No. 741,617. PATENTED OCT. 20, 1903.

H. W. BOGART.

ROTARY ENGINE.

APPLICATION FILED JAN. 15, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1,

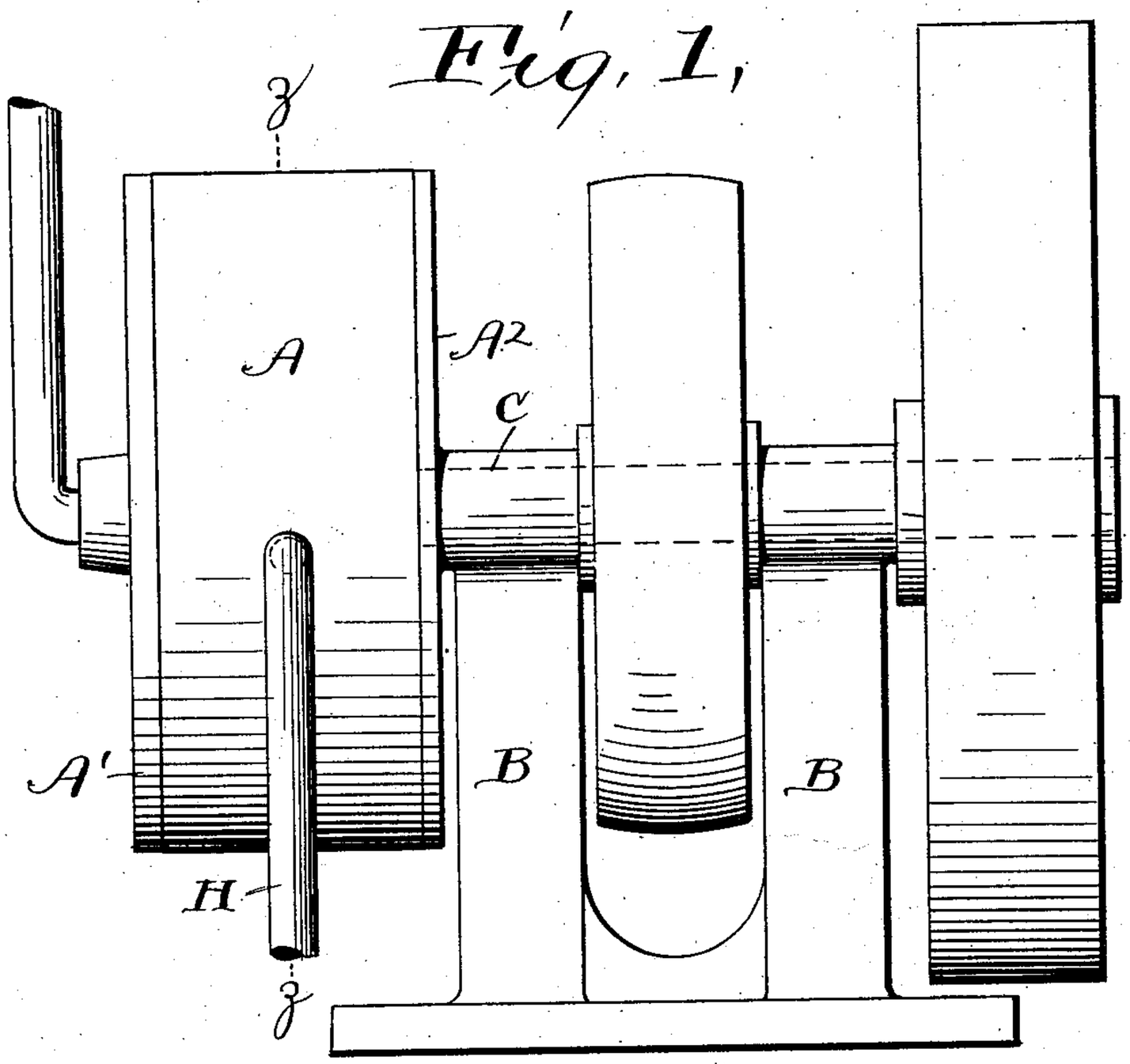
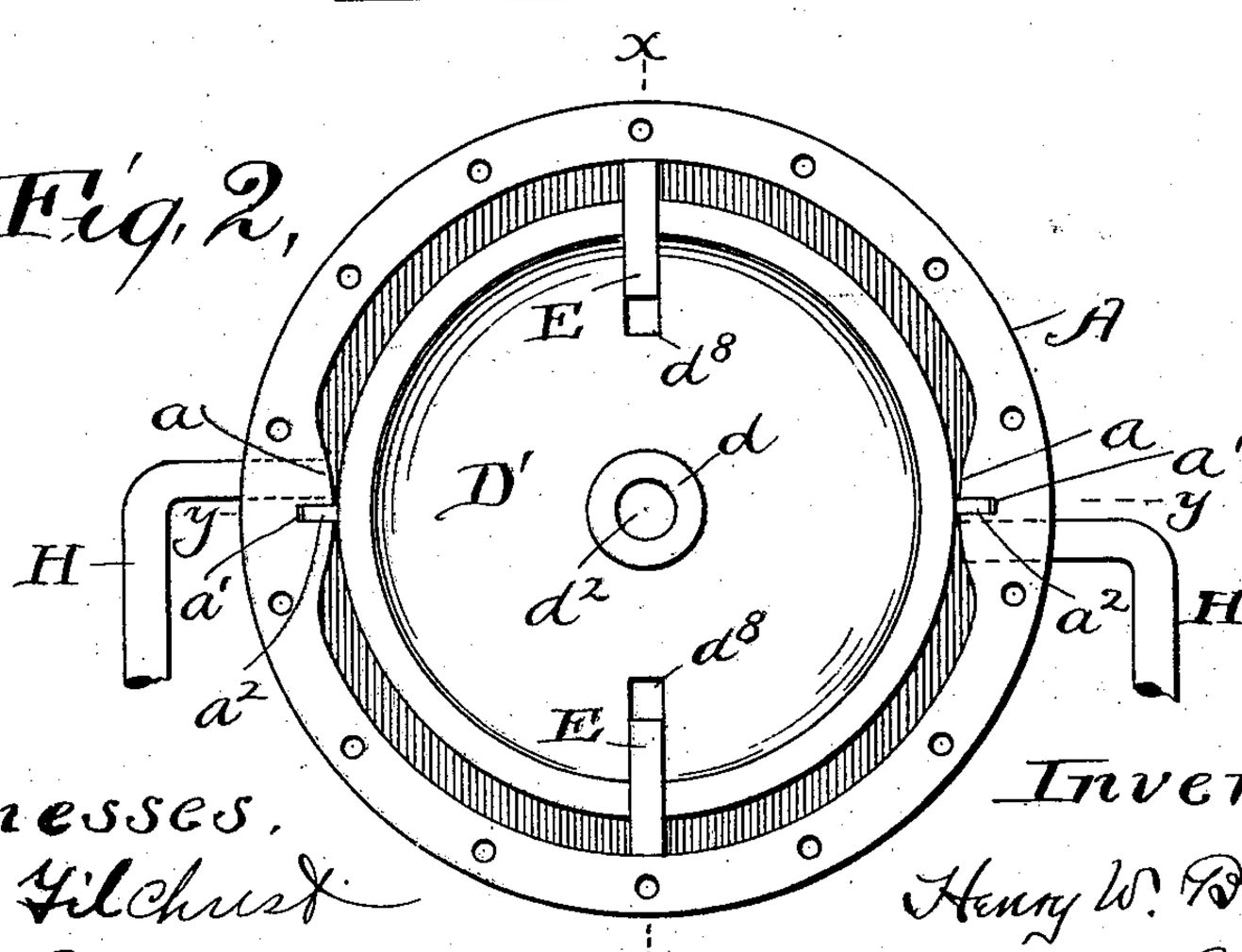


Fig. 2,



Witnesses.
E. B. Gilchrist
N. L. Brennan

Inventor:
Henry W. Bogart,
By his Attorneys,
Thurston & Bates

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

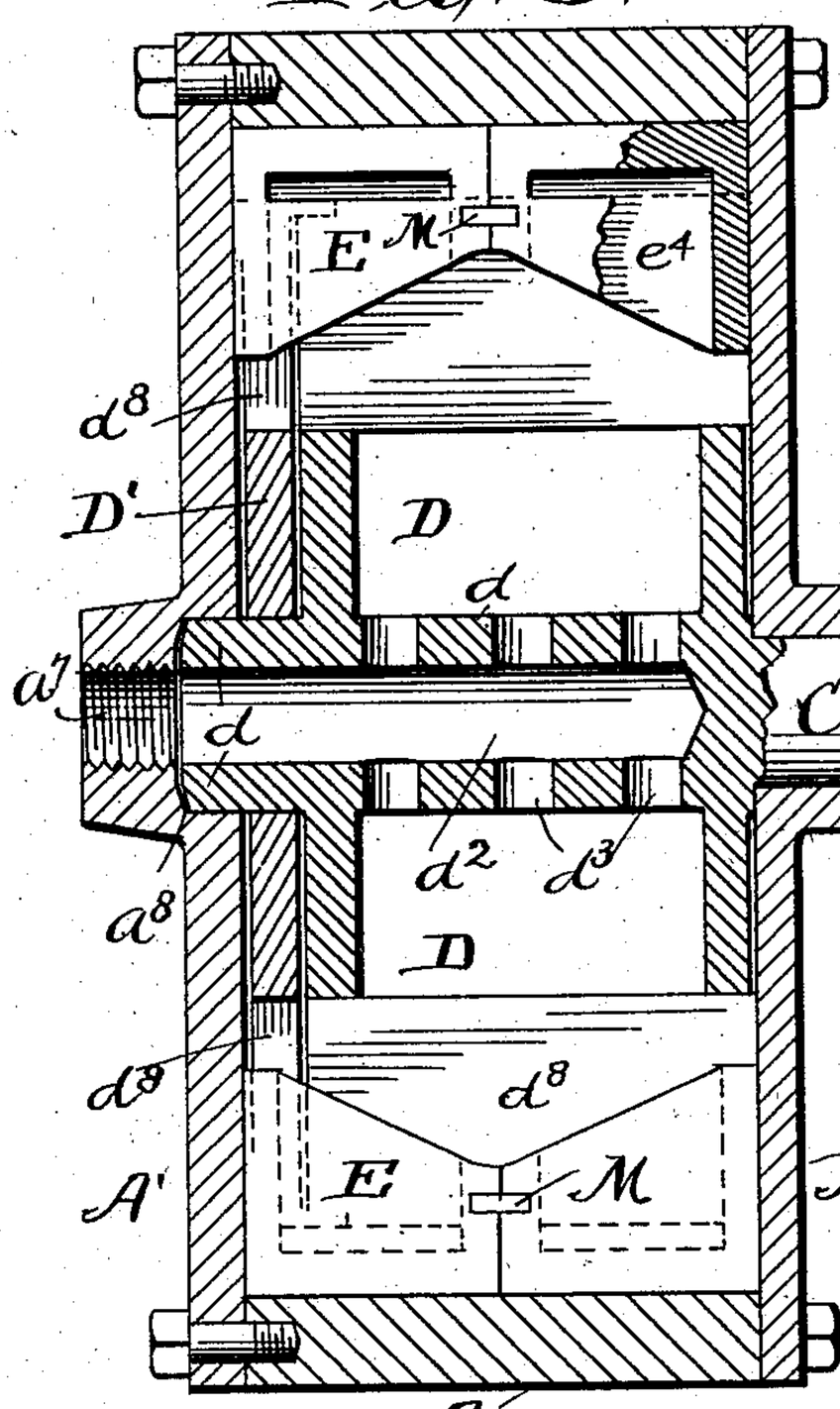


Fig. 4.

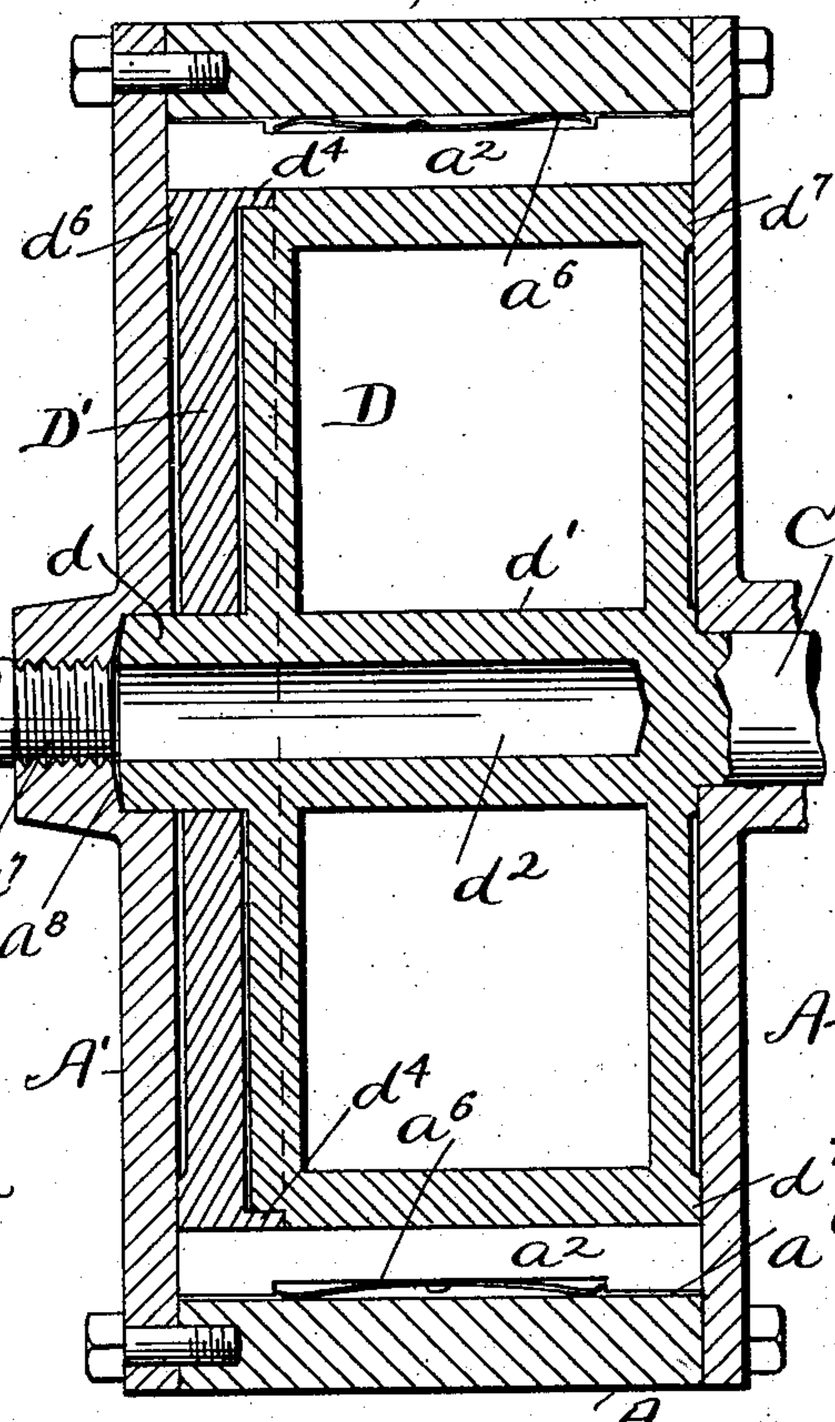


Fig. 5.

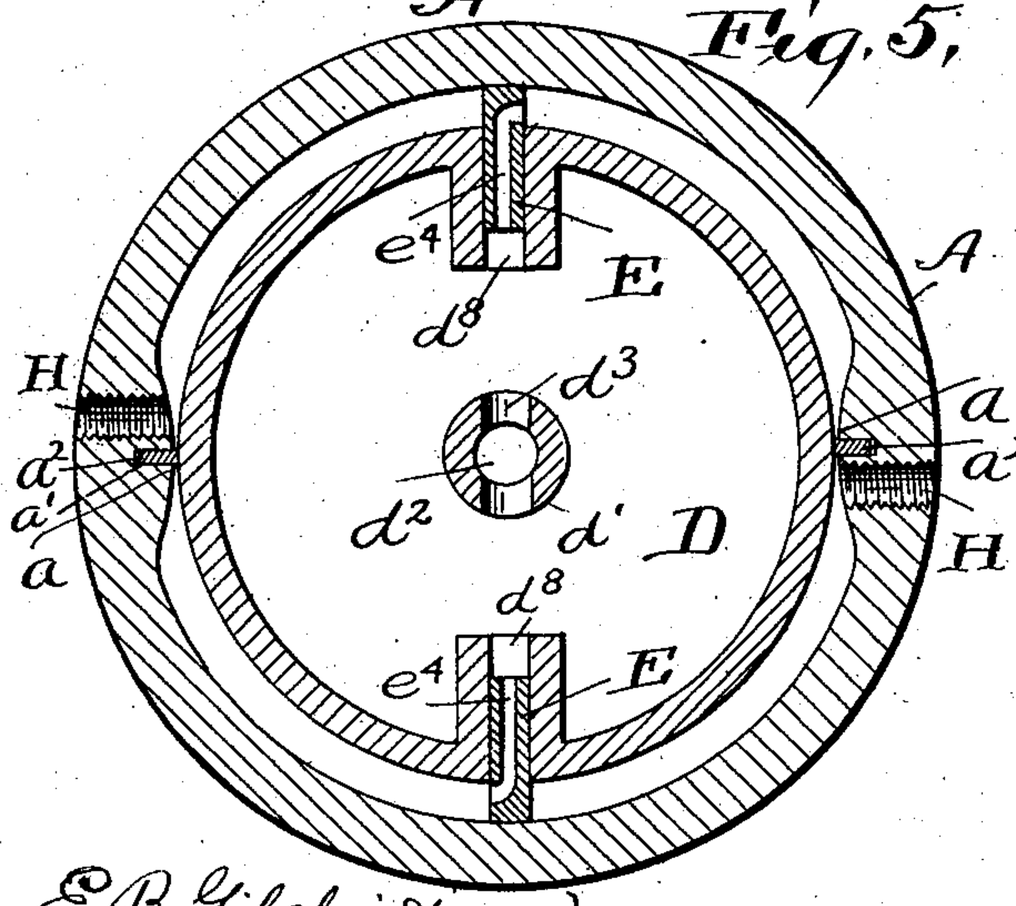


Fig. 6.

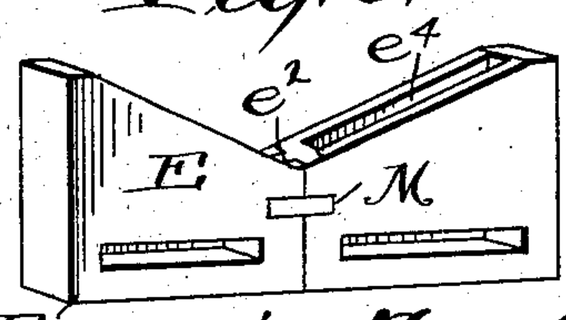
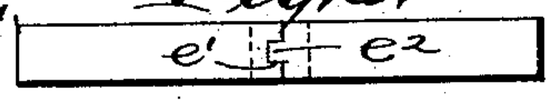


Fig. 7.

Fig. 8.



Inventor,
Henry W. Bogart,
By his Attorneys,
Thurston & Bates.

E. B. Gilchrist
N. L. Brennan
} Witnesses.

No. 741,617. Patented October 20, 1903.

UNITED STATES PATENT OFFICE.

HENRY W. BOGART, OF CLEVELAND, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 741,617, dated October 20, 1903.

Application filed January 15, 1903. Serial No. 139,092. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. BOGART, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of the invention is to provide a very simple, cheap, and efficient rotary engine; and the invention may be summarized as consisting of the construction and combination of parts shown in the drawings and hereinafter described, and pointed out definitely in the claims.

Referring to the drawings, Figure 1 is a side elevation of the engine. Fig. 2 is a view showing the cylinder and drum with the cylinder-head removed. Fig. 3 is a section on the line $x\,x$ of Fig. 2, Fig. 4 is a section on the line $y\,y$ of Fig. 2, and Fig. 5 is a section on the line $z\,z$ of Fig. 1, showing the cylinder and the drum in cross-section; and Figs. 6, 7, and 8 represent a perspective, top plan, and a bottom view, respectively, of one of the piston-blades.

Referring to the parts by letters, A represents a cylinder provided with heads A′ A^2. One of the heads, A^2, may be integral with the standards B B, in which the engine-shaft has its bearing. The other head is provided with an internal axial recess a^8 and with a steam-inlet a^7, communicating with said recess. A steam-inlet pipe will of course be secured in this inlet. Projecting inward from the cylinder-surface at diametrically opposite points are the two abutments $a\ a$, whose faces are inclined, as shown. In these abutments are the slots a', which are as long as the inside length of the cylinder, and in these slots the packing-strips a^2 are placed, which packing-strips are held by springs a^6 against the periphery of the drum D. This drum is provided with trunnions d and C, both of which are rotatably mounted in the cylinder-heads. The trunnion C serves as the engine-shaft, while the other is rotatably fitted in the recess a^8. The drum is hollow and is provided with a central hub d', extending across it. A hole d^2, entering from the end of the trunnion d, extends a very considerable distance into the hub. The steam admitted through the inlet a^7 passes into this hole and from thence through perforations d^3 in the hub into the cavity within said drum. An auxiliary head D′ of the drum is slidably mounted upon the trunnion d and has at its edge a cylindrical flange d^4, which is fitted into a rabbeted groove in the adjacent head of the drum, so that the external diameter of the drum and of this auxiliary head are the same. On the outer face of this auxiliary head is a cylindrical flange d^6, which bears against the inner face of the cylinder-head, and there is a similar flange d^7 on the remote face of the drum which bears against the opposite cylinder-head. The internal diameter of the flanges d^6 d^7 is less than the internal diameter of the flange d^4. Two radial slots d^8, located at diametrically opposite points, are formed through the cylindrical part of the drum and in both heads thereof and in the auxiliary head, and in these slots the piston-blades E are movably mounted. Each of these piston-blades must be of such length that its ends will fit tightly against the heads of the cylinder. In order to insure the close contact between the ends of said blades and the cylinder-heads, said blades are made of two parts $e\ e$, whose proximate edges are provided, respectively, with a groove e' and a tongue e^2, which is fitted thereto, so that said blade-sections may move in opposite directions against the cylinder-heads. A key M is fitted in slots in these two parts, and thus prevents any relative movement except that contemplated, which increases the length of said blades. The outer edges of these blades bear at all times against the inner periphery of the cylinder and are so held by the steam-pressure inside the drum against the inner edges of said blades. In order that the steam-pressure may also act to hold the ends of said blades against the cylinder-heads, the said blade-sections are made wider at their remote ends than at their proximate ends. As shown, the inner edges of said blades, exposed to the steam-pressure from within the drum, are inclined from their remote ends inward, as shown.

Suitable ports e^4 are provided in each piston-blade, the inner ends of said ports communicating with the interior of the drum and

the outer ends of said ports discharging into the annular space around the drum within the cylinder. The discharge ends of these ports in the two piston-blades are turned in opposite directions, substantially as shown.

The operation of the described mechanism is as follows:. Steam is admitted through the inlet a^7, and it passes thence through the hole d^2 into the interior of the drum. It acts always to force the piston-blades out against the inner surface of the cylinder, and it also acts to spread the blade-sections apart, so that they bear against the cylinder-heads. The steam then passes through the ports e^4 in the piston-blades into the annular space around the drum and by thrusting against the abutments and the projected piston-blades causes the drum to rotate. When these blades as the drum turns are brought into engagement with the inclined surfaces of the abutments, they are forced inward, and in this movement the discharge ends of their ports are covered, thereby cutting off the steam. The shape and length of these abutments and the location of the discharge ends of said ports determine the point at which the steam shall be so cut off. As these blades are passing from said abutments the steam within the drum forces the blades out, as stated, and thereby the ports e^4 are uncovered or opened to permit the admission of steam into the annular space referred to. Steam also passes through the slots d^8 in the heads D of the drum and the auxiliary head D′ into the spaces between the cylinder-heads and the drum and also between the auxiliary head and the adjacent head of the drum; but the area of the heads exposed to the steam-pressure inside the flange d^4 is greater than the area of the heads inside the flanges d^6 d^7, and the result is that the drum and its auxiliary head are forced apart, carrying the flanges d^6 d^7 into contact with the heads of the cylinder. This prevents the escape of steam from the annular space around the drum, wherefore said steam is compelled to act efficiently in the manner stated. The described construction is such that the steam itself acts to cause a close contact between the blades and the cylinder—inner surface and heads—and between the heads of the drum and of the cylinder. Thus harmful escape of steam is impossible, and these results are produced however much the surfaces may become worn or expanded by the heat. Through the cylinder-walls and on that side of the abutment toward which the piston-blades are driven are the outlet-ports H, through which the steam is exhausted and forced as the piston-blades approach said exhaust-ports.

Having described my invention, I claim—

1. In a rotary engine, in combination with the cylinder, having internal abutments provided with packing-strips, a drum rotatably mounted within said cylinder and arranged to rotate within said abutments, said abutments separating the space between said drum and said cylinder into separate chambers, piston-blades slidably mounted in said drum and provided with ports establishing communication between the steam-supply and said chambers, said blades closing said ports as they pass from one chamber to another, and being provided with a joint in the middle whereby they may be spread laterally and fill the entire space within the cylinder, substantially as described.

2. In a rotary engine, in combination with the cylinder and rotatable drum, a piston-blade slidably mounted in said drum and composed of two portions having a slidable connection between them, whereby said blade may be spread laterally by the pressure of the steam against the sides of the cylinder and having ports therein which are adapted to be closed when said blade is forced into said drum, and a key for locking said blade portions against movement except in a lateral direction, substantially as described.

3. In a rotary engine in combination with the cylinder and rotatable drum, a piston-blade slidably mounted in said drum and being composed of two portions which increase in width from their meeting ends, and a slidable connection between said portions, substantially as described.

4. In a rotary engine, in combination with the cylinder, a rotatable drum, a piston-blade slidably mounted in said drum, and composed of two portions which increase in width from their meeting ends, and are slidably connected, whereby said blade may be spread laterally against the sides of the cylinder by the pressure of the steam, and ports provided in said portions adapted to be closed when said blade is forced into said drum, substantially as described.

5. In a rotary engine, in combination with the cylinder, a rotatable drum, a piston-blade slidably mounted in said drum and composed of two portions which increase in width from their meeting ends, a tongue and groove connecting said portions, whereby said blade may be spread laterally against the sides of the cylinder by the pressure of the steam, and ports provided in said portions adapted to be closed when said blade is forced into said drum, substantially as described.

6. In a rotary engine, in combination with the cylinder, a rotatable drum, a piston-blade slidably mounted in said drum and composed of two portions which increase in width from their meeting ends and are slidably connected, whereby said blade may be spread laterally against the sides of the cylinder by the pressure of the steam, a key at the junction of said portions extending across the junction-space, and ports provided in said portions adapted to be closed when said blade is forced into said drum, substantially as described.

7. In a rotary engine, the combination with the cylinder, of a rotatable drum within said cylinder of less diameter, piston-blades slidably mounted in said drum, and an auxil-

iary head provided on said drum adapted to be forced outwardly by the steam-pressure against the head of said cylinder, substantially as described.

8. In a rotary engine, in combination with the cylinder, a rotatable drum within said cylinder of less diameter, a piston-blade slidably mounted in said drum, an auxiliary head telescoping onto said drum, and means whereby steam may be supplied behind said auxiliary head to force the same out in contact with the side of the cylinder, substantially as described.

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

HENRY W. BOGART.

Witnesses:
E. B. GILCHRIST,
E. L. THURSTON.