

W. G. SHEPPARD.

ROTARY ENGINE.

APPLICATION FILED AUG. 5, 1909.

948,256.

Patented Feb. 1, 1910.

3 SHEETS—SHEET 1.

FIG. 1.

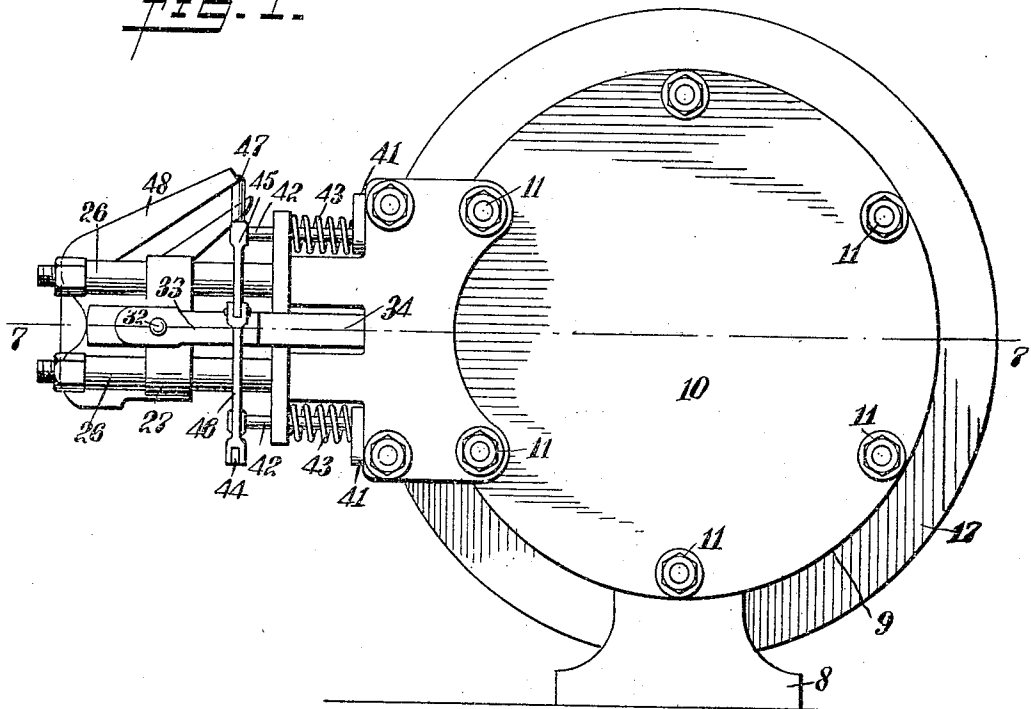
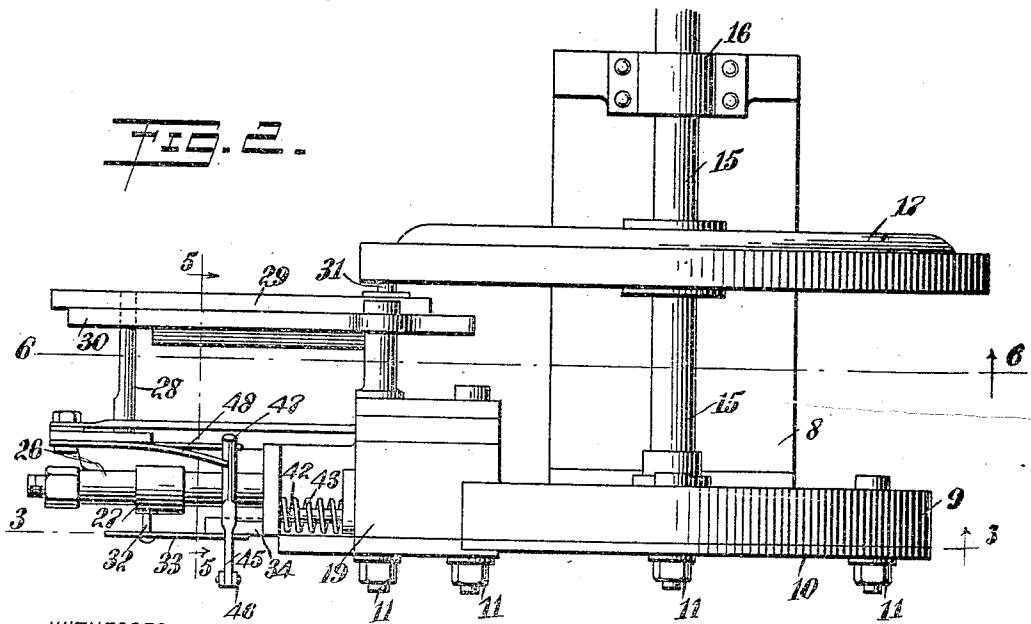


FIG. 2.



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3 SHEETS—SHEET 2.

FIG. 3.

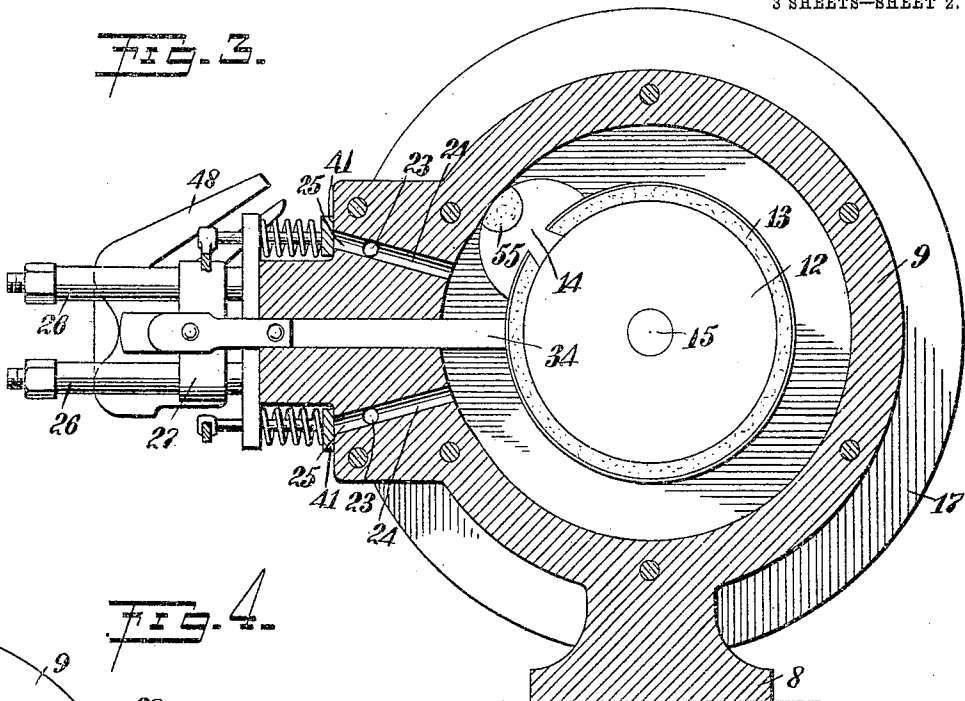


FIG. 4.

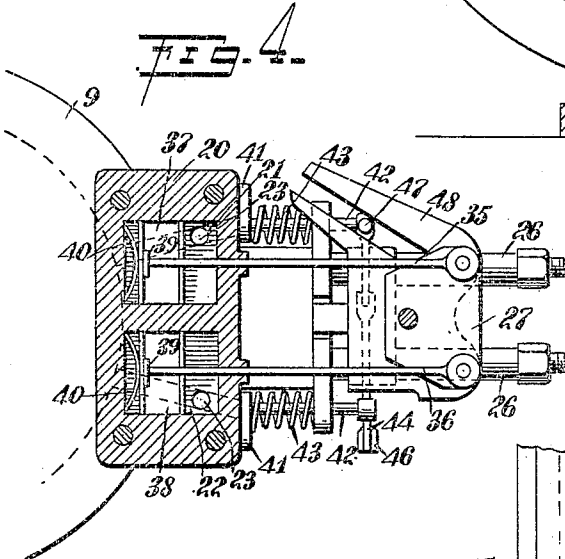
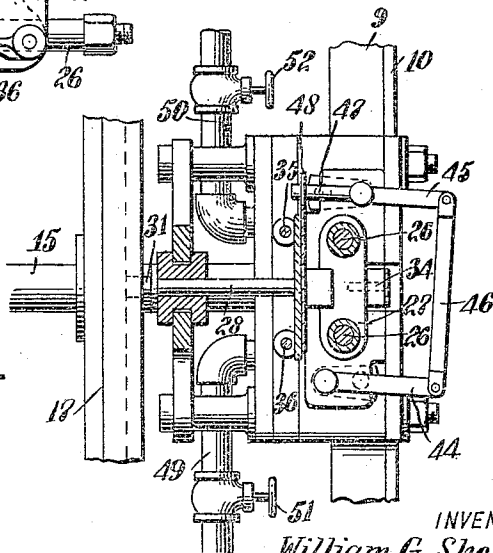


FIG. 5.



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FIG. 6.

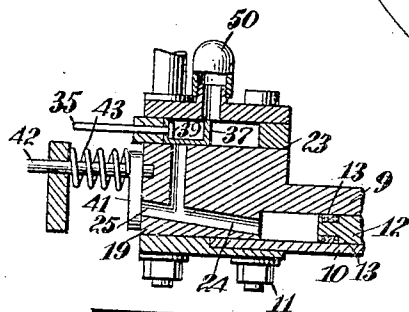
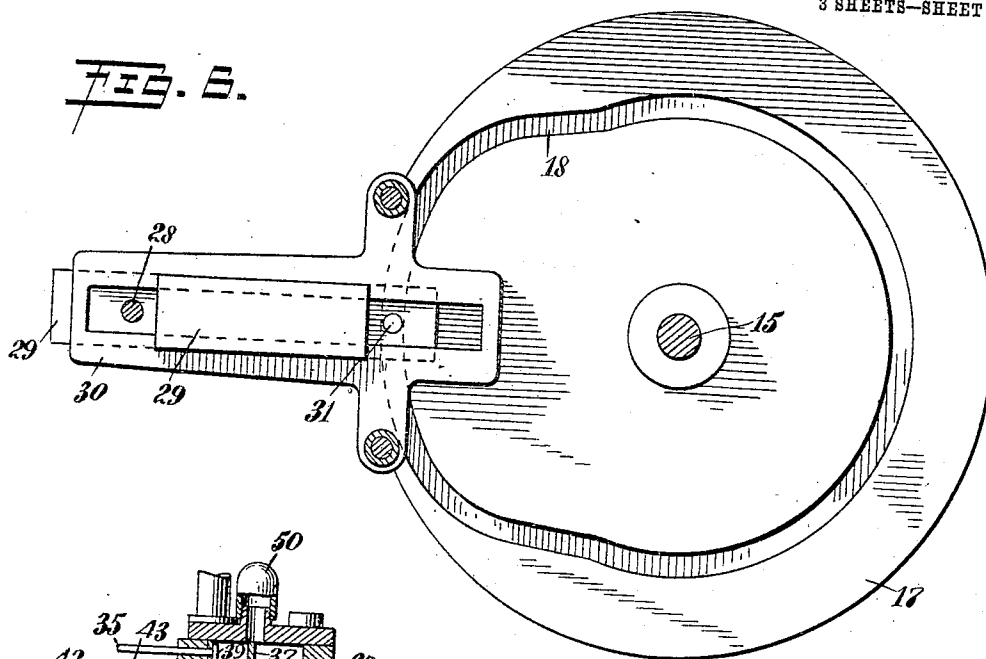
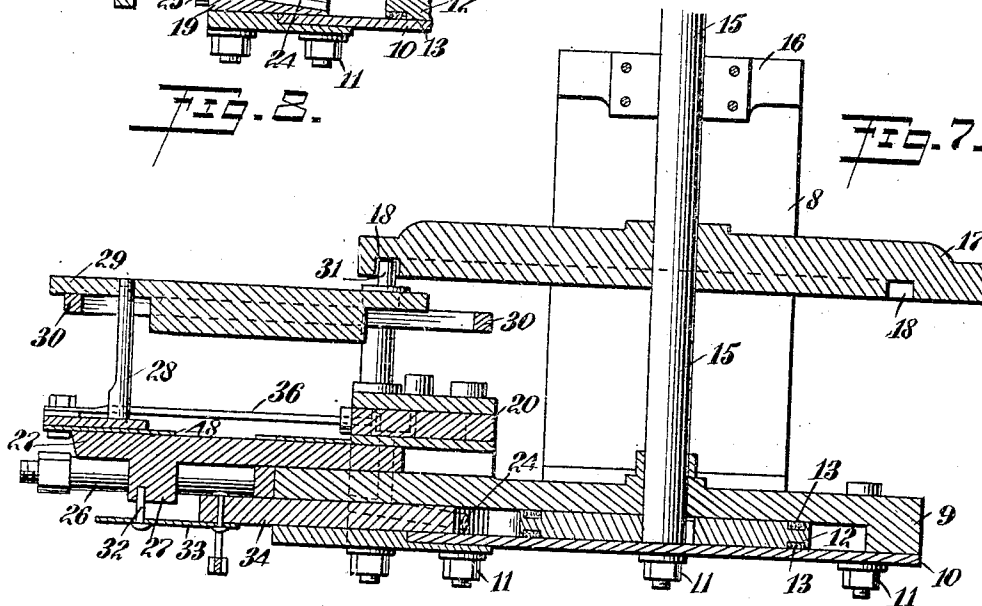


FIG. 8.

FIG. 7.



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WILLIAM GEORGE SHEPPARD, OF INDIANOLA, NEBRASKA.

ROTARY ENGINE.

948,256.

Specification of Letters Patent.

Patented Feb. 1, 1910.

Application filed August 5, 1909. Serial No. 511,316.

To all whom it may concern:

Be it known that I, WILLIAM G. SHEPPARD, a citizen of the United States, and a resident of Indianola, in the county of Red-willow and State of Nebraska, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

This invention relates to a new and improved rotary engine to be set in motion by any suitable fluid, such as steam or the like.

The object of the invention is to provide a device which will be simple in its construction, efficient in operation, readily accessible as to its parts, and at the same time strong and durable.

The device consists, generally speaking, of a rotor having a vane fixed thereon, a fulcrum valve, means for letting a motive fluid in between said fulcrum valve and said vane on either side thereof, and means for exhausting said motive fluid from between said fulcrum valve and said vane.

The device further consists in the construction and combination of parts, to be more fully described hereinafter and particularly set forth in the 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, and in which—

Figure 1 is a vertical end view of my device; Fig. 2 is a top plan view; Fig. 3 is a vertical transverse section on the line 3—3 in Fig. 2; Fig. 4 is a vertical section through the valve casing; Fig. 5 is a vertical section on the line 5—5 in Fig. 2; Fig. 6 is a vertical section on the line 6—6 in Fig. 2; Fig. 7 is a horizontal section on the line 7—7 in Fig. 1; and Fig. 8 is a horizontal section through the valve casing and inlet and exhaust passages.

Referring more particularly to the separate parts of the device, 8 indicates a base, which may be of any suitable material, and to which is secured in any well known manner a cylinder 9. The cylinder 9 has a removable facing plate 10, which is secured to the body of the cylinder by any suitable means, such as bolts 11.

Within the cylinder, there is provided a suitable rotor 12, which may be of any suitable form and material, but preferably has a packing ring 13 secured thereto in any well-known manner, whereby the motive

fluid is prevented from seeping from one side of the rotor to the other. The rotor 12 is preferably of smaller diameter than the interior of the cylinder, and has a vane 14 removably secured thereto, which is adapted to rotate with the rotor and engage the circumference of the opening within the cylinder. The vane 14 is provided with a suitable packing 55, which is adapted to prevent the motive fluid from passing from one side of the vane to the other. In order to support the rotor 12, there is provided a shaft 15, to which the rotor is secured, and which is journaled in the cylinder 9 at one end, and in a bracket 16, which extends upwardly from the base 8, at the other end.

Intermediate the bracket 16 and the cylinder 1 on the shaft 15, there is secured a combined fly-wheel and cam 17, which has a cam groove 18 in one face thereof, the purpose of which will be more fully disclosed hereinafter.

Extending from one side of the cylinder 9, there is provided a frame 19, on one side of which is attached in any well known manner, a valve casing 20, which has a plurality of valve chambers 21 and 22 therein. The valve chambers are connected to the interior of the cylinder 9 by means of suitable conduits or ports 23 and 24. The valve chambers 21 and 22 are for the purpose of supplying the motive fluid into the interior of the cylinder. In order to exhaust the spent motive fluid from the cylinder, the conduit 24 extends beyond the conduit 23 to a point 25 where it lets into the open air.

Extending from the frame 19, there are provided a pair of guides 26, on which is slidingly supported a cross-head 27, to the back side of which is secured in any well known manner a pin 28, which is secured at its opposite end to a cam follower 29, slidingly supported in a guide 30. The cam follower 29 has at its inner end a pin 31, which follows in the cam groove 18 on the cam fly-wheel 17, and is reciprocated thereby. Through this connection, when the shaft 15 rotates, carrying therewith the cam fly-wheel 17, the cross-head 27 is reciprocated on the guides 26. The cross-head 27 is connected at its front side by any suitable means such as a pin 32 and a connecting rod 33 to a fulcrum valve 34, which extends through a slot in the frame 19 into the interior of the cylinder 9, where it is adapted to abut against the rotor 12. By the recipro-

cation of the cross-head 27, the fulcrum valve 34 is inserted into and withdrawn from the interior of the cylinder 9.

Secured to the back side of the cross-head 27 in any well-known manner, there is provided a pair of valve rods 35 and 36, which extend into the valve chambers 21 and 22, and are connected at their inner ends to valves 37 and 38, which slide in the chambers 21 and 22, and which are adapted to open and close the ports 23 leading into the interior of the cylinder 9. The connection between the valve rods 35 and 36 and the valves 37 and 38 is not rigid, however. The inner ends of these valve rods have collars 39 secured thereto, which are adapted to abut alternately against the outer and inner ends of the sliding valves 37 and 38. The rods 35 and 36, therefore, have a limited travel relative to the sliding valves 37 and 38. In order to urge the valves 37 and 38 to close the port openings 23 promptly when the rods 35 and 36 have been moved outwardly, there are provided springs 40, which are secured under tension between the valve casing and the valves 37 and 38.

In order to regulate the exhaust opening 25, there are provided suitable pivot valves 41, which are secured to rods 42, and are normally held over the opening 25 by means of spiral springs 43. The rods 42 are rotated, so as to manipulate the valves 41 over and away from the exhaust openings 25 by means of crank arms 44 and 45. The crank arm 44 is operated from the crank arm 45 through a connecting link 46. The crank arm 45 has an oppositely-extending portion 47, which is engaged by a slotted cam 48, secured to the cross-head 27 in any well known manner, and adapted to rotate the crank arm 45.

In order to direct the rotation of the rotor 12, it is desirable to admit the motive fluid to only one of the valve chambers 21 and 22 at one time. There are, therefore, provided supply conduits 49 and 50, controlled by valves 51 and 52, which supply the motive fluid to the valve chambers 22 and 21.

The operation of the device will be readily understood from the above description. The steam is admitted by means of one of the valves 51 or 52, to one of the valve chambers 22 or 21. The steam passes through the ports 23 and 24 into the interior of the cylinder 9, where it expands between the fulcrum valve 34 and the vane 14, causing the latter to move away from the fulcrum valve 34, carrying with it the rotor 12. The rotor 12 rotates the shaft 15, thereby rotating the combined fly-wheel and cam 17, the groove 18 of which reciprocates, through the follower 29, the cross-head 27. The cross-head 27 operates to withdraw the fulcrum valve 34 from the cylinder 9 just about the time when the vane 14 approaches it, thereby

permitting the vane to rotate in a complete circle. At the same time, the valves 41 are pivoted away from the exhaust openings 25, thereby permitting the spent motive fluid to pass out of the cylinder into the open air. The sliding valves 37 and 38, however, have in the meantime been moved over the inlet ports 23, shutting off the flow of the motive fluid to the interior of the cylinder. On the inward movement of the cross-head 27, the valve rods 35 and 36 have a limited motion relative to the valves 37 and 38, thereby permitting the fulcrum valve 34 to be inserted into the cylinder 9 before the valves 37 and 38 have been removed from over the inlet ports 23. As soon as the fulcrum valve 34 has approached the limit of its inward travel, the collars 39 on the rods 35 and 36 come in contact with the inner ends of the valves 37 and 38, thereby forcing them against the tension of the springs 40 from their position over the inlet ports 23, and thus admitting the motive fluid through the conduit 24 into the interior of the cylinder between the fulcrum valve 34 and the vane 14. The operation is thus repeated over and over again, thereby transmitting a continuous rotation to the shaft 15, which may be connected up with any suitable machinery, to transmit power to the same.

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

1. In a rotary engine, the combination with a cylinder, of a rotor for said cylinder, a vane for said rotor, a fulcrum valve connected to said cylinder and adapted to be reciprocated in and out of said cylinder controlling means for said fulcrum valve, and means for operating said controlling means, adapted to permit a limited relative travel of said fulcrum valve before operating said controlling means.

2. In a rotary engine, the combination with a cylinder, of a shaft rotatably supported in said cylinder, a rotor secured to said shaft, a vane secured to said rotor, a fulcrum valve slidably supported in said cylinder, adapted to cooperate with said vane, a valve controlling the flow of a motive fluid to said cylinder, a valve controlling the flow of a motive fluid from said cylinder, a cross-head for operating said valves, and a cam on said shaft for operating said cross-head.

3. In a rotary engine, the combination with a cylinder, of a shaft rotatably supported in said cylinder, a rotor secured to said shaft, a vane secured to said rotor, a fulcrum valve slidably supported in said cylinder, a cross-head for operating said fulcrum valve, a slide valve for controlling the flow of a motive fluid to said cylinder, means for operating said slide valve from

said cross-head, a pivot valve for controlling the exhaust from said cylinder, a cam secured to said cross-head for operating said pivot valve, and means for operating said cross-head from said shaft.

4. In a rotary engine, the combination with a cylinder, of a rotor for said cylinder, a vane secured to said rotor, a fulcrum valve coöperating with said vane, means for controlling the flow of a motive fluid to said cylinder, a pair of valves for controlling the exhaust from said cylinder, pivot rods connected to said valves, spiral springs for normally holding said valves in a closed position, and a connecting rod for operating one of said valves from the other of said valves.

5. In a rotary engine, the combination with a cylinder, of a shaft rotatively supported in said cylinder, a rotor secured to said shaft, a vane on said rotor, a fulcrum

valve slidably connected to said cylinder, a cross-head for operating said fulcrum valve, means for admitting a motive fluid between said fulcrum valve and said vane, means for controlling the admission of said motive fluid to said last-mentioned means, means for controlling the exhaust of said motive fluid from said cylinder, operating connections between said last-mentioned means and said cross-head, and a cam follower adapted to be operated by said cam fly-wheel and adapted to reciprocate said cross-head.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM GEORGE SHEPPARD.

Witnesses:

C. S. QUICK, Jr.,

WM. A. DOLAN.