No. 883,319. PATENTED MAR. 31, 1908.

J. A. LEASK.

ROTARY ENGINE.

APPLICATION FILED JUNE 19, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

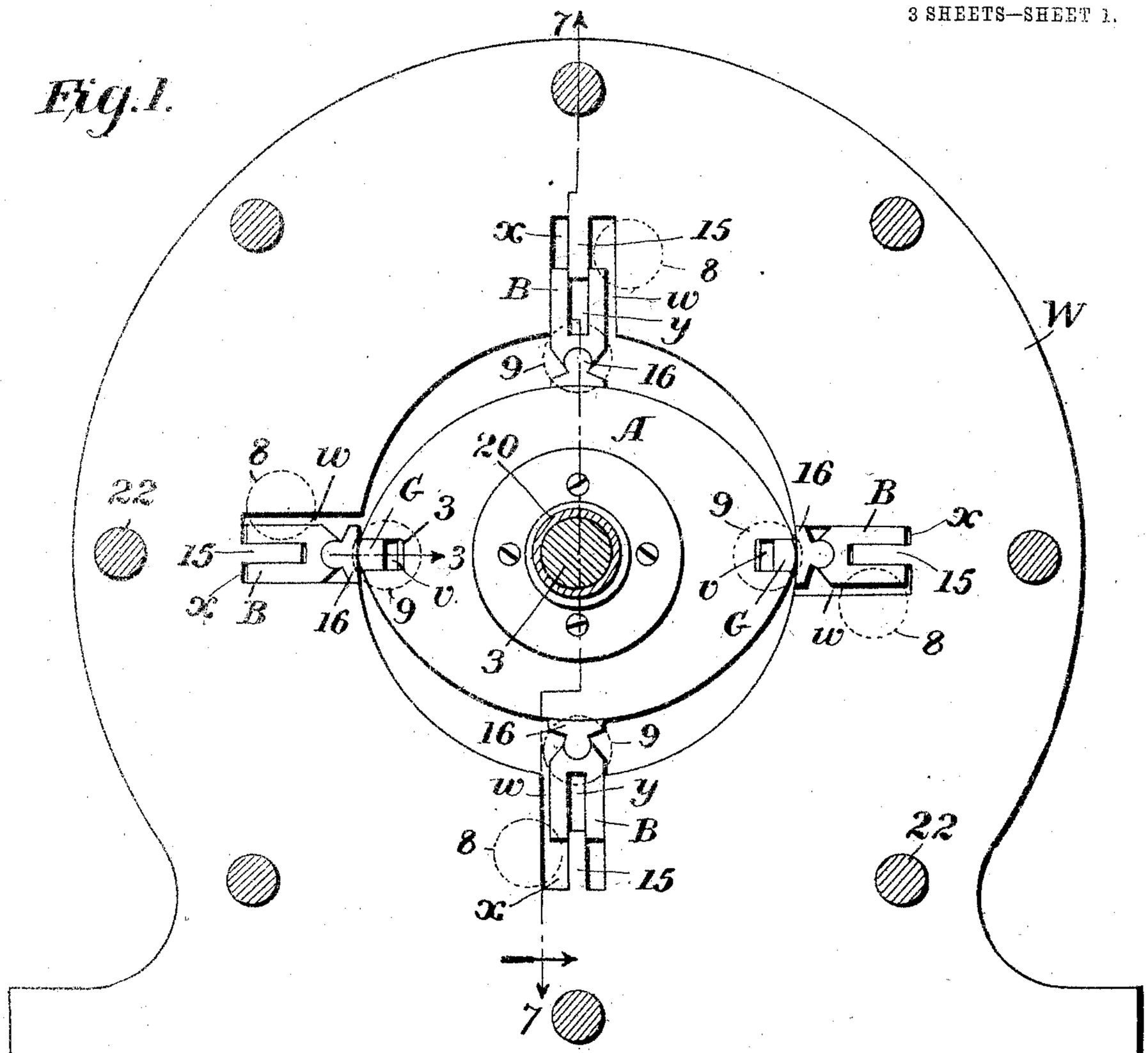
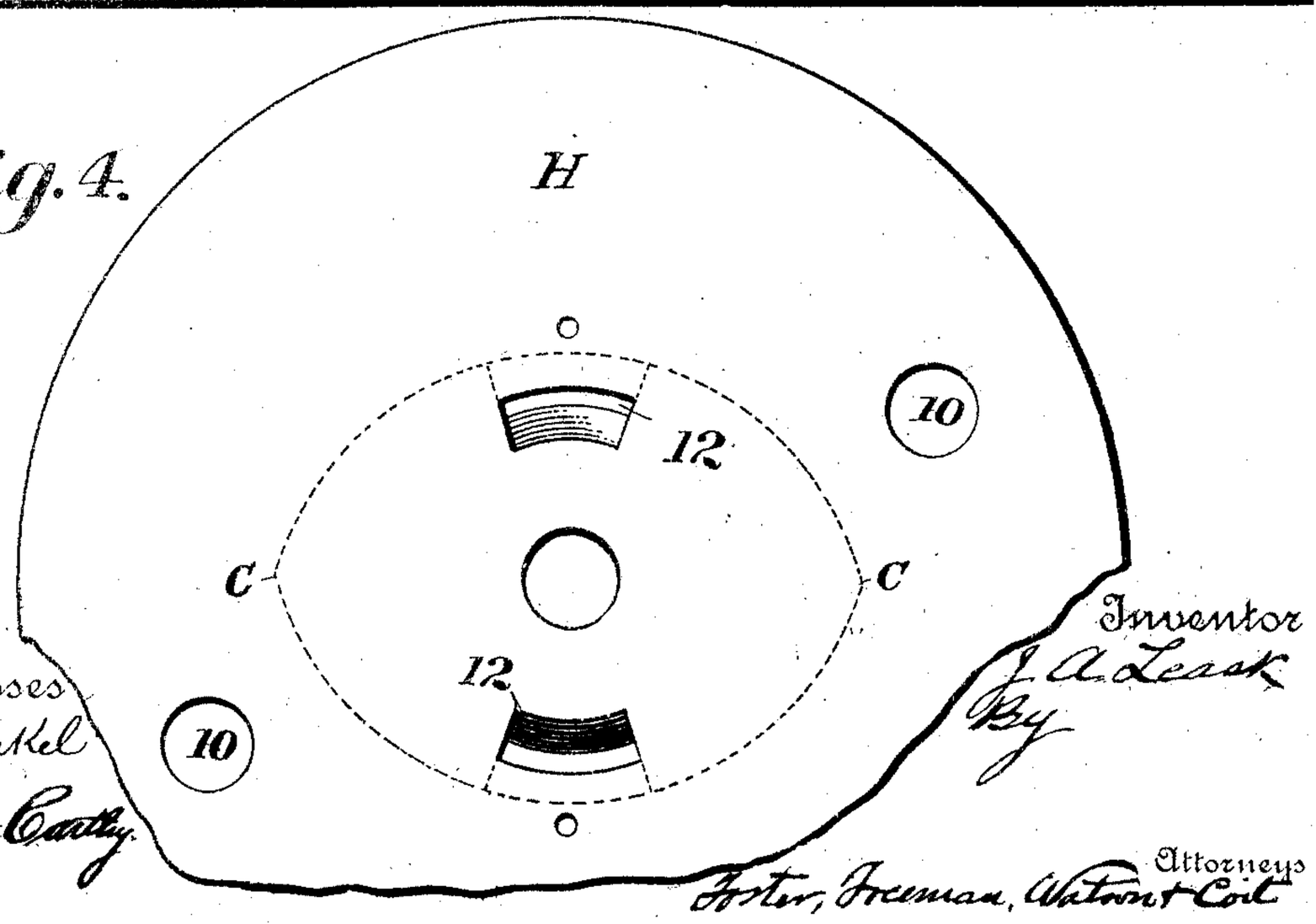


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 1.

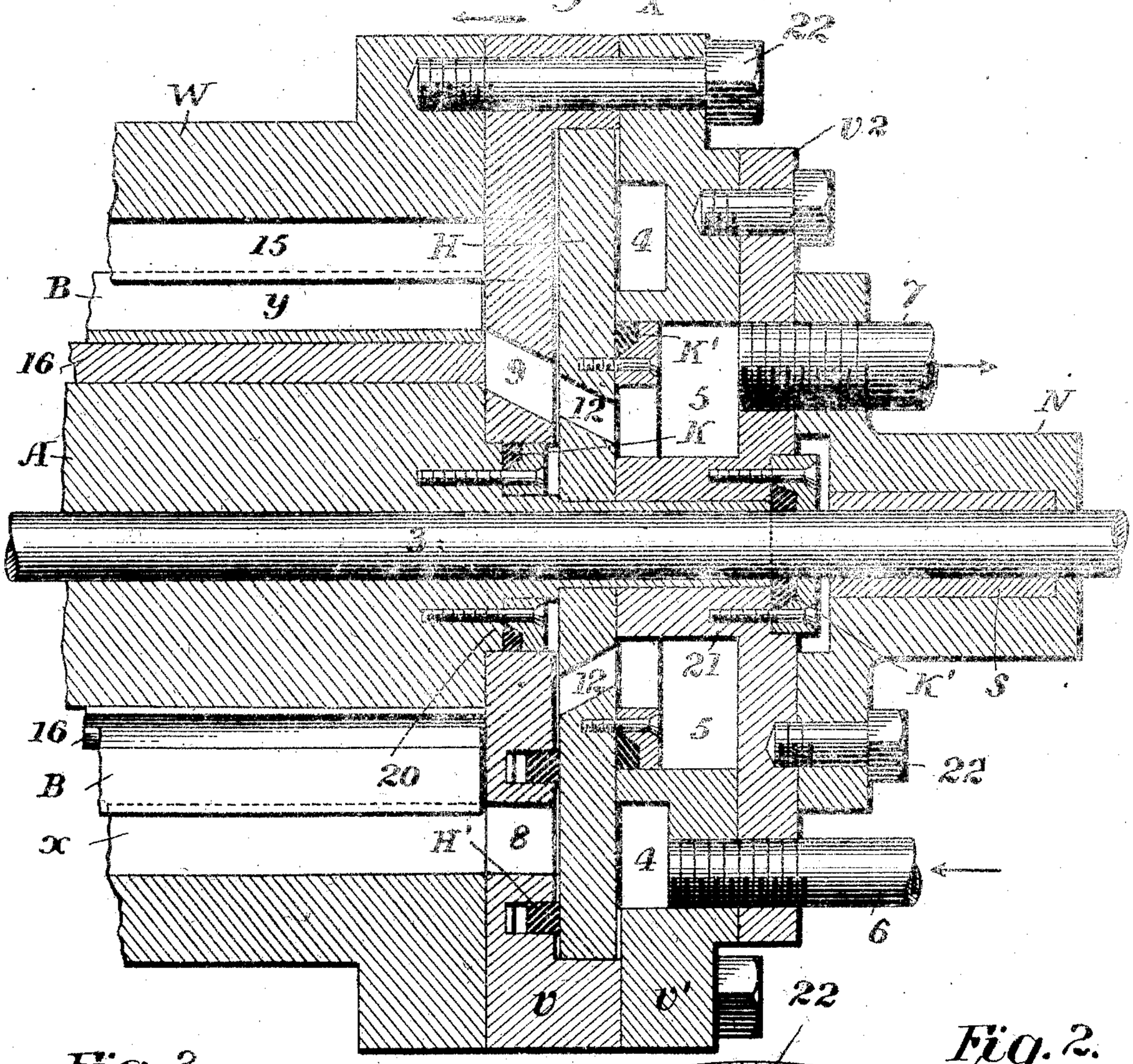


Fig. 3.

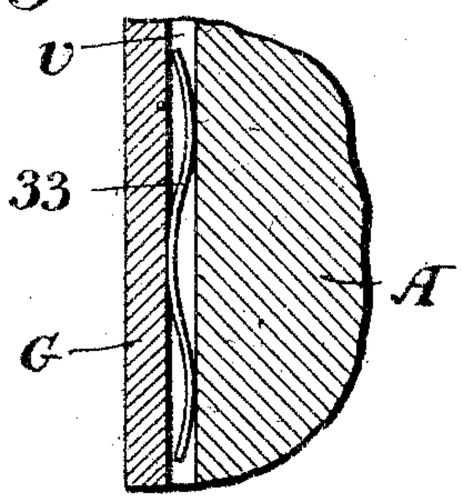
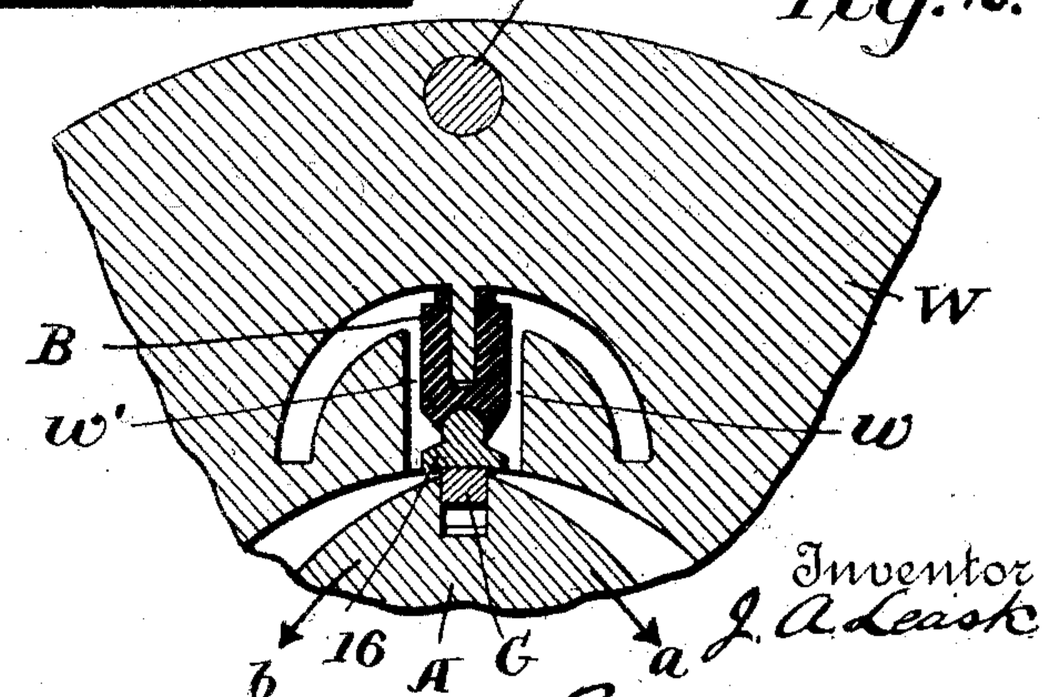


Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 5.

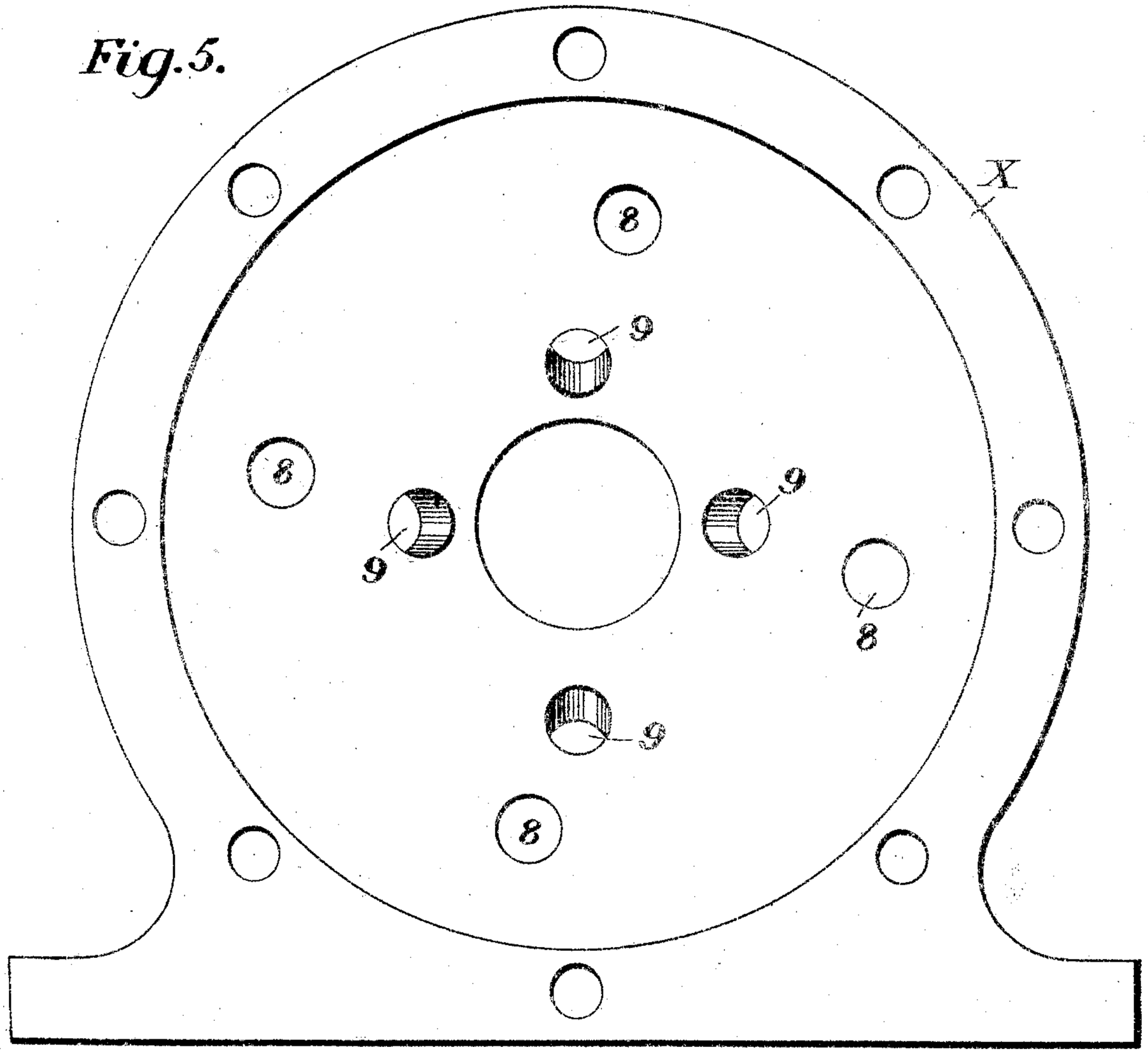
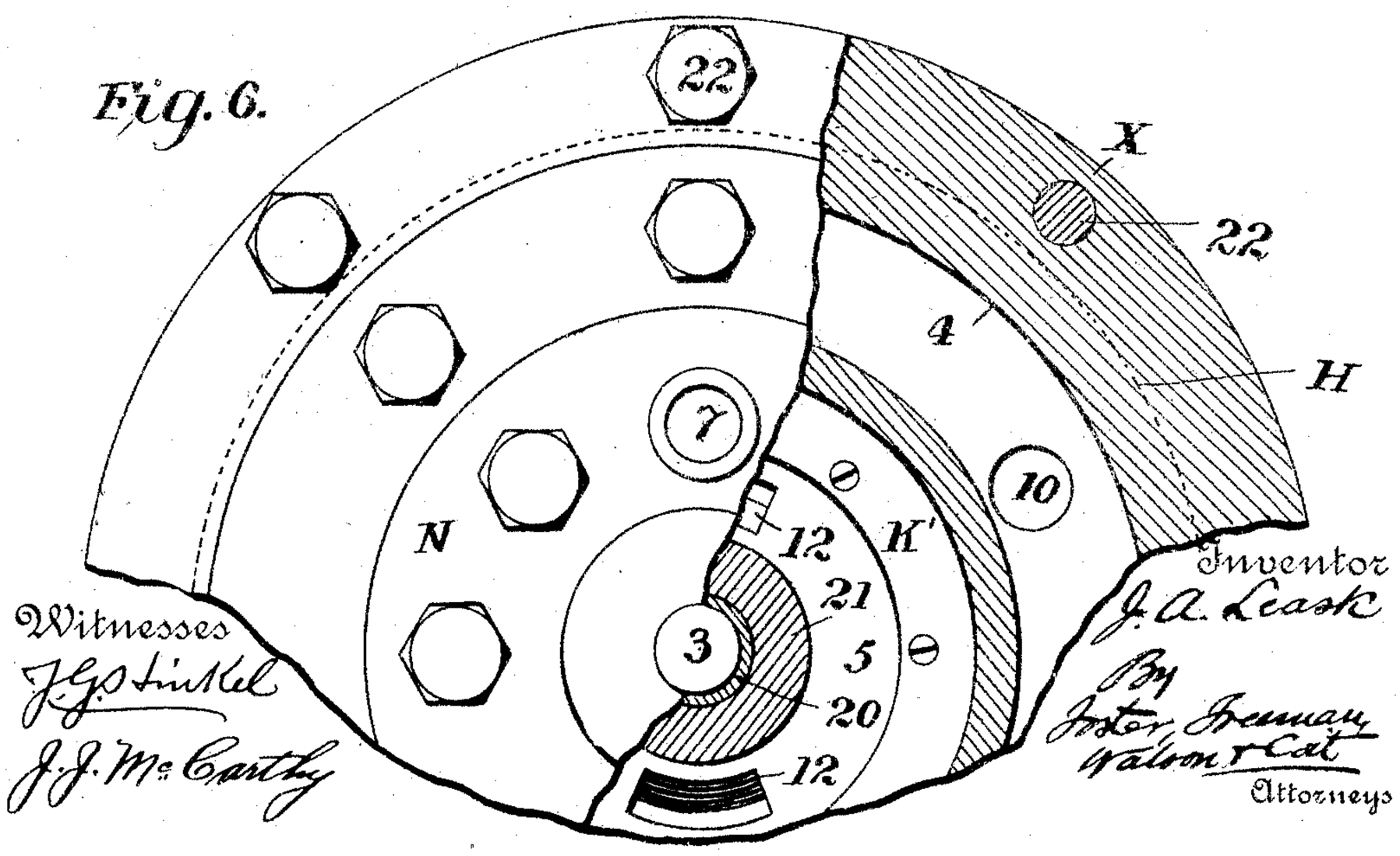


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

No. 883,319. Specification of Letters Patent. Patented March 31, 1908.

Application filed June 19, 1907. Serial No. 379,820.

To all whom it may concern:

Be it known that I, JAMES A. LEASK, a subject of the King of Great Britain, and residing at Cranbrook, British Columbia, Canada, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to rotary engines, and consists in an engine having a circular cylinder, a piston elliptical in cross section, and radial sliding abutments, and ports and passages, as fully set forth hereinafter and as illustrated in the accompanying drawing, in which:

Figure 1 is an end elevation of a rotary engine embodying my invention, the cylinder head removed; Fig. 2 is a transverse section of part of the cylinder and piston, showing the parts as constructed and arranged in a reversible engine; Fig. 3 is a section on the line 3, Fig. 1; Fig. 4 is a face view looking from the outside of one of the disks connected with the piston; Fig. 5 is a face view of the inner section of one of the cylinder heads looking from the outer side; Fig. 6 is a view in part section transversely through the cylinder head; and Fig. 7 is a longitudinal section at one end of the engine.

The cylinder W is cylindrical and has at each end a sectional head X, and within the cylinder rotates an elliptical piston A, the trunnions, or shaft, 3 of which extends centrally through bearings in the cylinder heads.

In one or both cylinder heads are two concentric annular channels 4, 5, the channel 4 communicating with an inlet pipe 6 and the channel 5 with an exhaust pipe 7. In the cylinder head, extending from the channel 4 to the inner face and equidistant from each other, are four steam-inlet ports 8, and in the cylinder head extending from the inner face to the channel 5, and equidistant from each other, are four outlet-ports 9, and, as shown in Fig. 5, the centers of the outlet ports are not upon the same radial lines as those of the inlet ports but are at one side of the latter.

Each trunnion 3, beyond the end of the piston A, extends through a disk H which is secured to and turns with the piston and which has upon opposite sides of the center two ports 10, 10, Fig. 4 so arranged that they may be brought to coincide with the ports 8, and shown as circular, and also two elongated exhaust ports 12, 12, which may be brought to coincide with the exhaust ports 9 in the cylinder head. In the cylinder W, equidistant from each other, are longitudinal radial openings x in which slide radially abutments B, each of the latter consisting of a longitudinal bar having a recess y to receive a radial guide blade 15 extending into the recess x, and the abutment carrying at the inner end a pivoted shoe 16, the face of which bears upon the face of the piston A. As shown the shoe has at the back a circular rib adapted to a longitudinal recess in the blade so that it can swing to secure a constant bearing upon the face of the piston.

Each of the recesses x extends to the end of the piston and so do the abutments B, and in Fig. 1 each of these abutments is so supported by the blade 15 as to leave a space or channel w between one side of the abutment and the side of the recess, and the ports 8 are so arranged, as shown in dotted lines in Fig. 1, that one of the ports 10 of the disk H is brought to coincide with a port 8 as the point C of the piston passes an abutment B and the steam may pass from the port 10 through the port 8 into the space w and to the space defined by one side of the abutment, and the converging faces of the piston and the inner wall of the cylinder. Assuming the steam to be passing into the upper port 8, it will bear upon the widest part of the piston so as to tend to rotate it clockwise Fig. 1, but as the port 10 passes from the port 8 the flow of steam is cut off, but it will act expansively, being confined between the abutments until the port 12 of the disk H begins to coincide with the port 9 at the right, when the steam will at once pass from the space which it occupied to the exhaust, and this will continue on both sides of the piston until the ports 12 and 9 are no longer in communication. By this time the other point C of the piston, that is the point upon its greatest diameter, will have passed below and beyond the upper abutment and the adjacent port 10 will be brought into communication with the upper port 8 and steam will pass through the passage w into the space between the upper abutment and the converging faces of the piston and cylinder with the same action as before. The same effect results in connection with each abutment as a port 10 is brought into communication with the port 8 adjacent to said abutment.

In order to make a reversible engine the abutments B are arranged so as to leave pas-

sages w, w' at opposite sides of the abutments, as shown in Fig. 2, and the passage w on one side is closed at one end while that on the other side is closed at the opposite end, so that by admitting steam to one end of the cylinder where it can pass to the passages w, the piston is turned in the direction of the arrow a, Fig. 2, but by admitting it to the other end of the cylinder it will pass to the passages w' and the piston will be turned in the direction of the arrow b, Fig. 2.

In order to maintain a close joint between the piston and the head of the cylinder the piston has bosses 20 extending into central recesses of the heads X, and annular packings K closing the joints, and the piston has longitudinal recesses v in which fit strips or packing blades G which are pressed outward against the surface of the cylinder by springs 33, as best illustrated in Fig. 3, and as these strips G wear from time to time they may be replaced.

It will be seen that as steam is admitted to the recesses x it bears upon the abutments B and loads the same so as to maintain a tight contact between the shoes and the faces of the piston.

It will also be seen that as the piston is elliptical in cross section the abutments resting thereon will be carried outward gradually, that is, each with a slow movement so as to avoid any hammering in the apparatus. It will further be seen that the ports 10 may be proportioned so as to secure the admission of steam for any desired length of time and they serve in connection with the ports 8 to admit the steam and cut it off before the piston has completed its rotary stroke, thereby permitting the use of the steam expansively.

Packings K', are arranged to be carried by the disk H so as to close the joints between that disk and the cylinder head, and an annular packing H' surrounds each port 8 to close the joint between the port and the disk H.

While the cylinder head may be constructed in any suitable manner I prefer to make it in sections, one section V, which is annular, containing the ports 8 and 9, the next section v', also annular and containing the annular channels 4 and 5, while an outer section v^2 aids in forming the channel 5 by means of an inner boss 21, and to this outer section is bolted a box N containing a Babbitt bearing s for the shaft or trunnion 3. The different sections of the head are held together and bolted to the body of the cylinder by means of bolts 22.

Without limiting myself to the precise construction and arrangement of parts shown, I claim:

1. A rotary engine provided with a circular cylinder, a piston elliptical in cross section rotating within said cylinder, a disk carried by the piston and provided with inlet and exhaust ports, abutments radially movable within recesses in the cylinder, and ports in the cylinder head for admitting steam to and conducting it from the respective inlet and outlet ports in the said disk.

2. The combination of the circular cylinder, a piston elliptical in cross section, radially movable abutments, a disk carried by the piston and having inlet and exhaust ports, a cylinder head having concentric circular channels communicating with inlet and exhaust pipes and with equidistant ports leading from the inner face of the head to the steam inlet channel, and exhaust ports communicating with the steam outlet channel and extending to the inner face of the head and arranged upon radial lines at one side of those passing through the inlet ports.

3. The combination of the circular cylinder having radial recesses, abutments sliding in said recesses and carrying pivoted shoes, an elliptical piston against which the shoes bear, a cylinder head having inlet and outlet ports, and an intermediate disk connected to be carried with the piston and having inlet and outlet ports, each abutment arranged to afford a passage between one side and the side of the recesses in the cylinder.

4. The combination of the circular cylinder, piston elliptical in cross section, radially movable abutments bearing upon the piston, a passage at one side of each abutment leading to one end of the piston and another passage at the opposite side of each abutment leading to the opposite end of the piston, a disk at each end of the cylinder having inlet ports adapted to be brought to communicate with the said passages and exhaust ports intermediate the inlet ports, and cylinder heads having inlet and outlet ports and passages, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES A. LEASK.

Witnesses:
G. A. SCHAEF,
GEORGE R. LEASK.