

No. 753,735.

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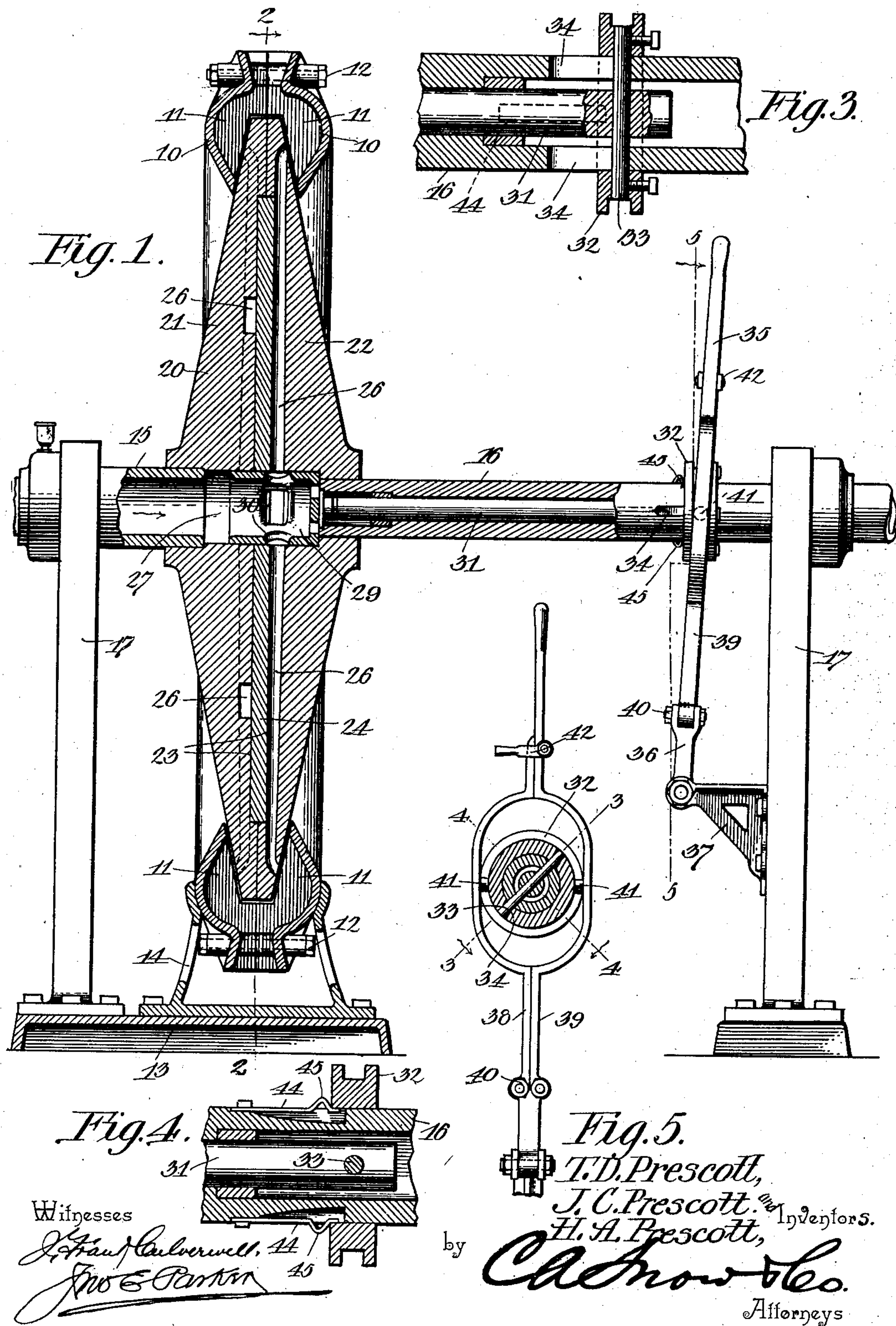
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ROTARY ENGINE.

APPLICATION FILED DEC. 13, 1902. RENEWED AUG. 3, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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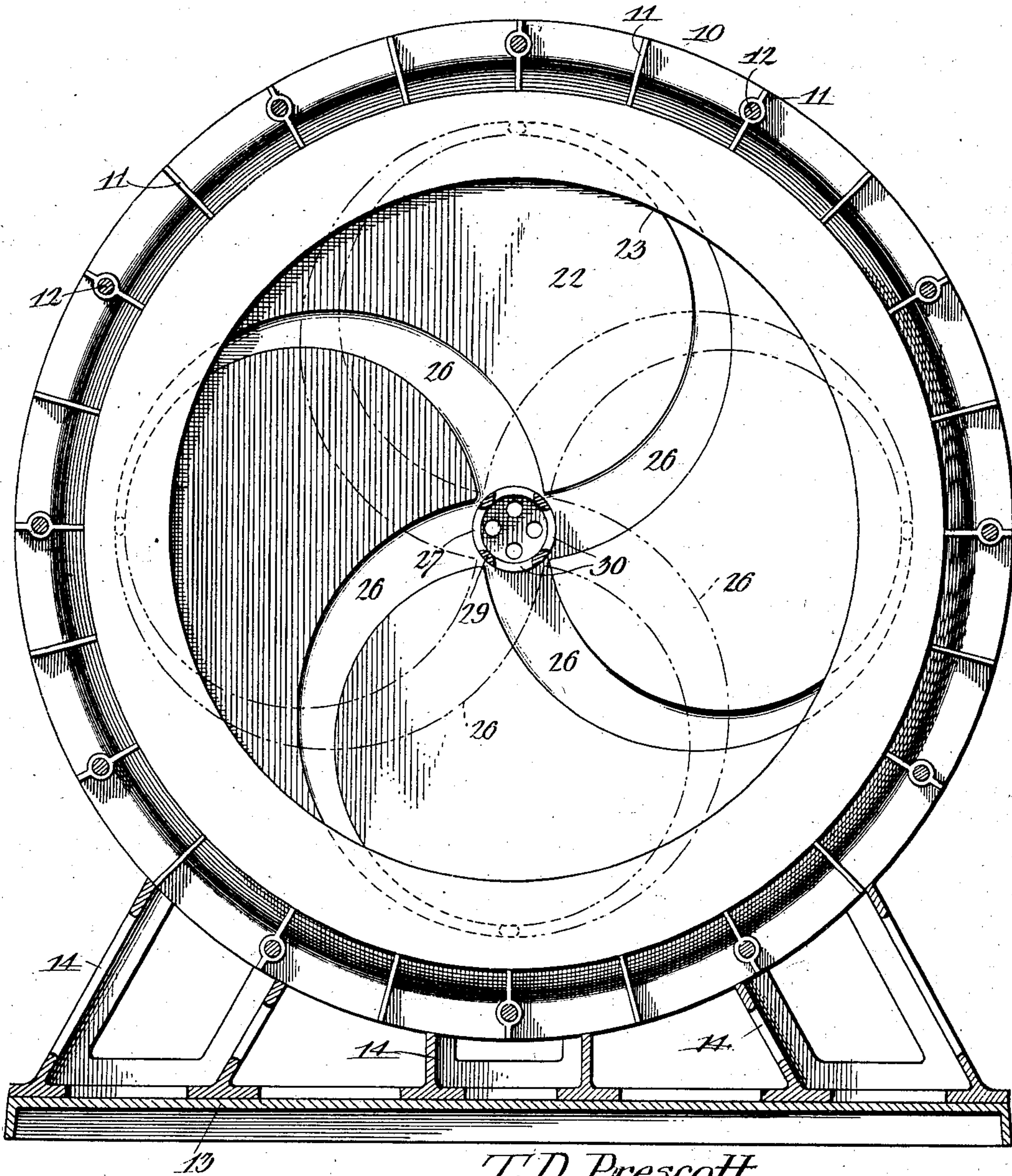
ROTARY ENGINE.

APPLICATION FILED DEC. 13, 1902. RENEWED AUG. 3, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS D. PRESCOTT, JAMES C. PRESCOTT, AND HENRY A. PRESCOTT,
OF PHILADELPHIA, PENNSYLVANIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 753,735, dated March 1, 1904.

Application filed December 13, 1902. Renewed August 3, 1903. Serial No. 168,121. (No model.)

To all whom it may concern:

Be it known that we, THOMAS D. PRESCOTT, JAMES C. PRESCOTT, and HENRY A. PRESCOTT, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to certain improvements in rotary engines of that general class forming the subject of Letters Patent No. 709,242, granted to us on September 16, 1902.

The principal object of the invention is to provide a rotary engine of simple construction which may be readily revolved in either direction and in which two distinct sets of steam channels or passages are arranged in the piston, the steam being directed by a suitable valve through one or other set of channels or passages in accordance with the direction in which the piston is to travel.

A further object of the invention is to provide an engine in which the two sets of oppositely-disposed steam channels or passages are employed in connection with a single set of fixed cylinder-abutments equally effective in either direction of movement of the piston.

A still further object of the invention is to provide a rotary engine of that class in which steam is admitted at the axis of rotation of the piston through a reversing-valve having a direct movement in the plane of the axis of rotation for controlling the admission of steam through either set of steam channels or passages.

A still further object of the invention is to provide an improved form of valve-operating mechanism in which provision is made for automatically locking the valve in adjusted position, and, further, to provide for the removal of a portion of the adjusting means in order to prevent continual friction in the operation of the engine.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended

claims, it being understood 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.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a rotary steam-engine constructed in accordance with the invention. Fig. 2 is a transverse sectional elevation of the same on the line 2 2 of Fig. 1, the central disk or plate being removed in order to more clearly show the arrangement of the steam ports or passages leading from the center of the piston. Fig. 3 is a sectional elevation of a portion of the valve-adjusting mechanism on the line 3 3 of Fig. 5 and drawn to a somewhat larger scale. Fig. 4 is a similar view on the line 4 4 of Fig. 5. Fig. 5 is a transverse sectional elevation of the valve-adjusting mechanism on the line 5 5 of Fig. 1.

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

The cylinder of the engine is formed of a pair of annular members 10, each having a grooved inner face, or of trough-like form in cross-section, so as to form an annular steam-space around the periphery of the disk. This annular steam-space is open to the outer air at the periphery of the cylinder in order to permit the free escape of the steam, and the steam-space is divided into a large number of separate compartments by radially-disposed abutments 11 in the form of comparatively thin plates suitably shaped to conform to the contour of the peripheral portion of the piston. The two members of the cylinder are secured together by bolts 12, which may be of any desired number, and the cylinder is supported on a bed-plate 13 by a suitably-shaped base 14, so constructed as not to interfere with the free escape of the steam or other fluid employed as an actuating medium. The shaft on which the piston is supported is hollow and is divided into two members 15 and 16, having bearings at the upper ends of a pair of standards 17, each member of the shaft being rigidly secured to one of the piston

members. The shaft member 15 is connected to a suitable source of pressure-supply, such as a steam-boiler or other reservoir containing fluid under pressure, and the entering fluid 5 passes through the shaft to the central portion of the piston and thence outwardly through the piston-passages to the cylinder, from whence it escapes to the outer air.

The piston 20 is composed of three members, two of which, 21 and 22, are of substantially the same construction, being formed of disks having inclined outer faces so arranged that the thickness of the disk is gradually increased from the periphery toward the supporting-shaft. The inner face of each disk is 15 recessed, as indicated at 23, for the reception of a plain disk 24 of uniform thickness, which serves to divide the two members and prevent the passage of steam from the channels at one side to the channels at the opposite side of the piston. The flat faces of both piston members are provided with a plurality of steam channels or passages 26, leading from a central and preferably cylindrical steam- 25 chest 27 to points near the periphery of the piston. These channels or passages are arranged on curved lines and are of gradually-decreasing area from the center to the outlet, at which point they are arranged on lines substantially tangential to the circumference of the piston, so that the jet of fluid under pressure may be directed against the fixed cylinder-abutments to the best advantage. The two sets of steam channels or passages are respectively disposed in opposite directions and 35 have their discharge ends disposed on opposite sides of the piston; the central disk 24 serving as one wall of each set of passages and preventing the escape of steam from one to the other. The construction is such as to permit of the formation of the steam-channels by the ordinary molding operations, the only coring necessary being between the outer wall of the recesses in the inner faces of the piston 40 members and the discharge ends of the steam-channels.

In the centrally-disposed steam-chest 27 is arranged a cylindrical and preferably cup-shaped valve 29, having a plurality of ports 50 or passages 30, the valve being adjustable in a direct line in the plane of the longitudinal axis of the shaft and piston to present its ports in alinement with either set of piston channels or passages in accordance with the direction 55 in which the piston is to revolve. The shaft member 16 is hollow, as before described, and receives and guides a valve-stem 31, which is connected at one end to a grooved collar 32, a diametrically-disposed pin 33 being employed for the purpose, and to permit free longitudinal movement of the collar and valve-stem the shaft is provided with longitudinally-disposed slots 34 for the passage of the pin 60 33. As a means of adjustment a lever 35 is

employed. This lever is formed of several 65 members, comprising a lower member 36, having a pivotal connection with a bracket 37, carried by one of the standards 17, and a pair of pivoted members 38 and 39, connected to the member 36 by pivot-bolts 40. The two 70 members 38 and 39 are so shaped as to embrace the collar 32, and each member is provided with a pin 41, adapted to enter the groove of said collar, and thus provide for the longitudinal adjustment of the collar by means 75 of the lever. The lever member 39 terminates at its upper end in a suitable handle, and at a point below the handle is provided with a pivoted yoke 42, which may be forced over the curved upper end of the lever member 38 to thereby hold the two members together and in operative position. After the 80 valve has been adjusted by means of the lever and collar the yoke 42 is moved out of locking engagement to permit the two members of the 85 lever to swing freely on the pivot-bolts 40, and thus move the pins 41 from engagement with the annular groove of the collar. This relieves the engine of the friction which would otherwise occur between the walls of the 90 groove and the pins. At opposite sides of the shaft are arranged small plate-springs 44, secured at one end to the shaft and provided near their free ends with outwardly-bent and approximately V-shaped portions 45, adapted 95 to engage with the opposite sides of the collar 32 in accordance with the position to which the latter is adjusted, the spring acting to properly hold the collar, and thus the valve, in adjusted position. 100

In operation steam is admitted to the steam-chest 27 and thence passes through the steam-ports of the valve 29 into one or other set of channels or passages 26 in accordance with the direction in which the piston is to travel. 105 The steam is directed through the curved channels and impinges against the successive abutment-plates 11, while all back pressure is avoided by permitting the free escape of the steam from the steam-space of the cylinder. 110

Having thus described the invention, what is claimed is—

1. The combination in a rotary engine, of an annular cylinder having radially-disposed abutments, a revoluble piston having its outer 115 portion arranged within the cylinder, the central portion of the piston being provided with a steam-chest, two sets of steam-passages arranged in different planes with respect to the transverse axial line of the piston and facing 120 in opposite directions, and a valve disposed in the steam-chest and movable in a plane parallel with the axis of the piston to thereby place either set of passages in communication with the chest. 125

2. The combination in a steam-engine, of an annular cylinder formed of two spaced members to permit the free escape of the actuating

fluid, a plurality of abutments carried by said spaced members, a revoluble piston having its outer portion arranged within the cylinder and provided with two sets of oppositely-disposed steam channels or passages, and a valve for controlling the passage of steam or other actuating fluid through said channels or passages.

3. The combination in a steam-engine, of an annular cylinder having radially-disposed abutments, a revoluble piston having its outer portion arranged within the cylinder, said piston comprising a pair of plates each provided with an inner recessed face and with steam channels or passages, and a centrally-disposed disk fitting within the recesses and forming one wall of each of the channels or passages.

4. The combination in a steam-engine, of an annular cylinder having radially-disposed abutments, a revoluble piston having its outer portion disposed within the cylinder, two sets of oppositely-disposed steam channels or passages arranged in the piston and terminating respectively on the opposite sides of the piston near the periphery thereof, said sets of steam channels or passages being disposed at different points in the width of the piston, a centrally-disposed steam-chamber with which both sets of channels communicate, a ported cylindrical valve disposed within the steam-chest and controlling the passage of steam therefrom to either set of channels, and means for adjusting said valve.

5. The combination in a steam-engine, of the annular cylinder, a revoluble piston having its outer portion arranged within said cylinder, steam channels or passages disposed in said piston, extending over the outer edge of the piston and positively embracing the sides thereof, said abutments being a plurality of sets of abutments carried by the cylinder and shaped to conform to the contour of the piston.

6. The combination in a steam-engine, of the cylinder comprising a pair of oppositely-facing annular members grooved or of trough-like form in cross-section to form an annular steam-space and spaced at their outer edges to permit the free escape of the actuating fluid, a plurality of radial abutments arranged within the cylinder, a piston having its outer portion dis-

posed within the cylinder, and steam channels or passages leading from the center of the piston and discharging within the said cylinder.

7. The combination in an engine, of the annular cylinder having a plurality of radially-disposed abutments, a revoluble piston having its outer portion disposed within the cylinder, a centrally-disposed steam-chamber within the piston, a hollow shaft carrying said piston, a valve arranged within the steam-chest, a valve-stem extending through the hollow shaft and connected to said valve, a grooved collar secured to said valve-stem, and a two-part lever having pins engaging the grooved collar, the two parts of the lever being separable to remove the pins from the collar after the valve has been adjusted.

8. The combination in a steam-engine, of the annular cylinder having a plurality of radially-disposed abutments, a revoluble piston having its outer portion arranged within the cylinder and provided with a centrally-disposed steam-chest, steam ports or passages leading from the chest to the outer portion of the piston, a valve arranged in the steam-chest, a hollow shaft carrying the piston, said shaft being provided with a pair of diametrically-opposed longitudinal slots, a valve-stem extending through the hollow shaft and connected at one end to the valve, a grooved collar slidably mounted on the shaft, a pin extending through the grooves of the shaft and connecting the valve-stem to the collar, plate-springs for locking the collar in either position of adjustment, and a pivoted lever having pins for engaging the grooved collar, said lever comprising a lower member pivoted to a fixed support, a pair of separable members pivotally connected to said lower member, and means for locking the separable members to each other, substantially as specified.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

THOMAS D. PRESCOTT.

JAMES C. PRESCOTT.

HENRY A. PRESCOTT.

Witnesses:

F. J. KING,

CHAS. STEHLE.