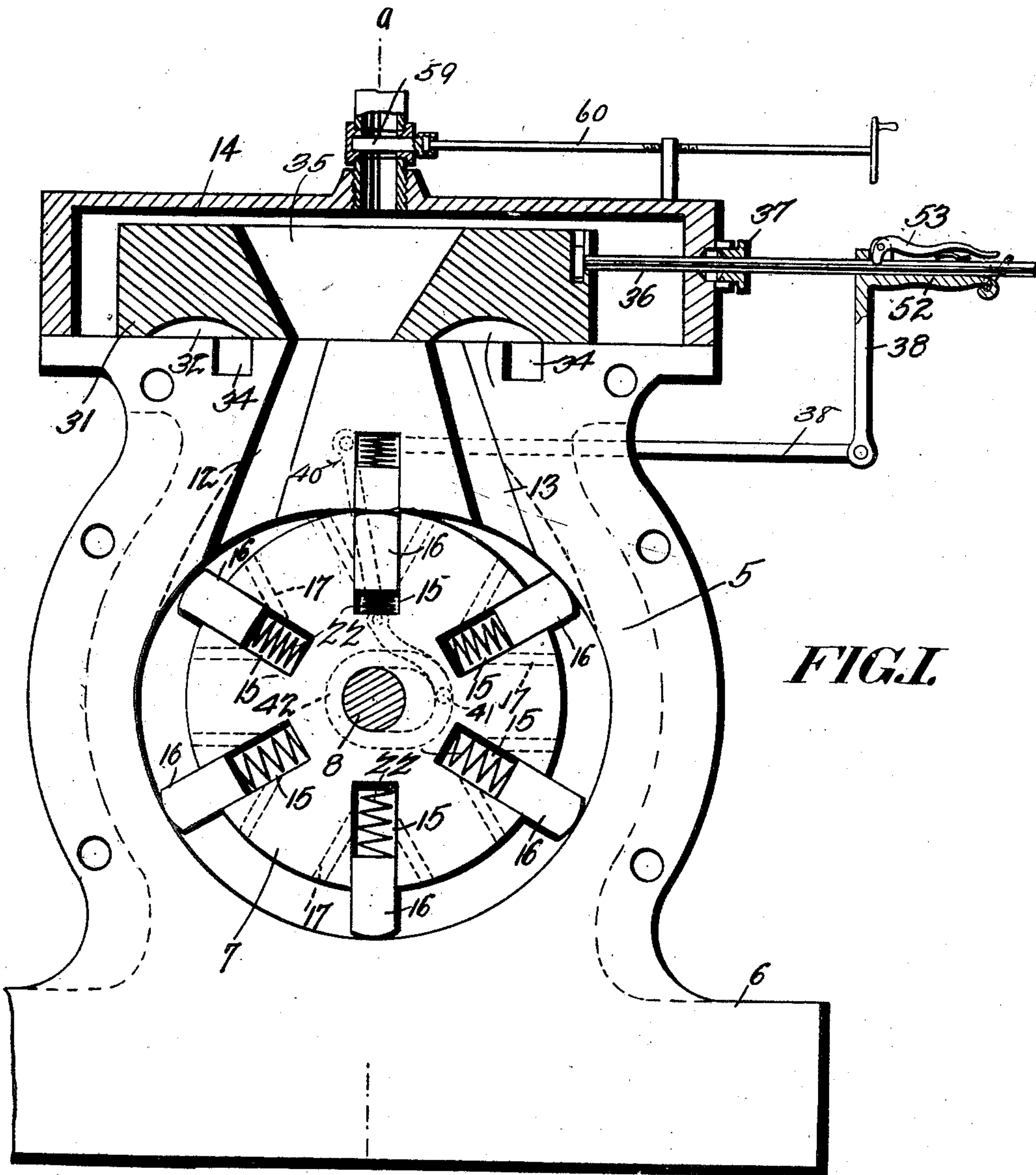


FIG. 1

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FIG. 2.

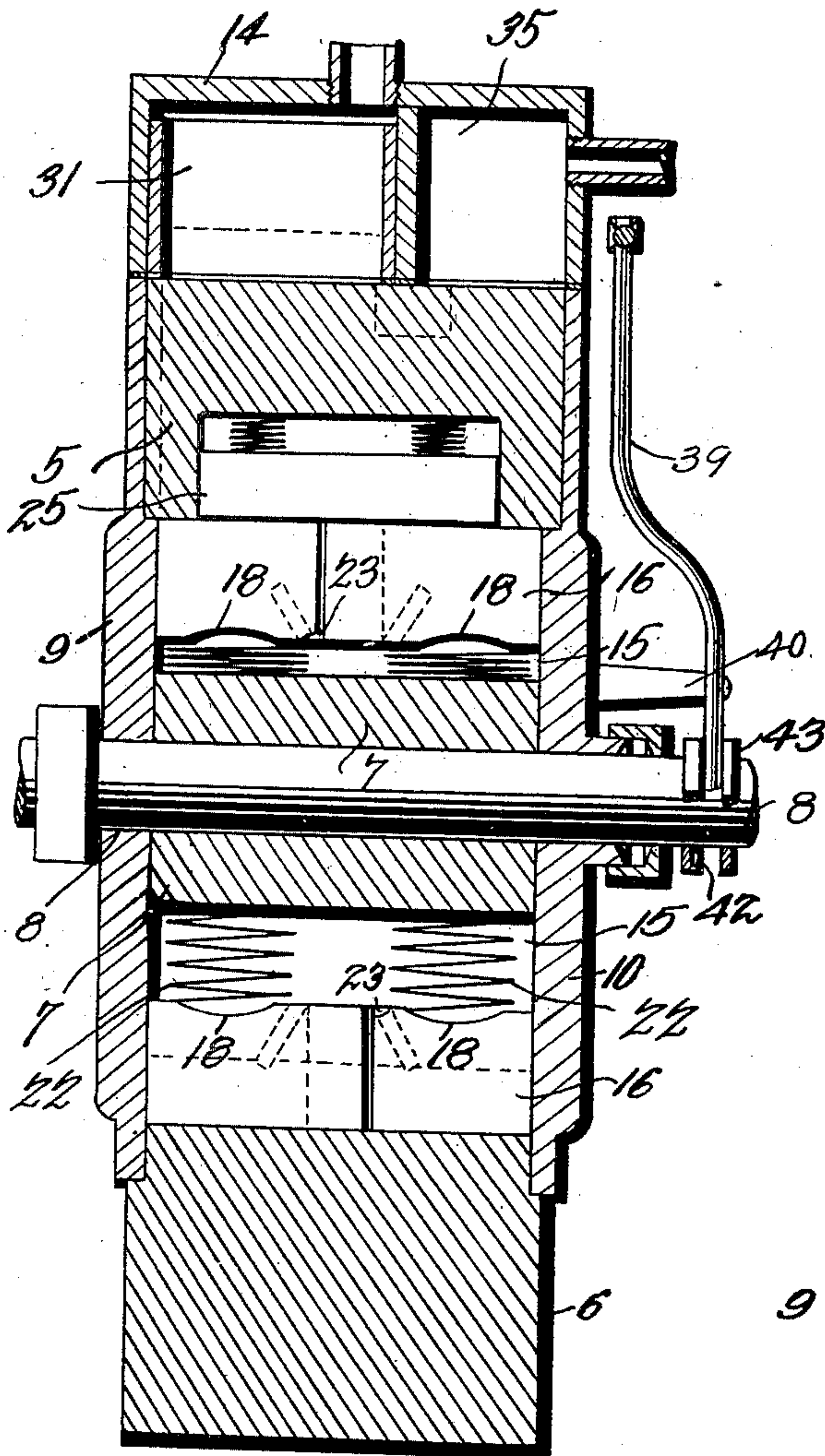


FIG. 3.

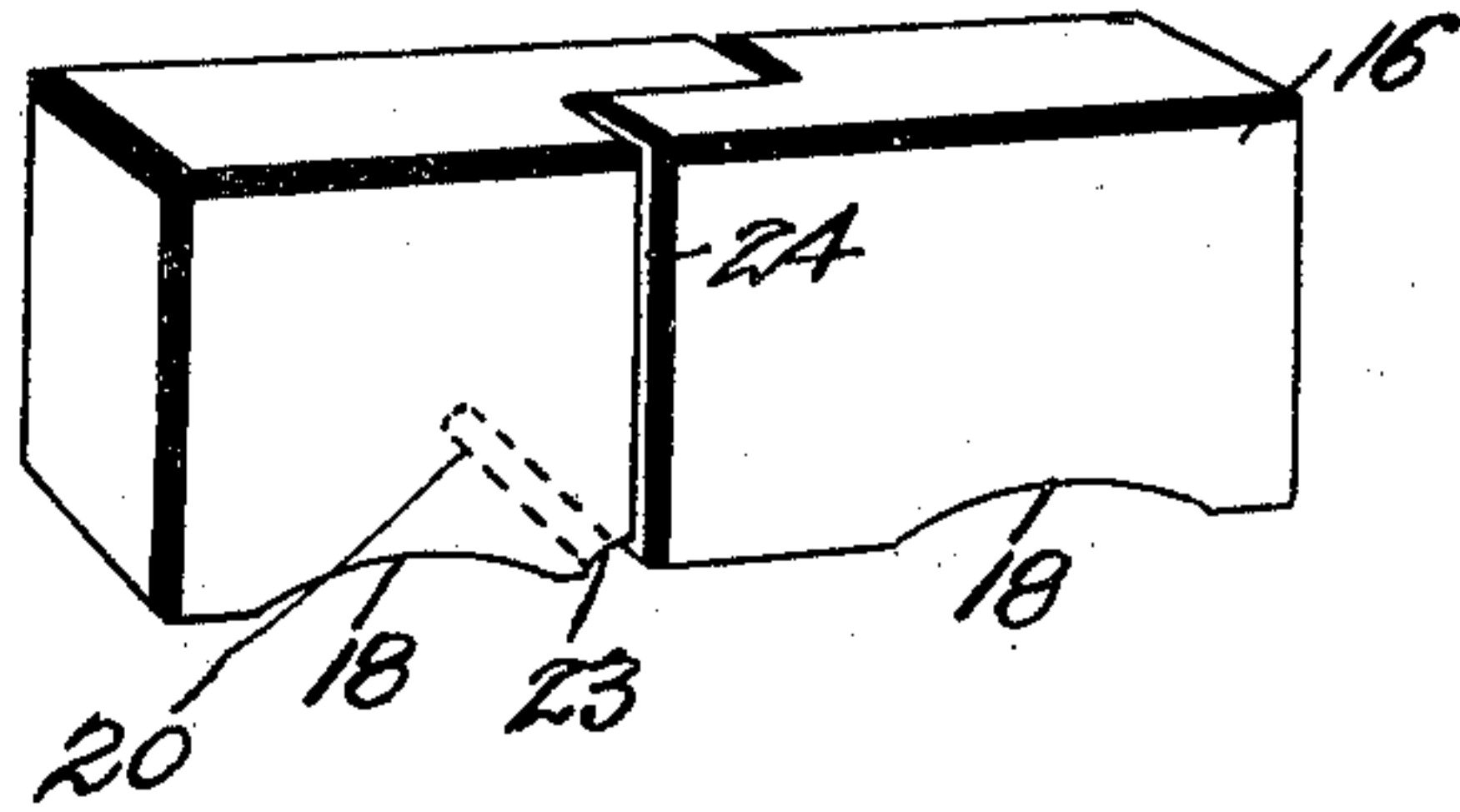


FIG. 4.

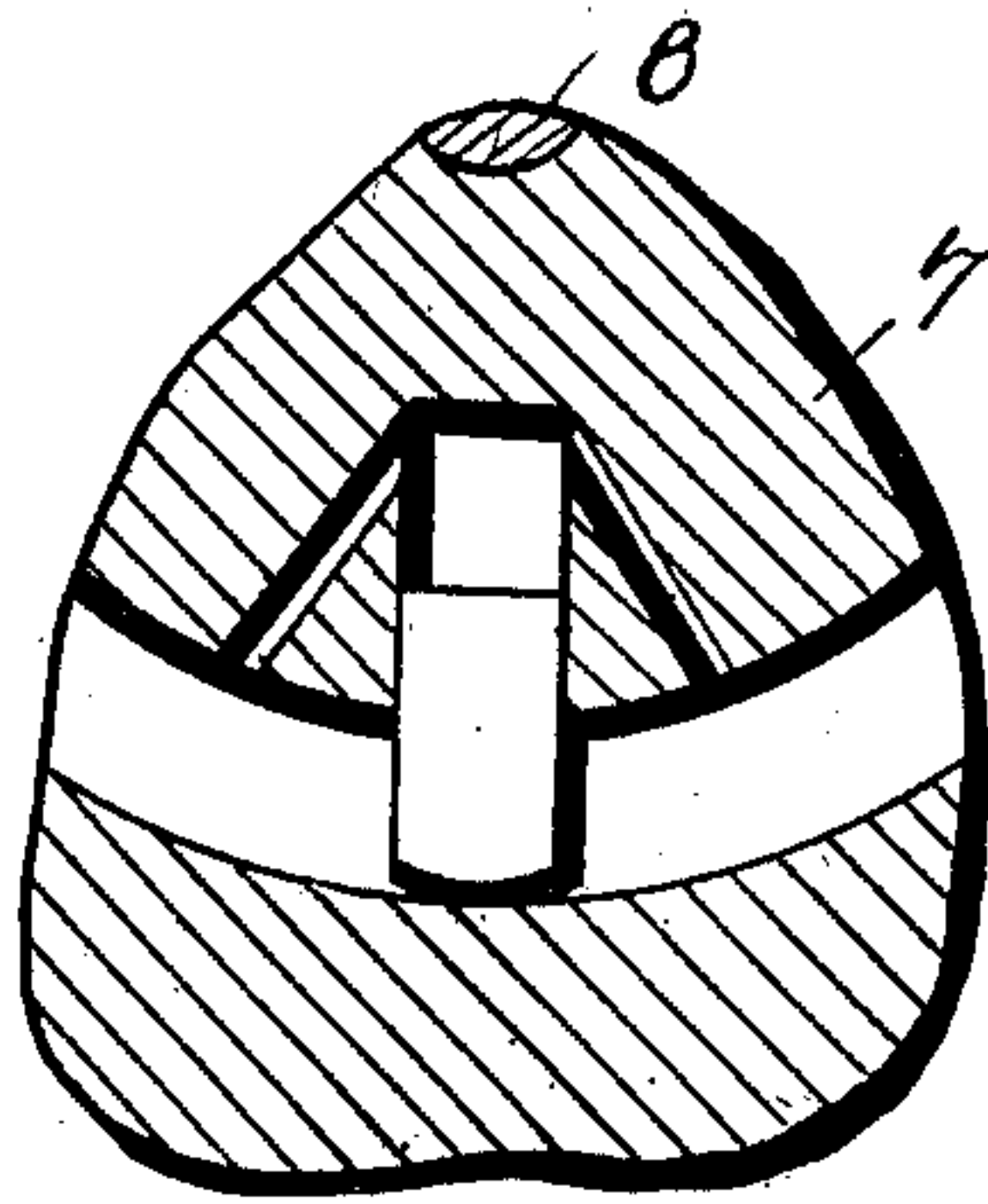
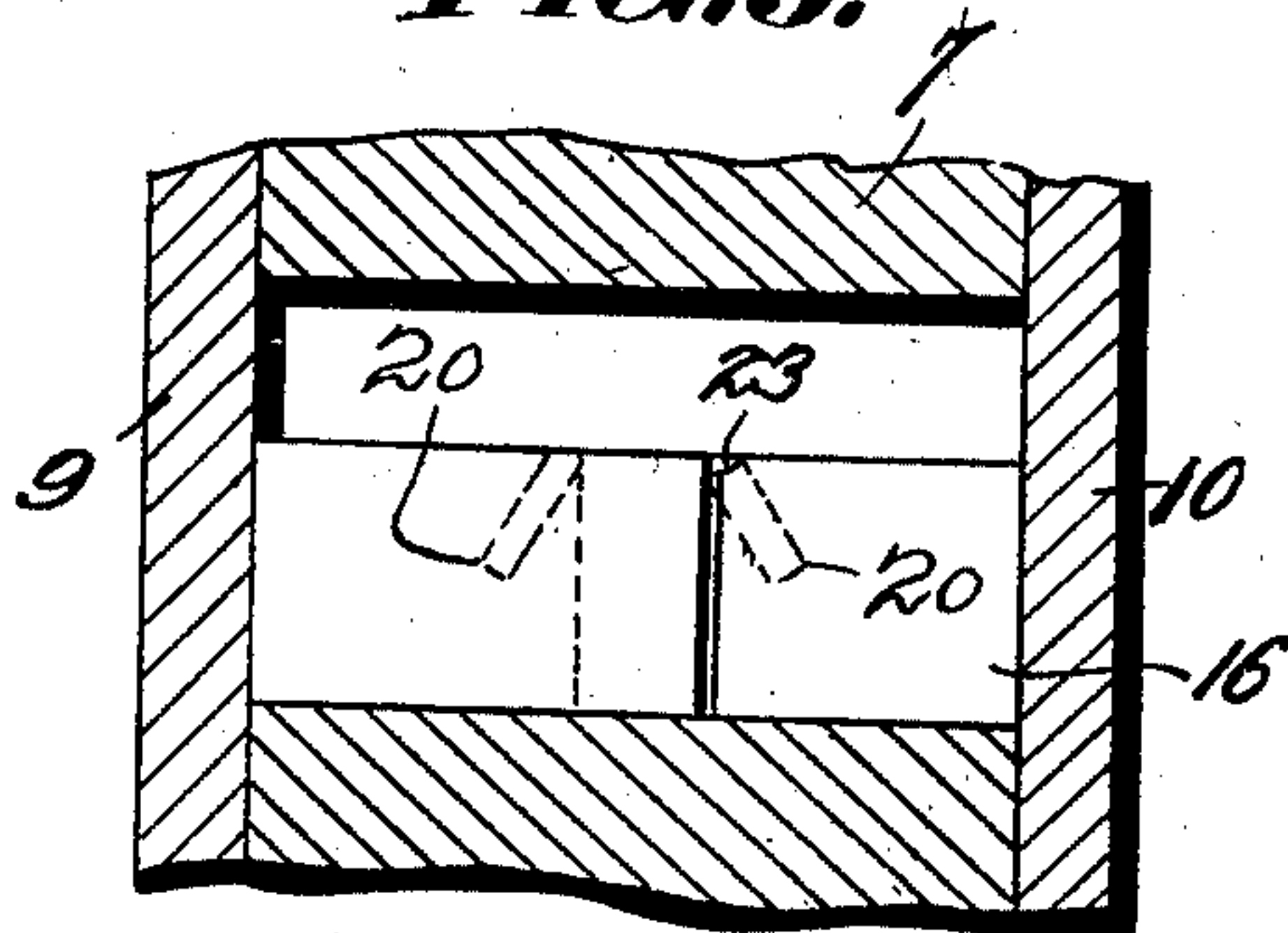


FIG. 5.



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UNITED STATES PATENT OFFICE.

ALBION P. CHARLES, OF IOLA, KANSAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 706,158, dated August 5, 1902.

Application filed February 24, 1902. Serial No. 95,432. (No model.)

To all whom it may concern:

Be it known that I, ALBION P. CHARLES, a citizen of the United States, residing at Iola, in the county of Allen and State of Kansas, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to certain improvements in rotary engines of that general class forming the subject of Letters Patent granted to me on August 13, 1901, under No. 680,406, and has for its principal object to provide an improved form of piston and piston-abutments, whereby all wear on the side and end walls of the abutments and the side and inner walls of the cylinder will be automatically taken up.

A further object of the invention is to improve, simplify, and cheapen the construction of the engine and to provide an improved form of cylinder and piston in which the steam-space of the cylinder will be of the same area at all points around the piston from the inlet to the outlet end.

Further objects and advantages of the invention will be apparent from a reading of the following description.

In the accompanying drawings, Figure 1 is a side elevation of a rotary engine constructed in accordance with my invention, one of the cylinder-heads being removed in order to more clearly illustrate the interior construction. Fig. 2 is a transverse sectional elevation of the engine on the line *a a* of Fig. 1. Fig. 3 is a detail perspective view of an improved form of movable abutment carried by the piston and movable under steam-pressure against the inner walls of the cylinder in order to automatically compensate for wear. Fig. 4 is a detail view illustrating an abutment of this character in position in a piston. Fig. 5 is a sectional view of a portion of the rotary piston, illustrating a modified construction of abutment.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

5 designates a cylinder mounted on a suitable base 6, said cylinder being adapted for the reception of a rotary piston 7, fixed on a shaft 8 and rotatable between the cylinder-heads 9 and 10, the latter being secured in place by suitable transverse bolts extending

through the cylinder-walls. In the upper portion of the cylinder and leading to the steam-space are steam-passages 12 and 13 in communication with a steam-chest 14 on the upper side of the cylinder. The steam-passages 12 and 13 diverge downwardly and are arranged tangentially to the periphery of the piston 7. The periphery of the cylinder and piston are concentric for the greater portion of their length, so as to afford a steam-passage of the same area from the inlet to the outlet end of the cylinder, the upper portion of the latter being arranged close to the periphery of the piston at a point between the two ports, the area of the steam-space being gradually contracted at these points, so that the movable abutments may be forced into their guiding-recesses in the piston after passing the exhaust-port and then be moved outwardly as they near the steam-port in order to expose their entire available area to the action of the steam at the latter point.

In the cylindrical piston are formed two or more radially-disposed recesses 15, adapted for the reception and guidance of radially-movable abutments 16, each comprising two similarly-shaped interfitting sections, the adjacent edges of which overlap, as illustrated in Fig. 3, in order to permit of a spreading action for contact with the side walls of the cylinder without forming any opening to permit of the passage of the steam during such movement. In the piston are formed a number of steam-passages 17, one of which is arranged on each side of each of the abutment-receiving recesses 15, said ports leading from the periphery of the piston to the lower part of such recesses and serving to admit steam from the periphery of the piston to the under side of the abutments, the latter being preferably provided with small recesses 18, adjacent to the outlet end of the ports, so that the steam-pressure may act immediately to force the abutments in a radial line for contact with the circular wall of the cylinder. The arrangement of the ports 17 is such that as the piston is moved inwardly near the exhaust side of the cylinder the steam freely escapes from the lower portion of the recess through the exhaust, and on reaching the pressure side the steam may freely enter below the piston and move the

same outward. In this manner the outer surface of each abutment is kept in contact with the circular wall of the cylinder and automatically compensates for wear, and at the same time the frictional contact will be uniform, each receiving the same amount of pressure and moved outwardly into contact with the cylinder-wall with the same degree of force. In arranging the ports or passages 17 care is taken to make such ports of the smallest possible area in order to prevent the use of an excessive quantity of steam in retaining the abutments in position against the wall of the cylinder, and the space between adjacent edges of abutment-sections is practically closed when the engine is first manufactured, any increase in the width of the space resulting from wear between the ends of the abutments and the side walls of the cylinder. The proportions of the steam-inlet port and the ports or passages 17 are such that the waste of steam through the ports 17 will not impair the efficiency of the engine to any appreciable extent. In order to provide for the lateral movement of the sections of the abutments, I arrange in each of the sections a diagonally-disposed passage, as indicated at 20, leading from the inner lower portion of each section toward the outer upper portion of the section, the entrance of the passage being such that the sections will be forced upwardly and outwardly with a sufficient degree of force to keep them in intimate contact with the side walls or heads of the cylinder, and thereby prevent the passage of steam and automatically compensate for wear between the edges of the abutments and the cylinder-heads. The steam-passages terminate at a point above the bottom of the recesses, so that when the abutments are forced wholly into such recesses by contact with that portion of the cylinder between the two steam-ports such abutments will pass beyond the passages and prevent any flow of steam from the steam side of the cylinder to the exhaust-port. In addition to using recesses under the pistons I also use coiled springs 22 under the same to act as a cushion and also to give the steam quicker action, thus permitting the steam to enter more quickly and throw the pistons to the outer wall of the cylinder. In some cases the steam-passages may extend directly to the bottom of the recesses, as illustrated in Fig. 4, the springs being dispensed with, and steam alone is allowed to force the abutments out into contact with the wall of the cylinder. The lower walls of said abutments may also be perfectly straight instead of recessed, as illustrated in Fig. 5. In both forms of abutments the steam will extend between the overlapping sections and serve to separate said sections, causing their ends to come into contact with the end walls of the cylinder. In connection with the use of a sectional abutment it will be observed that at the open lower end of the angularly-disposed ports 20

are suitable recesses 23, which permit of the passage of steam to said passages not only from the supply-passages 17, but also through the comparatively contracted passages 24 between the adjacent edges of the said overlapping sections of the abutment.

In the steam-chest 14 is a slide-valve 31, having a centrally-disposed passage 35, which is adapted to communicate with either of the ports 12 13 in accordance with the direction of travel of the engine. In the under face of the slide-valve are formed ports 32 and 33, either of which may be placed in communication with exhaust-ports 34 and with the ports 12 13. The ports or passages of the slide-valve may be moved to partially cover the various exhaust or inlet ports to reverse the engine or to stop the same when it may be desired. The valve is connected to a stem 36, passing out through a stuffing-box 37 in the steam-chest and connected to a rod 38, the outer end of which is pivoted to a lever 39, pivotally mounted on a bracket 40, carried by one of the cylinder-heads, the lower end of said lever 39 being provided with a roller 41, adapted to a cam-groove 42 in the cam-wheel 43, carried by the shaft 8. The rod 38 is carried by a tubular handle 52, slidably mounted on the rod 36, said handle being provided with a pivoted trigger 53, adapted for engagement with notches in the stem 36, so that the latter may be operatively connected to the cam disk or wheel and receive motion therefrom.

The supply of steam to the engine is governed by a gate-valve 59, having a stem 60, by which the flow of steam may be more accurately governed.

While the construction herein described, and illustrated in the accompanying drawings, presents the preferred form of device, it is obvious that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, what I claim is—

1. In a rotary engine, the combination with the cylinder, of a revoluble piston having radially-disposed recesses and provided with angularly-disposed ports or passages leading from the periphery of the piston to the lower portion of such recesses, sectional abutments adapted to said recesses, said abutments each comprising a plurality of overlapping sections having recesses adjacent to the terminals of the ports or passages, substantially as specified.

2. In a device of the class specified, the combination with the cylinder, of a revoluble piston having radially-disposed recesses and provided with angularly-disposed ports or passages leading from the periphery of said piston to the lower portion of the recesses, abutments adapted to said recesses, each abutment comprising two sections or mem-

bers having overlapping central portions and provided with recessed bottoms adjacent to the terminals of said ports or passages, each section being furthermore provided with a closed port or passage extending in a diagonal line from the inner lower portion thereof.

3. In a device of the class specified, the combination with the cylinder, of a piston arranged within the cylinder and having its periphery concentric with the curved inner wall of the cylinder between the inlet and exhaust port, that portion of the cylinder between the ports lying adjacent to the periphery of the cylinder, an abutment carried by the cylinder for contact with the periphery of the piston, a series of abutments adapted to radially-disposed recesses in said pistons, the piston being provided with angularly-dis-

posed ports or passages leading from the periphery thereof to the lower portion of the recesses, each abutment comprising a plurality of members having overlapping central portions, and each member being provided with recesses adjacent to the terminals of the angular ports or passages, there being diagonally-disposed ports or openings arranged in each of said members, substantially as and for the purpose specified.

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

ALBION P. CHARLES.

Witnesses:

L. H. BENNETT,
M. MILLER.