C. McQUOWN.

ROTARY ENGINE.

APPLICATION FILED APR. 4, 1908.

931,077.

Patented Aug. 17, 1909.

2 SHEETS—SHEET 1.

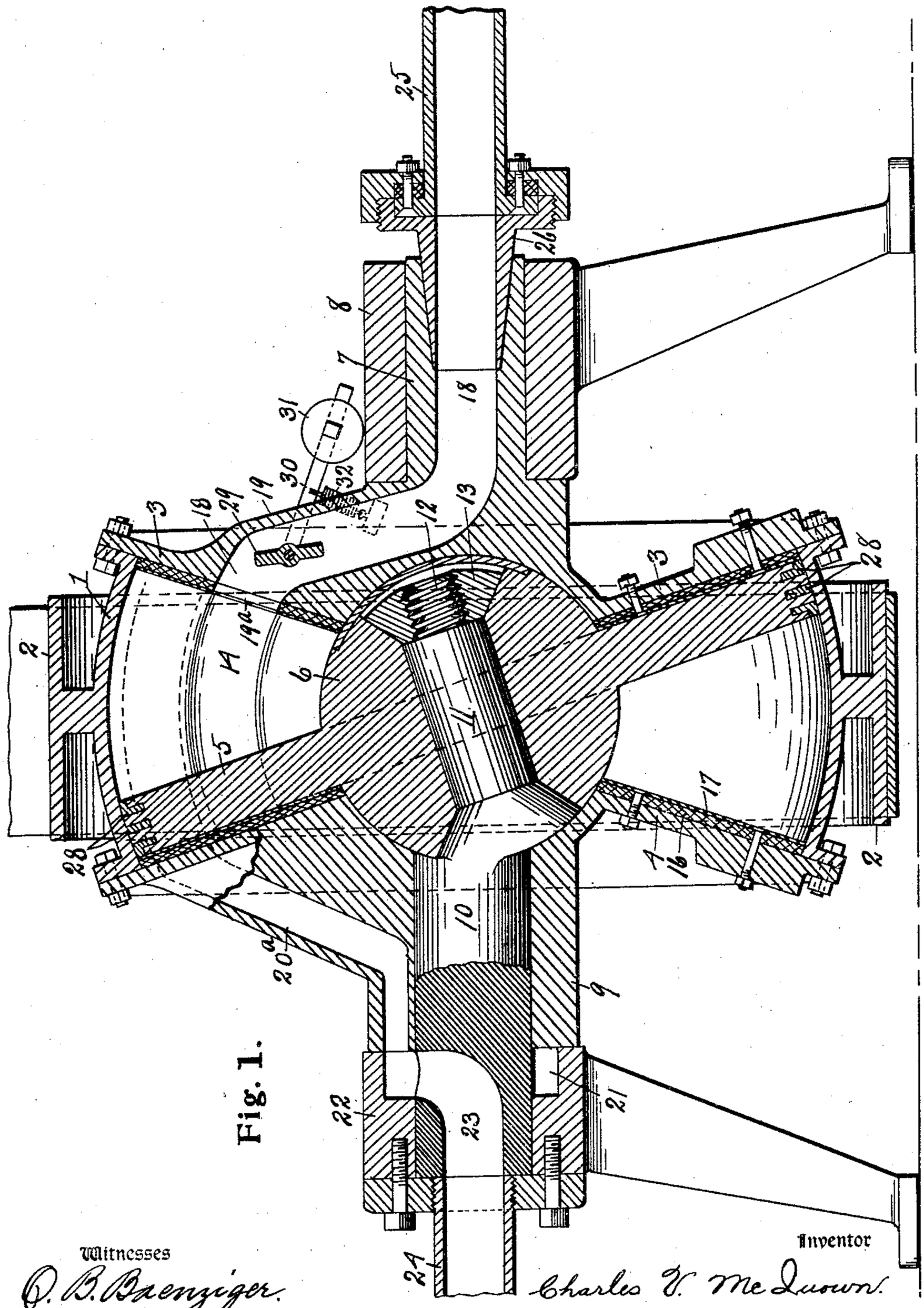

Fig. 1.

Witnesses

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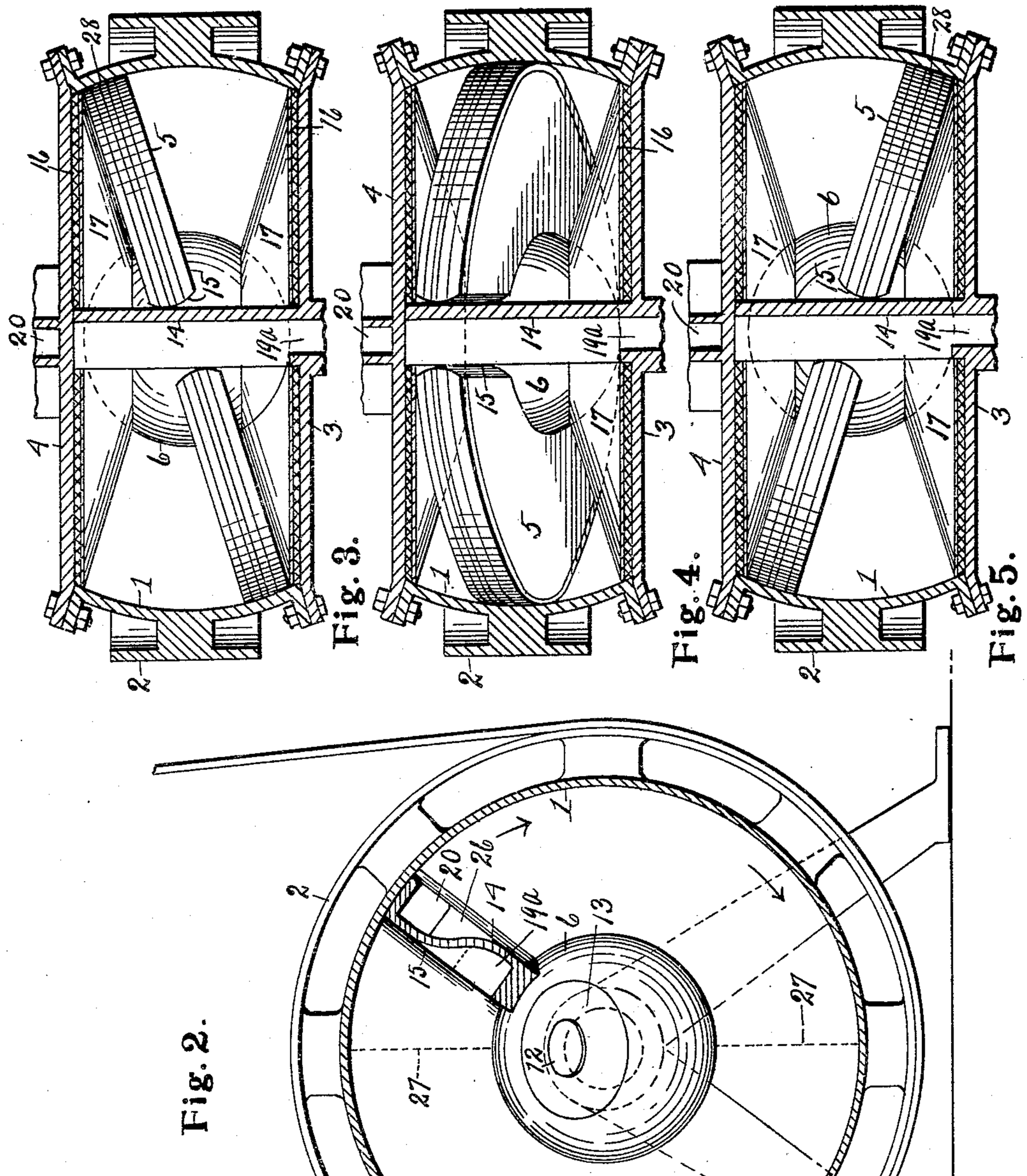

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES McQUOWN, OF DETROIT, MICHIGAN.

ROTARY ENGINE.

No. 931,077. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed April 4, 1908. Serial No. 425,170.

To all whom it may concern:

Be it known that I, CHARLES McQUOWN, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Rotary Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to rotary engines of the disk type, and consists in the construction and arrangement of parts hereinafter more fully set forth and pointed out particularly in the claims.

The object of the invention is to produce an engine of the character described, of comparatively simple and inexpensive construction, wherein provision is made for effecting a continuous application of pressure from the motive fluid to drive the engine, the arrangement being such as to cause a rotation of the cylinder or case with the disk which is located within the cylinder and which divides the interior obliquely into steam spaces located on opposite sides thereof, the diametrically opposed faces of said disk co-acting with the opposed conical heads of the cylinder to form abutments which resist the passage of the steam or motive fluid and cause it to act upon the sectoral piston carried by the rotary case or cylinder.

The above object is attained by the structure illustrated in the accompanying drawings, in which:—

Figure 1 is a diametrical section through an engine embodying my invention, and a longitudinal section through the supporting bearings on which the rotatable parts turn. Fig. 2 is a sectional view of the cylinder or case and of the sectoral partition dividing the interior of the circular cylinder diametrically, the disk and its spherical hub appearing in elevation. Figs. 3, 4, and 5 are diagrammatical views, partly in section, employed to illustrate the varying position of the disk with respect to the sectoral partition of the cylinder which forms the piston.

The rotatable cylinder 1 is the segment of a sphere and carries upon its rim a circular flange 2 which serves as a belt pulley. The heads 3 and 4 of the cylinder describe frustums of cones. Mounted between said conical cylinder heads is the disk 5 having a spherical hub 6 which is adapted to lie in sockets in said heads. The cylinder or steam chamber is mounted to revolve upon bearing members projecting from the heads thereof, head 3 having the journal 7 which revolves in a bearing 8, and head 4 having the bearing member 9 which turns upon the fixed shaft 10. From the inner end of the fixed shaft 10 projects an inclined journal 11 which enters the spherical hub 6 of the disk 5 and upon which said disk is journaled, the end of said inclined journal having a thread 12 on which is screwed a nut 13 to maintain the disk in position as it revolves. The disk 5 being mounted upon an axis which is inclined to the axis about which the cylinder revolves, causes the disk and cylinder to revolve in different planes, the arrangement being such, however, as to maintain a constant contact between the opposite sides of the disk and the conical walls of the cylinder heads along diametrically opposed radial lines, which lines of contact, notwithstanding the rotation of the disk and cylinder in the same direction, remain fixed with respect to each other, whereby the obliquely disposed disk is caused to divide the cylinder into two separate steam chambers lying on opposite sides of said disk.

The piston 14 is a sectoral partition which is attached to and crosses from side to side between the heads of the cylinder, dividing the circular space within the cylinder in which the steam or other motive fluid works. The disk 5 is provided with a radial slit 15 therein which embraces the sector or piston 14 and enables said piston to slip back and forth therethrough.

In order to effect a tight joint along the radial lines of contact between the flat faces of the disk 5 and the conical heads of the cylinder, the conical walls of said heads are provided with a compressible packing 16 over which is placed a thin metal plate 17. The pressure of the disk against said packing causes it to compress slightly and effect a tight joint between said parts.

The steam induct passage 18 extends longitudinally of the journal 7, thence upwardly within a housing 19 on the head 3, and communicates with the interior of the cylinder through a port 19ª in said head, as clearly shown in Fig. 1, said port entering the cylinder on one side of the sector or pis-

ton 14. On referring to Fig. 2 it will be seen that said piston or sector is curved laterally and that the exhaust port 20 leads from the cylinder on the opposite side thereof from the steam induction port, said ports, however, being practically in the same vertical plane. Communicating with the educt port is an exhaust passage way 20[a] which is formed within the wall of the head 4 and communicates with the circular channel 21 in the bearing 22 that embraces the end of the shaft 10, said shaft having an L-shaped way 23 therein which communicates with said channel 21 at one end and at the other end leads into the exhaust pipe 24. By this arrangement the exhaust passage way 20 leading from the cylinder, although revolving therewith, is at all times in communication with the exhaust pipe 24. The steam supply pipe 25 is provided with a tapered fitting 26 which enters the reamed outer opening of the steam induct port 18 and is fitted therein to make a steam tight joint between the fitting 26 and the rotary journal 7 in which said induct port is formed. The radial lines of contact between the opposite faces of the disk and the conical heads of the cylinder are diametrically opposite and will usually lie in a vertical plane, as indicated by dotted lines 27 in Fig. 2. These radial lines of contact between the disk and the conical cylinder heads form abutments beyond which the motive fluid or steam can not pass and which compel the steam to act upon the sector or piston 14 to revolve the cylinder.

With the parts in substantially the position shown in Figs. 1, 2, and 4, the stem or other motive fluid on entering the cylinder through the port 19[a] fills the semicircular chamber thereof between the piston 14 and the lower line of abutment 27 on the left of said piston; being unable to pass the lower line of abutment, the motive fluid will act upon the piston to revolve the cylinder in the direction of the arrow shown in Fig. 2. At the moment the steam enters the cylinder with the parts in the position shown in Fig. 4, the available steam space of the cylinder is but one quarter of the area thereof or one-half of the semicircular chamber formed between the piston 14 and the lower line of abutment between the disk and cylinder head 3. As the disk 5, however, is revolved with the cylinder, its relation to the piston changes, as shown in Fig. 3, which illustrates a one quarter turn to the right from the position shown in Fig. 2, permitting the steam to enter the left hand chamber of the cylinder when it will occupy the space on both sides of said disk, the abutment for the chamber upon one side thereof being the lower line of contact, and the abutment for the chamber on the opposite side being the upper line of contact between the disk and cylinder heads. When the cylinder and piston shall have made one-half a revolution, as shown by dotted lines in Fig. 2, the exhaust port 20 will be placed in communication with that chamber of the cylinder which was previously the steam induction chamber, and the induct port 19[a] will be placed in communication with that chamber which was the exhaust chamber, whereby the expanded steam in the chamber in which its force was last exerted, may escape through the exhaust port, and the exhaust chamber becomes filled with expansible steam which operates against the piston to drive it continuously in the same direction. By this arrangement a constant pressure is exerted against the sectoral piston and a constant supply of steam to the cylinder is maintained, at the same time provision is made for exhausting the steam at each one-half revolution of the cylinder from the compartment in which it has expended its force against the piston. While the cylinder and disk revolve in unison, the oblique axis upon which the disk is mounted causes its diametrically opposed faces to maintain contact with the conical heads of the cylinder as it rotates, the changing relation of the disk to the sectoral piston being illustrated in the diagrammatical views 3, 4, and 5, Fig. 5 illustrating the opposite position of the parts to that shown in Fig. 3, the piston drawing back and forth through the slot in said disk as the disk and cylinder revolve.

The periphery of the disk 5 is provided with packing rings 28 to prevent the escape of steam between the circular wall of the cylinder and said disk.

To provide for regulating the passage of the steam to the induct port 19[a] in accordance with the speed of the engine, a throttle valve 29 of the butterfly type is located in the passage way 18 and connected to an arm 30 having an adjustable weight 31 thereon. Attached to said arm at one end and at the other end to the head of the cylinder, is a spring 32. As the cylinder revolves, the tendency of the weight is to throw outward, which tendency is resisted by the spring 32. As the speed increases, the centrifugal force exerted by the weight will overcome the tension of the spring and actuate the arm to turn the valve 29 and restrict the flow of steam to the port 19[a]. As the speed of the engine decreases, said spring will act to return said parts and again open the valve.

Having thus fully set forth my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A rotary engine, comprising a rotatable cylinder, conical heads for said cylinder rotatable therewith, a disk within the cylinder rotatable therewith on a non-rotative

axis inclined to the axis of the cylinder to form diametrically opposed radial lines of abutment between the disk and cylinder heads, a sectoral piston secured to and rotatable with the cylinder dividing the steam space therein, a slot in said disk which receives said piston, one of the cylinder heads having a single steam induct port communicating with the cylinder through said head on one side of said piston, and the opposite cylinder head having a single steam educt port communicating with the cylinder on the opposite side of said piston.

2. A rotary engine, comprising a rotatable cylinder in the form of a segment of a sphere, conical heads for said cylinder rotatable therewith, a disk within the cylinder rotatable therewith, said disk being journaled upon a non-rotative axis inclined to the axis of said cylinder, the opposite faces of said disk having radial contact with the opposite cylinder heads, a packing surface upon said conical heads against which the faces of said disks bear, a sectoral piston fixed to and rotatable with the cylinder dividing the circular steam space of the cylinder, one of the heads having a steam induction port which communicates with the steam space on one side of said piston, the other of the cylinder heads having a steam exhaust port which communicates with the cylinder on the opposite side of said piston.

3. A rotary engine, consisting of a rotary cylinder having cylinder heads in the form of frustums of cones, a disk within the cylinder having a spherical hub mounted in sockets in the conical heads of the cylinder, said disk being journaled on a non-rotative axis inclined to the axis upon which the cylinder revolves, rotary bearing parts on the opposed heads of the cylinder which support said cylinder to rotate, a sectoral partition dividing the circular chamber of the cylinder and forming a piston, said partition being secured to the cylinder and rotatable therewith, said disk having a radial slot therein which receives said piston, one of the bearing parts having a steam induction passage which communicates with the cylinder through one head on one side of said piston, the other bearing part having a steam educt passage which communicates with the cylinder through one head on the opposite side of said piston.

4. A rotary engine, consisting of a rotary cylinder describing a segment of a sphere, conical heads for said cylinder, a disk crossing the interior of the cylinder obliquely journaled between said heads, the axis of said disk being inclined to the axis about which said cylinder rotates, a sectoral piston secured to and rotatable with the cylinder and dividing the circular interior thereof, said disk having a radial slot which allows of the passage of said piston therethrough, one of the cylinder heads having a steam induct port communicating with the cylinder on one side of said piston, the other of said cylinder heads having a steam educt port communicating with the cylinder on the opposite side of said piston, said induct and educt ports being in substantially the same radial plane.

5. In a rotary engine, the combination of a rotary cylinder in the form of a segment of a sphere, conical heads for said cylinder, a disk within the cylinder located between said heads and journaled on an axis inclined to the axis of the cylinder, said disk making permanent contact between its opposite faces, and the conical heads of the cylinder along radial lines forming abutments which remain permanent with respect to each other, a single sectoral piston attached to the cylinder or rotary casing and dividing the annular space within the cylinder, said disk having a radial slot in which said piston lies, one of said cylinder heads having a single steam induct port, and the other cylinder head having a single steam educt port, said ports communicating with the interior of the cylinder on opposite sides of said piston adjacent thereto.

In testimony whereof, I sign this specification in the presence of two witnesses.

CHARLES McQUOWN.

Witnesses:
I. G. Howlett,
O. B. Baenziger.