

No. 649,541.

Patented May 15, 1900.

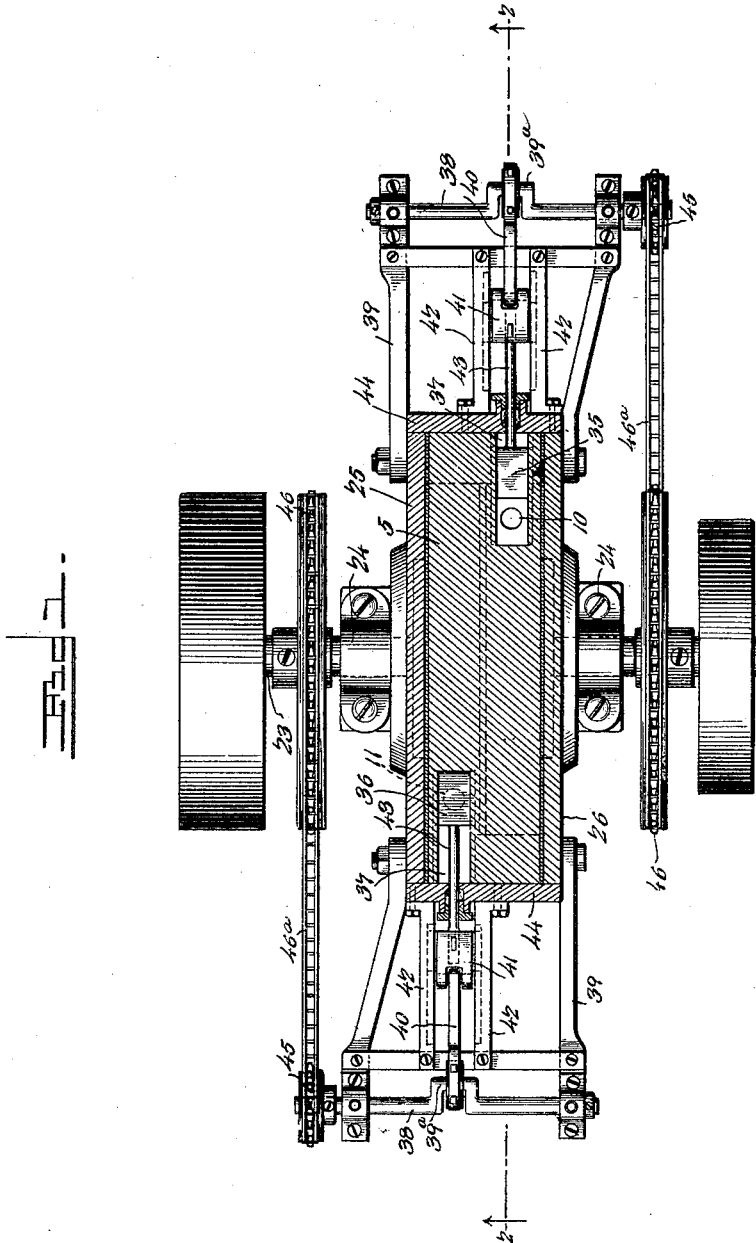
J. W. FLOWERS, M. FOY & F. T. WILLIAMS.

ROTARY ENGINE.

(Application filed Aug. 2, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

E. F. Stewart.

Geo. H. Chandler

By their Attorneys,

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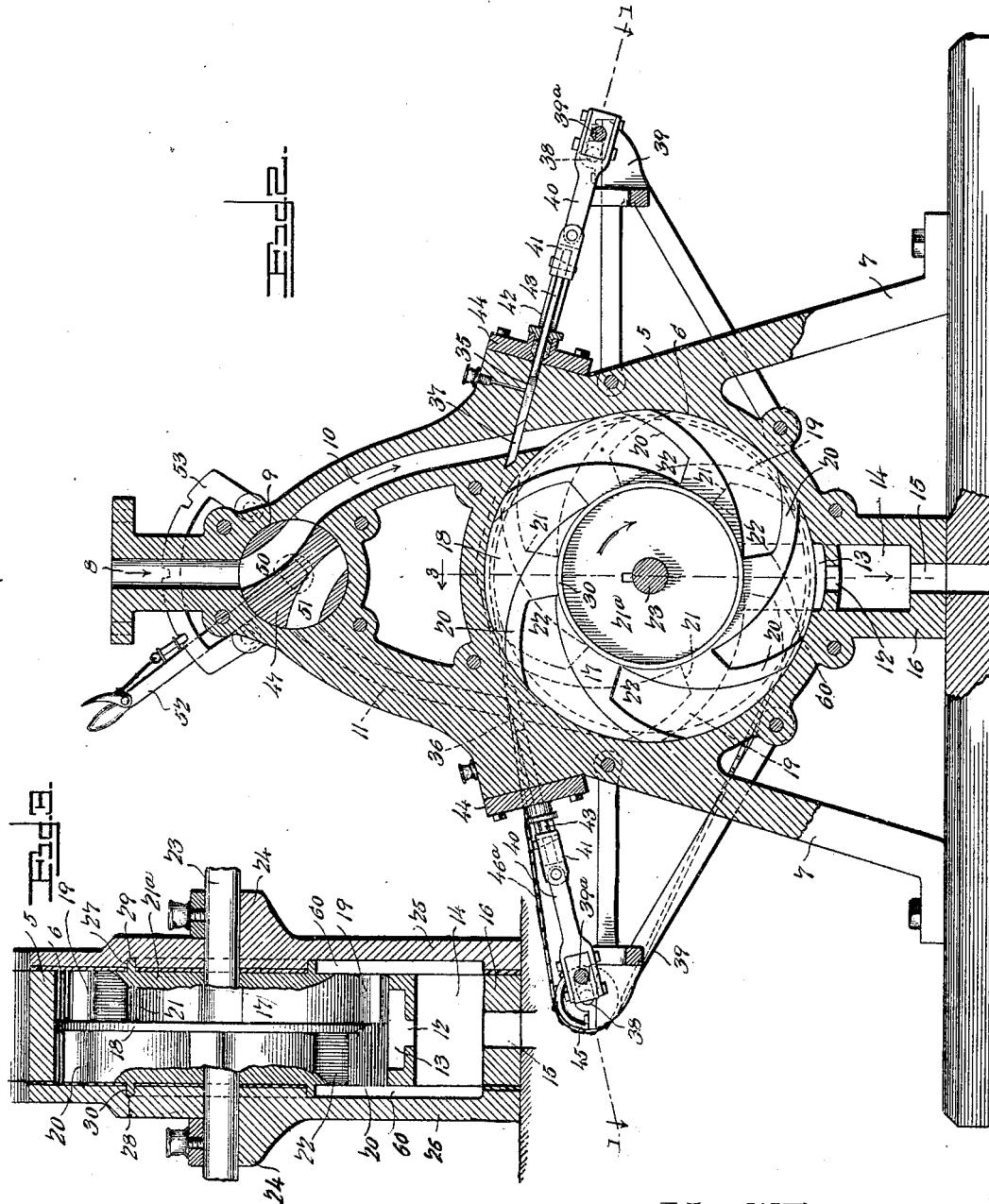
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UNITED STATES PATENT OFFICE.

JULIUS WILLIAM FLOWERS, OF NEWPORT, OREGON, AND MICHAEL FOY
AND FRANK T. WILLIAMS, OF WORCESTER, MASSACHUSETTS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 649,541, dated May 15, 1900.

Application filed August 2, 1899. Serial No. 725,902. (No model.)

To all whom it may concern:

Be it known that we, JULIUS WILLIAM FLOWERS, residing at Newport, county of Lincoln, and State of Oregon, and MICHAEL FOY and FRANK T. WILLIAMS, residing at Worcester, in the county of Worcester and State of Massachusetts, all citizens of the United States, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to rotary engines of that class in which a drum is rotatably mounted in the frame and has pockets for the reception of steam or other gas under pressure and in which slide valves to cut off the steam after each pocket is filled.

The object of the invention is to provide a cheap and simple construction adapted for rotation in opposite directions and in which a simple form of throttle may be employed for opening and closing the feed-pipe and also for reversing the direction of rotation of the drum or piston.

In the drawings forming a portion of this specification, and in which like numerals of reference designate corresponding parts in the several views, Figure 1 is a section on line 1 1 of Fig. 2. Fig. 2 is a section on line 2 2 of Fig. 1, said section being taken through one of the movable abutments. Fig. 3 is a section on line 3 3 of Fig. 2.

Referring now to the drawings, 5 represents the casing of the engine, having a cylindrical transverse opening 6 therein and provided with legs 7, through the medium of which it is adapted to be secured to a suitable supporting-base. The casing 5 is substantially triangular in form, and leading into the upper end thereof is a steam-inlet 8, entering a transverse frusto-conical opening 9, from opposite sides of which lead steam-passages 10 and 11, which extend downwardly and enter the cylindrical opening 6 at opposite sides of the vertical diameter of the opening. Leading from the opening 6 is an exhaust-passage 12 equidistant from the sides of the casing, and into this exhaust-passage leads a transverse arc-shaped slot 13 for a purpose which will be presently explained.

The exhaust-passage 12 leads through the base of the cylindrical opening 6 and into an

enlarged chamber 14, having an outlet 15 through the base upon which the machine is mounted, said chamber 14 and outlet 15 being formed in a downwardly-projecting lug 16 upon the under side of the casing and forming an additional support therefor.

Mounted in the cylindrical opening 6 is a rotary piston or drum 17, comprising a web 18, the diameter of which is equal to the diameter of the opening 6 and on each side of which web are disposed oppositely-extending fingers 19 and 20, carried by a hub 21, said fingers having their outer and inner surfaces bounded by arcs of circles, as shown, resulting in the formation of two series of pockets 21 and 22, leading from the hub 21 outwardly and peripherally of the flange 18, the outer ends of said pockets being much larger than the inner ends thereof.

The hub 21 is fixed to a shaft 23, which is journaled in suitable bearings 24 in covering-plates 25 and 26, which are bolted upon the opposite faces of the frame 5 and which form the side walls of the opening 6. Suitable packing is arranged between the plates 25 and 26 and the adjacent portion of the frame, and in substitution of packing between the hub and said plates there are formed upon the inner faces of said plates and concentric with the shaft 23 annular grooves 27 and 28, in which are seated similar flanges 29 and 30 upon said hub.

The passages 10 and 11 are so arranged with respect to the casing that the passage 10 communicates with the opening 6 on that side of the web 18 at which is located the series of pockets 21, whereby steam may be supplied to said pockets through said passage, the passage 11 entering the opening 6 at the opposite side of the web, the pockets being so disposed that the fingers separating them will extend in the directions of their respective passages 10 and 11 as they move adjacent thereto, so that the discharge of steam from the passages will enter the pockets and pass directly against the rear ends thereof, which ends are flat and are disposed to lie at angles to the passages when in a position to receive steam from the latter. Thus if steam be admitted through the passage 10 it will enter the pocket of the series 21, into which said passage at that time

opens, and engaging the end wall or bottom of the passage the impact of said steam will rotate the piston in the direction shown by the arrow in Fig. 2. Conversely, if steam be admitted through passage 11 it will enter the pockets of the series 22 successively and will rotate the piston in an opposite direction, it being of course understood that said passages are alternately opened and closed.

10 In order to close the passages 10 and 11 intermittently during the operation of either to cut off the supply of steam therethrough and enable the utilization of the steam with a consequent economy, there is provided a movable valve for each of said passages, said valves 35 and 36 being adapted to move in corresponding passages 37, formed transversely of the passages 10 and 11 and of such width that said valves when moved forwardly thereof will effectively close their respective passages 10 and 11. These valves have an alternate reciprocatory motion which is communicated thereto through the medium of crankshafts 38, mounted in suitable brackets 39, connected with the casing 5, and upon the cranks 39^a of which are mounted pitmen 40, connected with cross-heads 41, moving in guideways 42. These cross-heads 41 are connected with reciprocatory rods 43, connected directly with the valves 35 and 36, respectively, said rods 43 passing through stuffing-boxes carried by plates 44, which cover the ends of the guide-passages 37. Motion is communicated to the shafts 38 through the medium of sprockets 45 and 46, mounted upon the shafts 38 and 23, respectively, and connected through the medium of chains 46^a, of common form.

40 In order to supply or regulate the supply of steam through passages 10 and 11 from the inlet-pipe 8, a frusto-conical plug-valve 47 is fitted in the opening 9 and has formed therein transverse curvilinear passages 50 and 51, of which the passage 50 is adapted to simultaneously register with pipe 8 and passage 10 to form a path from the former to the latter, the passage 50 registering completely with the inner end of said pipe, so that it may receive the entire amount of steam passing from the pipe. The plug 47 fits the opening 9 snugly, so that there is no leakage, and hence by gradually rotating the plug to move the registering end of the passage 50 from the inlet-pipe 8 the supply of steam to the passage 55 may be gradually cut off.

The inlet end of passage 51 is separated from the corresponding end of passage 50 by an extent of surface greater than the diameter of the inlet 8, so that as the passage is moved from registration with the inlet the supply of steam to the passage 50 will be completely cut off before the passage 51 communicates initially with the inlet. A lever 52, fixed to the plug 47, has a notched segment 53 for holding it at different points in its movement and through the medium of which lever and segment the plug-valve may be adjusted

to throw either passage 10 and 11 into communication with the inlet 8 or to cut off said communication entirely, thus causing the piston to rotate in either direction or to lie dormant.

The valves 35 and 36 are so positioned and arranged that they will be operated to close their respective passages 10 and 11 directly after full communication of said passages with their respective pockets has been made. Thus when the passage 10 is opened to receive steam the valve will be first withdrawn as a pocket comes into alinement with the passage, and as soon as the pressure within the pocket is nearly the same as in the passage, which is while the passage is in open communication with the pocket, the valve will move to close the passage.

The pockets are successively exhausted at their sides and adjacent their inner ends through exhaust-slots 60, formed in the plates 25 and 26 radially of the opening 6 and reaching from the flanges 29 and 30 downwardly to the bottom of the chamber 14, the width of which latter is equal to the length of the opening 6. Thus as the inner ends of the pockets successively reach the slots 60 they will exhaust through them, while the centrifugal force will throw the water of condensation outwardly along the outer face of each pocket, from the edge of which it will pass into the chamber 14 through the opening 12, the water being drained to said opening through the slot 13.

Thus it will be seen that there has been formed a simple and effective machine capable of starting and stopping and of being driven in opposite directions, the entire regulation of the machine being through the medium of a single valve, while the elements of the structure are so formed and positioned that there will be a minimum of wear and friction in the machine. Also it will be seen that there is embodied in a single apparatus a mechanism which is operated both by impact and expansion with a corresponding efficiency, and it will be readily understood that the specific construction and arrangement herein shown and described may be varied and that any suitable materials may be employed for the different parts without departing from the spirit of the invention.

While this invention has been described as being operated by steam, it will of course be understood that a motive agent of any other suitable kind may be employed, such as air, &c. It will of course be understood that, if desired, the plate 26 may be formed integral with the casing.

Having thus described the invention, what is claimed is—

1. In a rotary engine, the combination with a casing, having steam-passages therein, of a rotatable piston mounted in the casing and having two series of pockets oppositely disposed, and opening outwardly thereof, the openings of said pockets being adapted to

successively communicate with said steam-passages, the communicating end of each passage being less in diameter than the communicating openings of the pockets; whereby
 5 communication between each passage and its respective pockets will be continuous through a portion of the rotation of the movable piston, valves adapted to move transversely of and close the steam-passages before the
 10 communication thereof with their respective pockets has been diminished, rods connected to the valves, cranks connected with the rods, and connections between the cranks and the piston for rotating the cranks.

15 2. In a rotary engine, the combination with a casing, of a rotatable piston mounted therein and having a radial web and oppositely-disposed pockets at the sides of said web, steam-supply passages leading to the pockets
 20 at opposite sides of the web, means for supplying steam alternately to said passages, valves movable transversely of said passages and adapted to close them during their communication with their respective pockets,
 25 rods connected to the valves, cranks connected with the rods, and connections between the cranks and the piston for rotating the cranks.

3. In a rotary engine, the combination with a casing having a rotatable piston, said casing
 30 having steam-inlets adapted to supply steam to the piston, slide-valves movable transversely of the steam-inlet and adapted to close them intermittently, brackets upon the casing, crank-shafts mounted in the brackets,

pitmen connecting the cranks of the crank- 35 shafts with the slide-valves, sprockets carried by the shafts, a sprocket rotatable with the piston, and chains connecting the sprockets to move the valves from the piston.

4. In a rotary engine, the combination with 40 a casing having steam-inlet passages therein, of a rotatable piston mounted in the casing and having two series of pockets oppositely disposed and opening outwardly thereof, the openings of the pockets being adapted to suc- 45 cessively communicate with their respective steam-inlet passages, the series of pockets being separated by a radial partition, brackets upon the casing, bearings carried by the brackets, crank-shafts mounted in the bear- 50 ings, pitmen connecting the cranks of the crank-shafts with the slide-valves, sprockets carried by the crank-shafts and piston, and chains connecting the sprockets.

In testimony that we claim the foregoing as 55 our own we have hereto affixed our signatures in the presence of witnesses.

JULIUS WILLIAM FLOWERS.

MICHAEL FOY.

FRANK T. WILLIAMS.

Witnesses to signature of J. W. Flowers:

GEORGE MATTHEWS,

R. A. BUESELL.

Witnesses to signatures of M. Foy and F. T. Williams:

RUFUS B. FOWLER,

H. M. FOWLER.