(No Model.)

2 Sheets—Sheet 1.

# W. S. SUTTON.

## ROTARY ENGINE.

No. 604,276. Patented May 17, 1898.

FIG. 1.

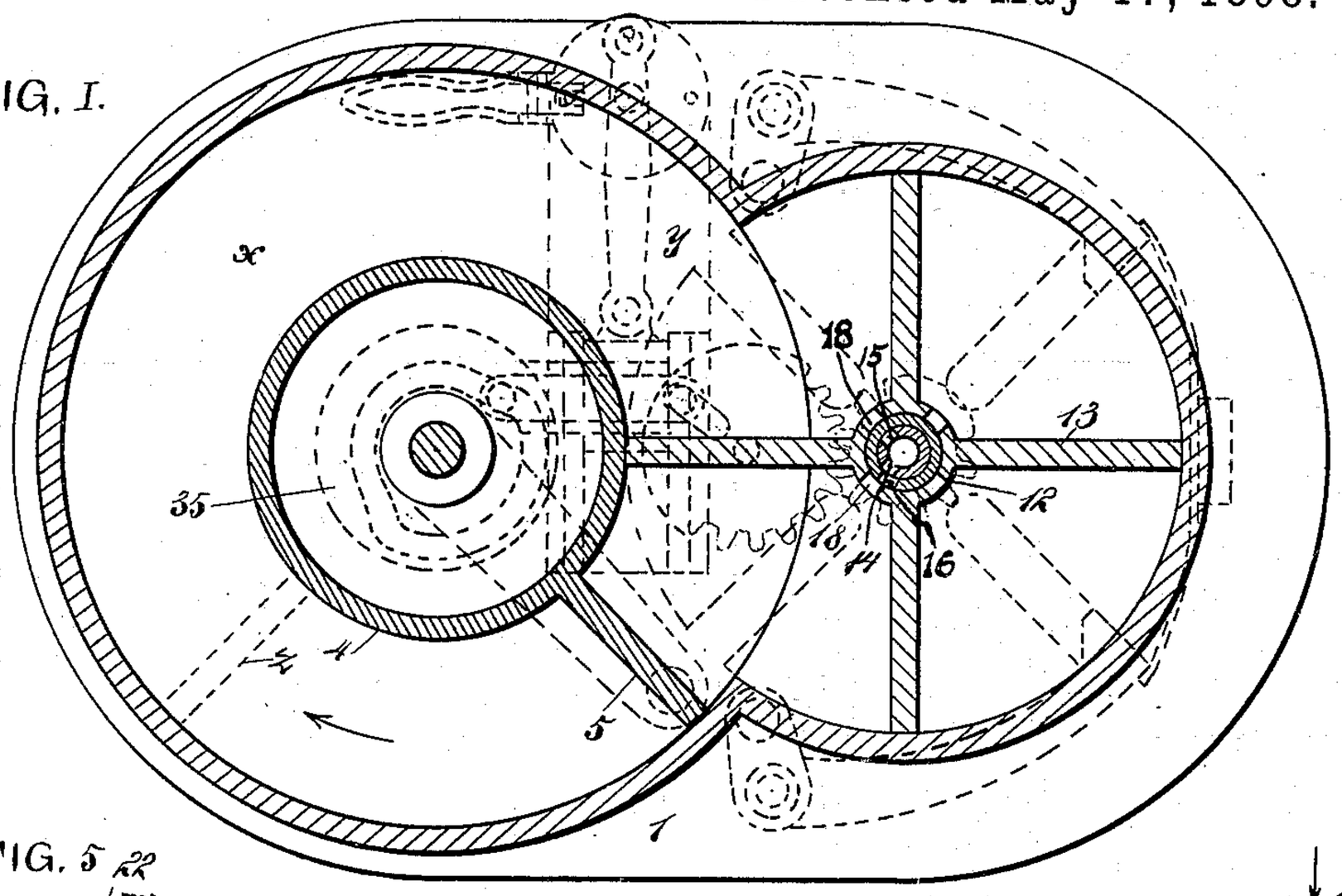


FIG. 5

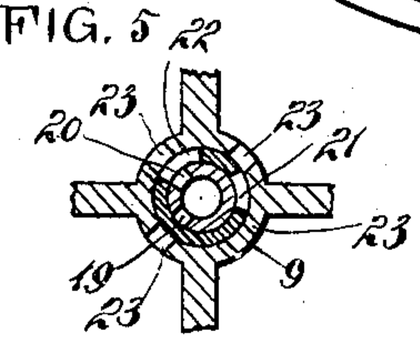


FIG. 2.




FIG. 6.




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## ROTARY ENGINE.

No. 604,276. Patented May 17, 1898.

FIG. 3.

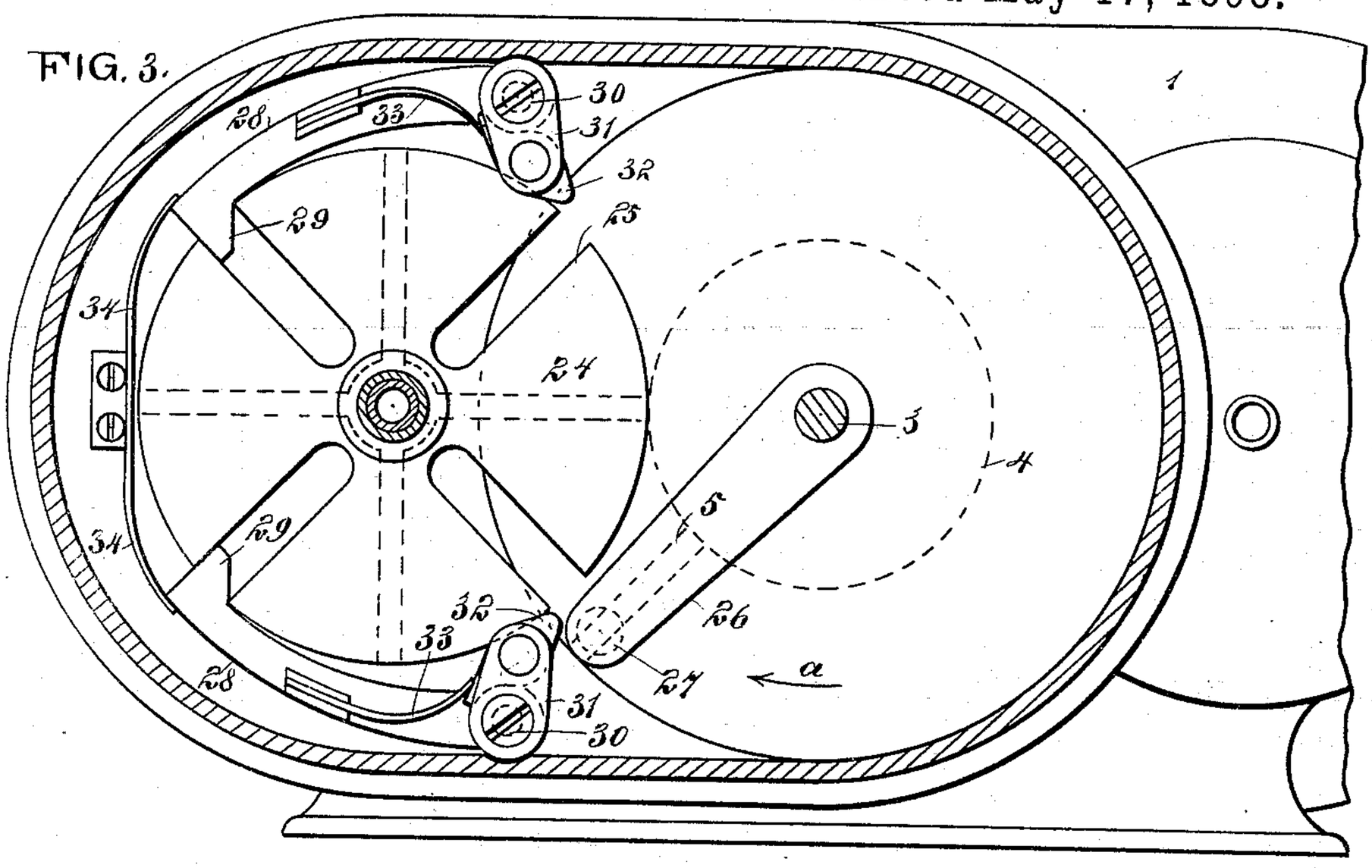
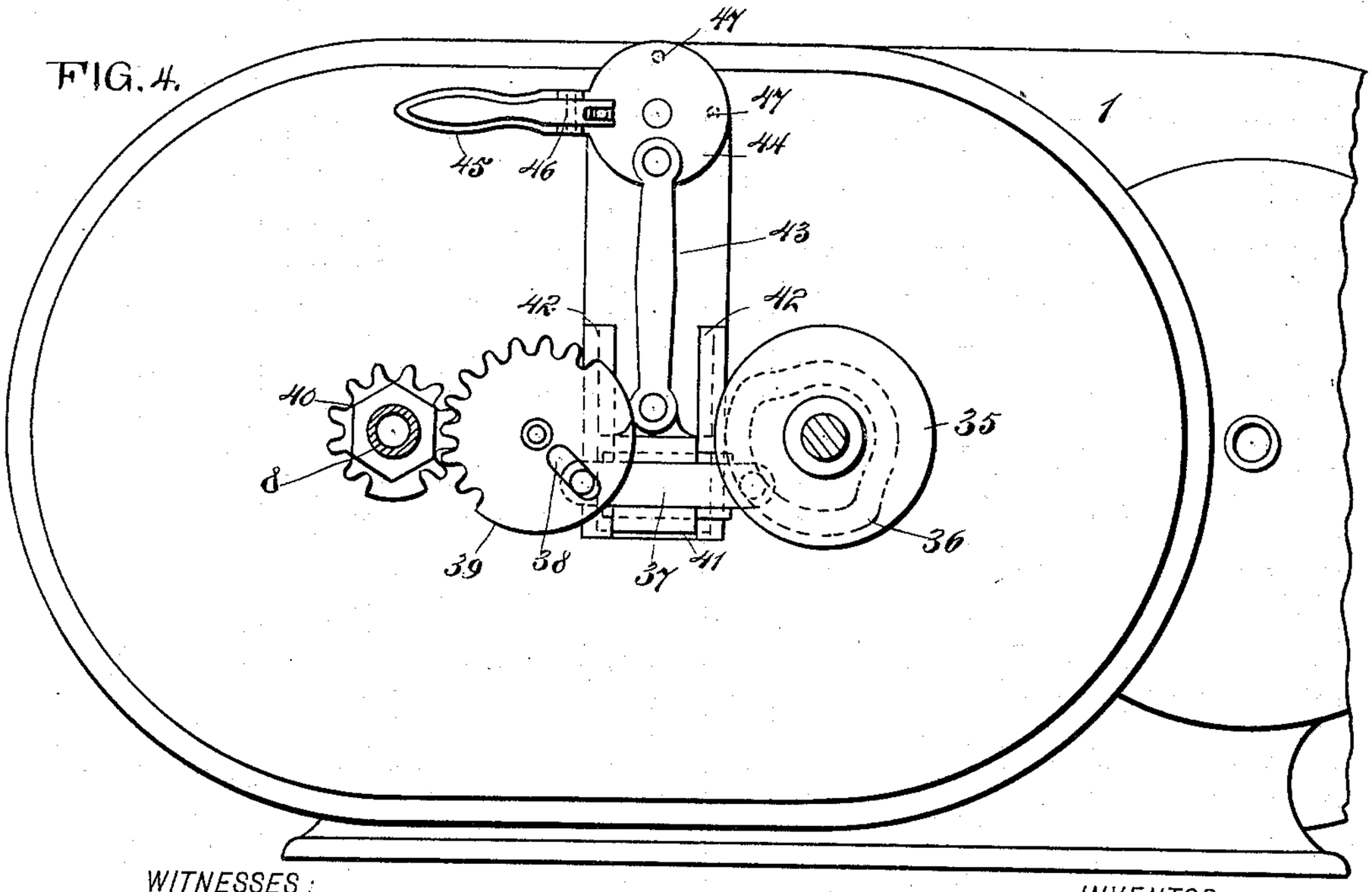



FIG. 4.




WITNESSES:

Donn Tarbell

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FIG. 7.

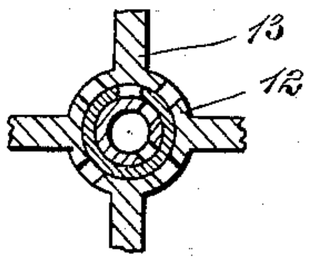
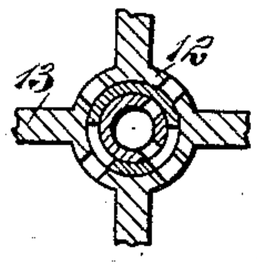



FIG. 8.




INVENTOR

W. S. Sutton

BY Munn & Co

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# UNITED STATES PATENT OFFICE.

WILLIAM SAYRE SUTTON, OF BELVIDERE, ILLINOIS.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 604,276, dated May 17, 1898.

Application filed May 1, 1897. Serial No. 634,683. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM SAYRE SUTTON, of Belvidere, in the county of Boone and State of Illinois, have invented new and useful Improvements in Rotary Engines, of which the following is a full, clear, and exact description.

This invention relates to rotary engines driven by steam, water, gas, or other motive agent; and the object is to provide an engine of this character having two similar pistons, one receiving the motive agent while the other is operating under the expansive power of the motive agent, whereby dead-centers are overcome; and a further object is to provide a simple controlling means for the two pistons, one independently of the other.

I will describe a rotary engine embodying my invention, and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a vertical section, on the line 1 1 of Fig. 2, of a rotary engine embodying my invention. Fig. 2 is a horizontal section. Fig. 3 is a section on the line 3 3 of Fig. 2. Fig. 4 is a side elevation. Fig. 5 is a section on the line 5 5 in Fig. 2; and Figs. 6 to 8, inclusive, are sectional views showing different positions of the inlet and outlet ports of the controlling-valves.

The engine comprises a casing having two cylinders 1 and 2, one being offset from the other. Extending through the casing is a driving-shaft 3, upon which are rigidly mounted the pistons, each comprising a hub portion 4, having a piston-wing 5 extended radially from it, the end of said wing bearing against the inner surface of its cylinder. The pistons 4 4 are separated by a disk 6, and at the outer end of the pistons similar disks 7 are secured. These several disks bear with their peripheries against the inner surface of the cylinders, and the spaces between the disks 6 and 7 form chambers for the motive agent—such, for instance, as steam. The disks will rotate with the pistons, and the bearing of the disks upon the inner surface of the cylinders will form a practically steam-tight joint. Such a joint could not easily be made were the pistons bearing against the cylinders.

Extended transversely through the casing are inlet-pipes 8 and exhaust or outlet pipes 9. These pipes are continuous—that is, the pipes 8 and 9 are in the form of a single stationary pipe, the inlet end being separated from the exhaust end by a partition 10. Mounted to oscillate in a rotary direction on the pipe 8 9 is a sleeve 11, designed to open and cut off the inlet and exhaust ports, as will be hereinafter described. Mounted to rotate on the sleeve 11 is an abutment-wheel comprising a hub portion 12, having four radial abutment-blades 13. The abutment-wheels are arranged in chambers in line with the chambers containing the pistons, and the blades 13 have a sufficient length to bear against the inner surface of their chambers and also to bear against the outer surfaces of the hub portions 4 of the pistons.

The inlet-tube is provided with two inlet-ports 14 and 15, designed at certain times to register with a port 16 in the sleeve 11, and this port 16 is designed at certain times to register with one of a series of ports 18, extended through the hub of the abutment-wheel. The exhaust portion 9 of the pipe is provided with two exhaust-ports 19 and 20, designed at certain times to register with exhaust-ports 21 and 22 through the sleeve 11. It will be seen that these exhaust-ports 21 and 22 are somewhat wider than the exhaust-ports through the pipe and also somewhat wider than the exhaust-ports 23 through the hub of the abutment-wheel. These ports 21 and 22 are used for exhaust independently, depending on the direction in which the engine is running.

I will now describe means for imparting a step-by-step rotary movement to the abutment-wheel and also means for shifting the valve-sleeve 11. The hub 12 of the abutment-wheel is extended outward beyond the outer side of the disk 7, and on its outer end the hub is provided with an abutment-controlling disk 24, provided with four radial slots 25, and on the shaft 3 are secured arms 26, having laterally-disposed pins 27, designed to engage in the slots 25 to rotate the disk 24, and consequently rotate the abutment-wheel.

Means is provided for holding the abutment-wheels against the back pressure of the steam. As here shown, this means consists of pivoted dogs 28, arranged within the casing, one at the top and one at the bottom of each controlling-disk 24. The dogs 28 have finger portions 29, adapted to engage in the slots 25, and these finger portions are beveled on the side toward the piston. The dogs 28 are extended from sleeves mounted to rotate on studs 30, extending from the side walls of the casing, and on these sleeves are arms 31, to the ends of which tappets 32 are pivoted. These tappets 32 are designed to engage at their inner ends with the sleeves from which the dogs are extended, so that the finger ends of said dogs may be moved out of engagement with the controlling-disk 24 when the piston is moved in one direction. The tappets 32 are held yieldingly in position by means of springs 33, attached at one end to the dogs 28 and bearing at the other end against the ends of the tappets nearest the sleeves. The finger portions of the dogs 28 are held yieldingly in engagement with the disk 24 by means of a spring 34, attached to the casing and bearing against the outer surfaces of the dogs.

The operation of this part of the engine is as follows: Assuming that steam is admitted to rotate a piston in the direction indicated by the arrow *a* in Fig. 3, the pin 27 will engage the tappet 32 of the lower dog 28 and move its finger 29 out of the slot 25. Then the pin 27 will enter the slot 25, which is substantially in line with the tappet and will impart a quarter-revolution to the disk 24, and consequently impart a quarter-revolution to the abutment-wheel. This motion is necessary to allow the piston-wing 5 to pass an abutment-blade. When the pin 27 shall have imparted a quarter-revolution to the disk 24, the said pin will move out of the slot 25, in which it was engaged, and in moving outward it will engage the tappet 32 of the upper dog 28, and as the said tappet 32 is mounted to swing in the direction of the movement of the pin it is obvious that it will be swung by the pin to allow it to pass. Of course as the disk 24 is rotated the wall of the slot 25, engaging with the beveled side of the finger 29 of the upper dog 28, will cause said upper dog to swing outward on its pivot.

Mounted on the shaft 3 at the outer sides of the casing are cam-wheels 35, designed to impart an oscillating rotary motion to the valve-sleeves 11. The cam-wheels 35 are provided with cam-grooves 36, into which pins extended from horizontally-reciprocating shifting bars 37 engage. The opposite ends of the shifting bars 37 have pins extended into radial slots 38, formed in the segment-gears 39, mounted on studs extended from the casing of the engine. These segment-gears 39 engage with segment-pinions 40, rigidly secured to the sleeves 11. The bars 37 are mounted to slide in blocks 41, which are mounted to slide in vertical guideways 42. The blocks 41 have link connections 43 with setting-disks 44, having hand-levers 45 and locking-dogs 46. These locking-dogs are pivoted to the hand-levers 45 and have pins extending through the disks 44 and adapted to engage with either one of a series of holes 47 in the casing.

When the parts are in the position indicated in Fig. 4, the direction of rotation of the piston will be as indicated by the arrow *a* in Fig. 3. The cams 35 will of course rotate with the shaft 3, and the cam-slots 36 are so arranged—that is, with the concentric portions near the periphery of the disk and the concentric portions near the hub of the disks—that no motion will be imparted to the bars 37 excepting when the pin extended into the cam-slot is in engagement with the portion between the inwardly-curved portions of the cam-slots between the lesser and greater circles. At this time the bars 37 will move longitudinally to impart a rotary motion to the segment-gears 39 sufficient to shift the valve-sleeves 11 to alternately open and close the inlet and exhaust ports.

When it is desired to reverse the motion of the pistons, the disks 44 will be rotated to draw the bars 37 to their upper position—that is, near the upper peripheries of the cam-disk 35 and the segment-gears 39—and then the operation is the same excepting that the pistons move in a reverse direction.

In Fig. 1 it will be seen that the engine is receiving the motive agent through the ports 14, 18, and 16, and this will continue until the piston-wing 5 shall have reached about to the point marked *x*. The remainder of the motion from *x* to *y* will be caused by the expansive power of the motive agent, as at the point *x*. The sleeve 11 will be rotated to cut out the port 16. As the ports 21 and 22 in the exhaust portion of the sleeve are somewhat wider than the other ports, it is obvious that the exhaust-ports will never be entirely cut off. Therefore the steam forward of the piston-wing will exhaust as the said piston rotates.

It will be seen that the piston-wings 5 of the two pistons are arranged in different positions, as indicated by dotted lines *z* in Fig. 1, so that just as one piston-wing reaches the point *y* steam will be admitted to the other piston-wing, carrying the first one across its abutment to the position shown in full lines in Fig. 1. By this operation it is obvious that dead-centers will be overcome.

I have indicated where under the present conditions the expansive force of the motive agent will begin, but it will be understood that the length of stroke under the initial pressure may be varied by varying the form of the cam-slots 36.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A rotary engine, comprising a casing, a

shaft extended through said casing, pistons mounted on the said shaft but isolated one from the other, each piston comprising a cylinder or hub portion and a radial wing, an abutment-wheel for each piston, each abutment-wheel consisting of a hub portion having inlet and outlet ports and radial blades, means for controlling the admission of steam through said ports, disks mounted on the hub portions of the abutment-wheels, the said disks being provided with radial slots, dogs pivoted in the casing, there being two dogs for each disk, the said dogs having fingers to engage in the slots of the disks, and means for moving said dogs into and out of engagement with the disks, substantially as specified.

2. A rotary engine, comprising a casing, a shaft extended through said casing, pistons mounted on said shaft but isolated one from the other, each piston comprising a cylinder or hub portion and a radial wing, an abutment-wheel for each piston, each abutment-wheel consisting of a hub portion having inlet and outlet ports and radial blades, means for controlling the admission of steam through said ports, disks mounted on the hub portions of the abutment-wheels, the said disks being provided with radial slots, dogs pivoted in the casing, one at the upper side and one at the lower side of each disk, the said dogs having finger portions to engage in the slots, spring-pressed tappets carried by the dogs and adapted to move the dogs and also to move relatively to the dogs, and arms extended from the shaft, having pins designed to engage in the slots of the disks, substantially as described.

WILLIAM SAYRE SUTTON.

Witnesses:
W. A. WILLIS,
F. SPACKMAN.