B. O. WALKER.

ROTARY STEAM ENGINE.

APPLICATION FILED NOV. 30, 1912.

1,106,997.

Patented Aug. 11, 1914.

3 SHEETS—SHEET 1.

Fig. 6.

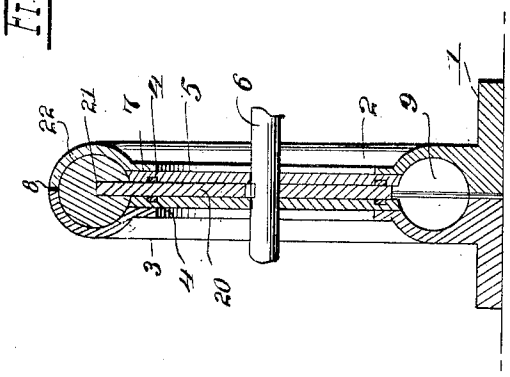
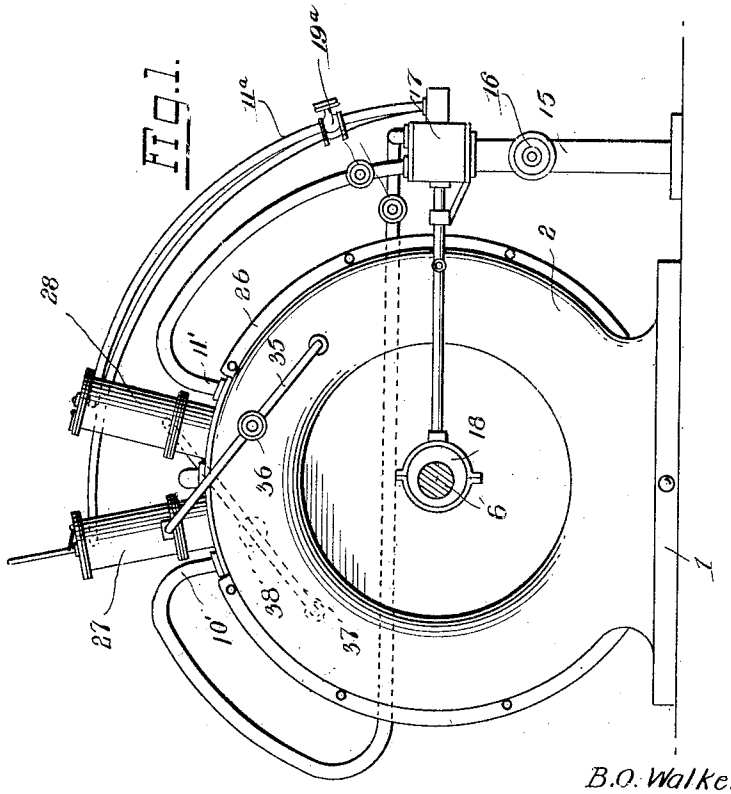



Fig. 1.




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3 SHEETS—SHEET 2.

FIG. 2.

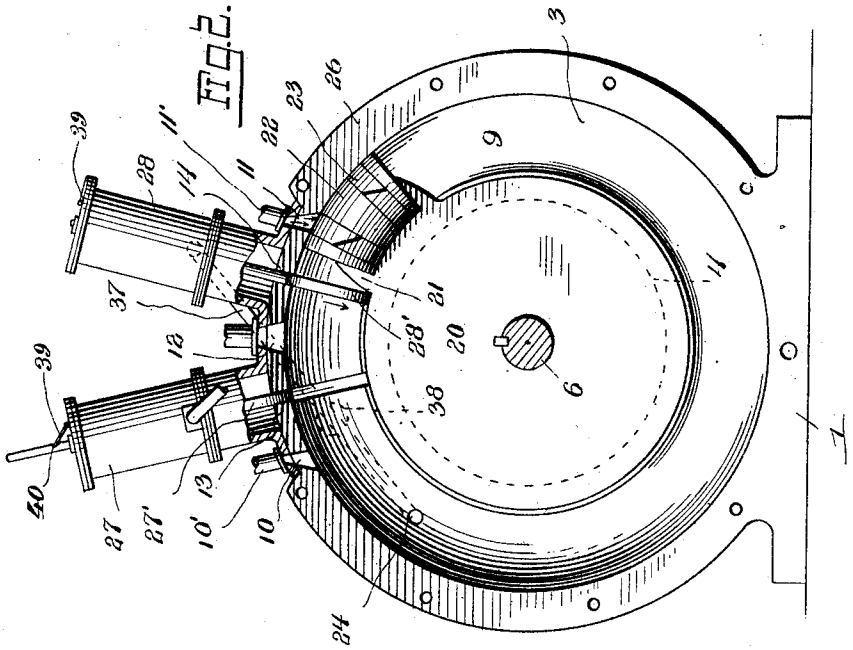
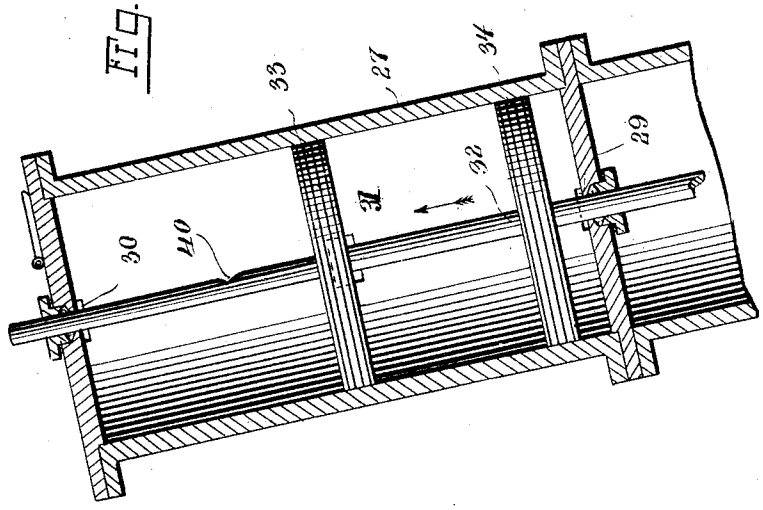



FIG. 5.




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3 SHEETS—SHEET 3.

FIG. 4

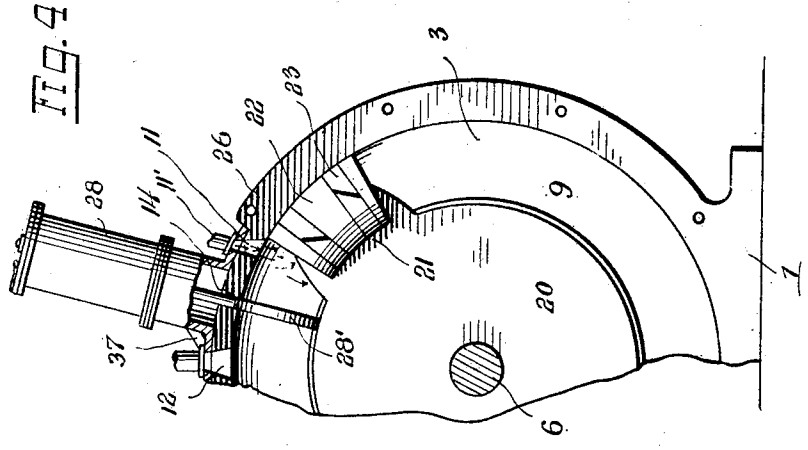
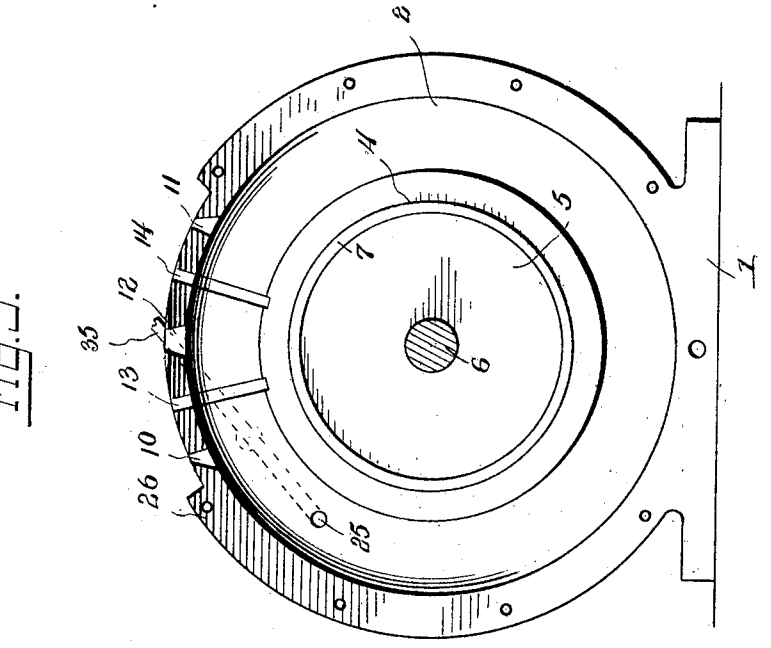



FIG. 5.




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# UNITED STATES PATENT OFFICE.

BERTRAM O. WALKER, OF PORTLAND, OREGON.

## ROTARY STEAM-ENGINE.

1,106,997. Specification of Letters Patent. Patented Aug. 11, 1914.

Application filed November 30, 1912. Serial No. 734,356.

*To all whom it may concern:*

Be it known that I, BERTRAM O. WALKER, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented new and useful Improvements in Rotary Steam-Engines, of which the following is a specification.

This invention relates to rotary steam engines, its principal object being to provide an engine of this type which will utilize both the impact and expansive forces of the steam and enable high speed and power to be obtained with economy in the use of steam and fuel.

A further object of the invention is to provide a rotary engine which may be reversed to run in either direction at will.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of a rotary steam engine embodying my invention. Fig. 2 is a vertical section taken on a line at right angles to the engine shaft and between the sections of the main cylinder or casing, showing the piston in a position to close but about to pass the acting steam inlet port and also showing the coacting gate projected. Fig. 3 is an inner face view of the main cylinder or casing section complemental to that shown in Fig. 3. Fig. 4 is a fragmentary sectional view similar to Fig. 2, showing the piston in its point of travel beyond the steam inlet port. Fig. 5 is a vertical section through one of the gate controlling cylinders. Fig. 6 is a vertical longitudinal section through the engine.

In carrying my invention into practice I provide an engine comprising a suitable base 1, supporting a main cylinder or casing composed of plates or sections 2 and 3, bolted or otherwise suitably united. The said casing plates or sections 2 and 3 are provided with circular openings 4 closed by disks 5 keyed to the engine shaft 6. Secured to the plates or disks are suitable packing rings 7, which maintain a steam-tight connection between said plates and disks. Packing 8 is also interposed between the flat abutting faces of the plates in order to prevent leakage of steam from the casing or cylinder.

The inner faces of the plates or sections 2 and 3 are formed with counterpart annular grooves providing a steam channel 9, and said plates or sections are also provided in their upper edges with meeting pairs of grooves providing steam supply ports 10 and 11, a main steam exhaust port 12, and guide slots or passages 13 and 14 arranged between the exhaust port and the respective steam supply ports. The ports 10 and 11 are arranged on opposite sides of the vertical transverse center of the main cylinder or casing and communicate respectively through branch pipes 10′ and 11′ with a main steam supply pipe 15. The pipe 15 is provided with a manually operable controlling and cut off valve 16, and also with a controlling valve 17, operated at timed intervals from an eccentric 18 on the engine shaft 6, while each of said branch pipes 10′ and 11′ is provided with a manually operable cut off valve 19. The valve 17 also controls the flow of steam to branch pipes $10^a$ and $11^a$, each having a manually operable cut off valve $19^a$.

Keyed to the engine shaft is a piston disk 20 provided with a peripheral extension 21 carrying a piston head 22 provided with suitable packing rings 23 and arranged to operate in the steam channel 9. A feed port 24 is formed in the casing section 2 and communicates with the channel 9 at a point adjacent the steam supply port 10, while a similar feed port 25 is formed in the casing section 3 and communicates with the channel 9 at a point adjacent to the steam supply port 11.

Spaced flanges 26 are provided upon the upper edges of the casing sections and support cylinders 27 and 28, each provided with inlet ports 29 and 30 at the lower and upper ends thereof and an exhaust port 31 intermediate said inlet ports. Movable vertically in each of said cylinders is a piston rod 32 carrying a pair of spaced piston disks 33 and 34, operating as valves to control the aforesaid ports. The stem 32 of the cylinder 27 carries at its lower end a movable gate or abutment 27′, while the stem of the cylinder 28 is provided with a corresponding gate or abutment 28′, which gates or abutments are respectively movable through the guide slots 13 and 14 into and out of the steam channel 9.

The inlet port 29 of the cylinder 27 communicates through a pipe 35 having a controlling valve 36 with the feed port 25 in the

casing section 3, while the inlet port 30 thereof communicates with the branch supply pipe $10^a$. The inlet port 29 of the cylinder 28, on the other hand, communicates through a pipe 37 having a controlling valve 38 therein with the feed port 24 in the casing section 2, while this inlet port 30 communicates with the branch steam supply pipe $11^a$. It will thus be observed that the gate 27′ is arranged for coöperation with the steam supply port 10 and feed port 25, while the gate 28′ is arranged for coöperation with the steam supply port 11 and feed port 24, the construction and arrangement being such that one of the gates and its cooperating ports and cylinder are provided in running an engine in one direction, while the other gate and its acting set of ports and cylinder are provided in running the engine in the opposite direction.

In operation, when it is desired to run the engine in one direction, say to the right, the valve 16 in the main steam supply pipe 15, the valve 17 in the branch pipe 10′ the valve $19^a$ in the branch pipe $10^a$ and the valve 36 in the pipe 35 are opened, while the valves in the branch pipes 11′ and $11^a$ and valve 38 in the feed pipe 37 are closed, so as to provide for the admission of steam through the port 10 and to the inlet ports of the cylinder 27. Under these conditions the gate 28′ is retracted, while provision is made for automatically projecting and retracting the gate 27′. Steam then passes through the pipe $10^a$ to the inlet port 30 of the cylinder 27 and projects the gate 27′, and also flows through the port 10 into the steam channel 9 between the said projected gate and the piston, causing the latter to rotate in the steam channel. When the piston in its path of rotation passes beyond the feed port 25, the steam feeds through the pipe 35 to the cylinder 27 through the pipe 10′ and inlet port 29, thus raising the gate 27′ and allowing the piston to pass, the steam finally exhausting through the port 12. When the piston passes the port 25, the main steam supply valve 17 is closed by the action of the eccentric 18, and kept closed until the piston passes beyond the exhaust port 12 and inlet port 10, when said valve 17 is again opened by the action of the eccentric to feed steam to the port 30 of the cylinder 27 for the projection of the gate 27′ and through the port 10 into the channel 9 for the further propulsion of the piston. When it is desired to run the engine in the opposite direction, the valves 17 and $19^a$ in the pipes 10′ and $10^a$ and valve 36 in the pipe 35 are closed, while the valves 17 and $19^a$ in the pipes 11′ and $11^a$ and the valve 38 in the pipe 37 are opened for the supply of steam through the port 11 and to the ports 29 and 30 of the cylinder 28. By this means provision is made for running the engine in either direction at will, but if desired, a single gate and set of steam supply connections may be used in a simple type of engine designed to run in one direction only.

It will be understood that the piston valves 33 and 34 of each cylinder 27 or 28 are so spaced as to provide for the retraction and projection of the associated gate through steam admitted through the respective ports 29 and 30 and the exhaust of steam admitted via either of said ports through the exhaust port 31. When the gate is projected steam entering through the pipe 35 or 37 acts upon the piston valve 34 to raise the stem 32 until said valve passes immediately above the port 31, whereupon the steam behind said piston valve 34 exhausts and the piston valve 33 is brought into operative position immediately below the port 30. Steam entering through the port 30 then acts upon said piston valve 33 to depress the stem until said piston valve passes below the port 31, when the steam behind said piston valve 33 exhausts through said port and at the same time the piston valve 34 is brought into proper operative relation to the port 29. If desired, a latch device 39 may be provided on each valve actuating cylinder 27 or 28 for manual adjustment into engagement with a notch 40 in the piston stem, whereby either gate may be locked in a retracted position while the other gate is in use.

From the foregoing description, taken in connection with the drawings, the construction and mode of operation of my improved rotary engine will be readily understood, and it will be seen that the invention provides an engine of this type which is simple of construction and adapted, if desired, to run in either direction, and which enables both the impact and expansive forces of the steam to be utilized, with resultant economy in the use of steam and fuel, while allowing high speed and power to be developed.

While steam is herein specified as the motive agent, it will, of course, be understood that gas, gasolene or other motive fuel for driving the engine under fluid pressure may be employed.

I claim:—

1. A rotary steam engine comprising a casing provided with a steam channel having a steam inlet, an exhaust outlet and a discharge port at one side of the inlet, a rotary piston operating in the casing, a cylinder provided with inlet ports at its ends and an intermediate exhaust port, one of said inlet ports being in communication with said discharge port, a steam supply pipe communicating with the steam inlet of the casing and the other inlet port of the cylinder, a piston in said cylinder, a gate connected with the piston and movable across

the steam channel between the steam inlet and exhaust outlet, and means for controlling the supply of steam through the supply pipe.

2. A rotary steam engine comprising a casing provided with a steam channel having an exhaust outlet and steam inlets on opposite sides thereof, and also having discharge ports in its opposite sides and on opposite sides of the steam inlets, a rotary piston operating in the casing and controlling the discharge ports, a pair of cylinders each provided with inlet ports at its ends and an intermediate exhaust port, the lower inlet port of one cylinder communicating with the discharge port at one side of the casing and the lower inlet port of the other cylinder communicating with the discharge port at the opposite side of the cylinder, pistons in said cylinders, gates connected with the pistons and movable across the steam channel between the discharge outlet and the respective steam inlets, a main steam supply pipe having a controlling valve, valved branches leading therefrom to the other inlet ports of the cylinders, and means for periodically opening said controlling valve.

3. A rotary steam engine comprising a casing having a steam channel provided with inlet and exhaust ports and a discharge port, a piston operating in said cylinder and controlling said discharge port, a gate movable across the steam passage between the inlet and exhaust ports, a cylinder and piston for operating the gate and adapted to receive steam from said discharge port to retract the gate, and steam supplying connections for supplying steam at prescribed intervals to the casing through the inlet port and to the cylinder to project the gate.

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

BERTRAM O. WALKER.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."