No. 868,104. PATENTED OCT. 15, 1907.

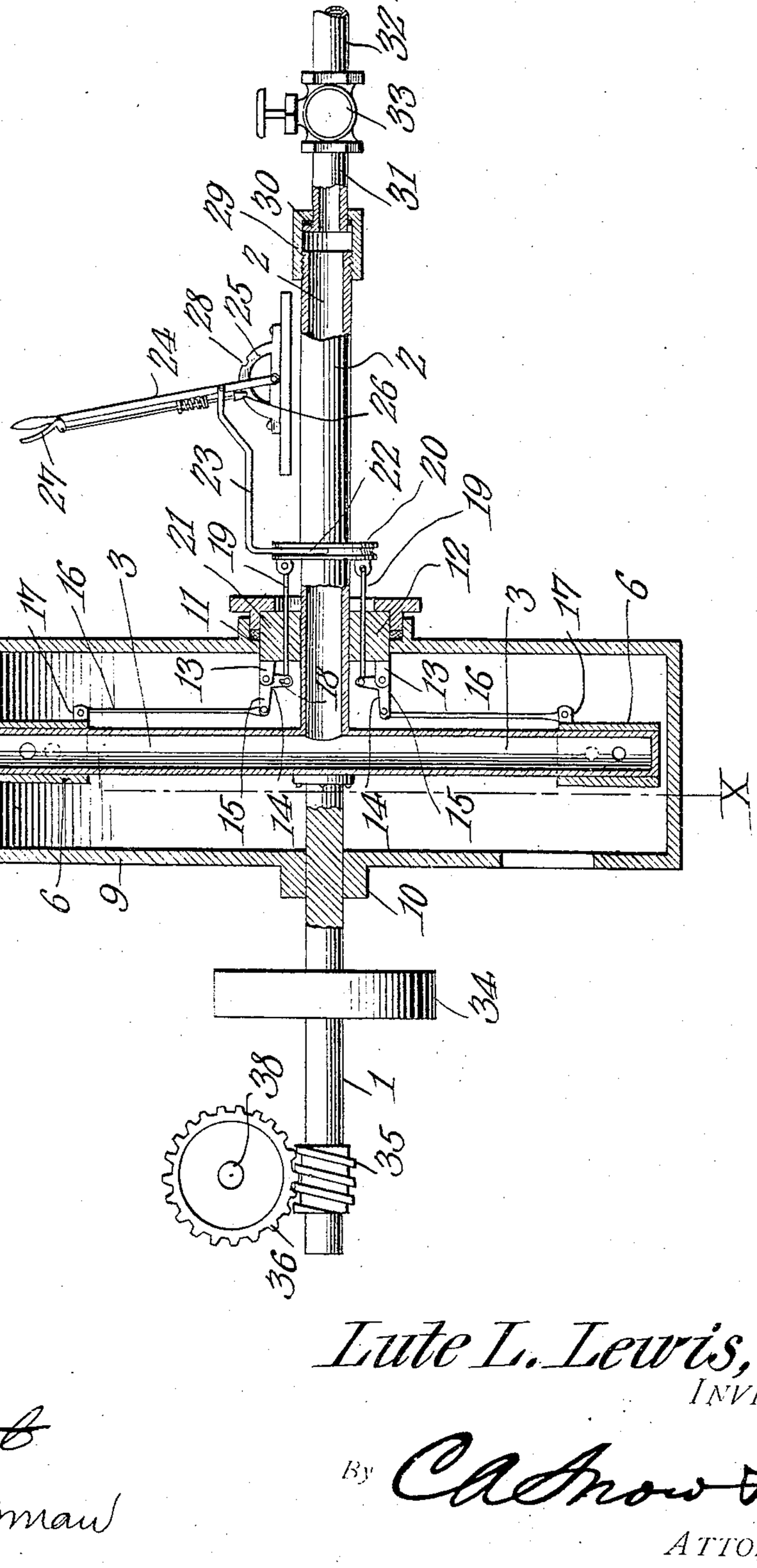
L. L. LEWIS.

ROTARY ENGINE.

APPLICATION FILED JAN. 29, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



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F. T. Chapman

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2 SHEETS—SHEET 2.

Fig. 2.

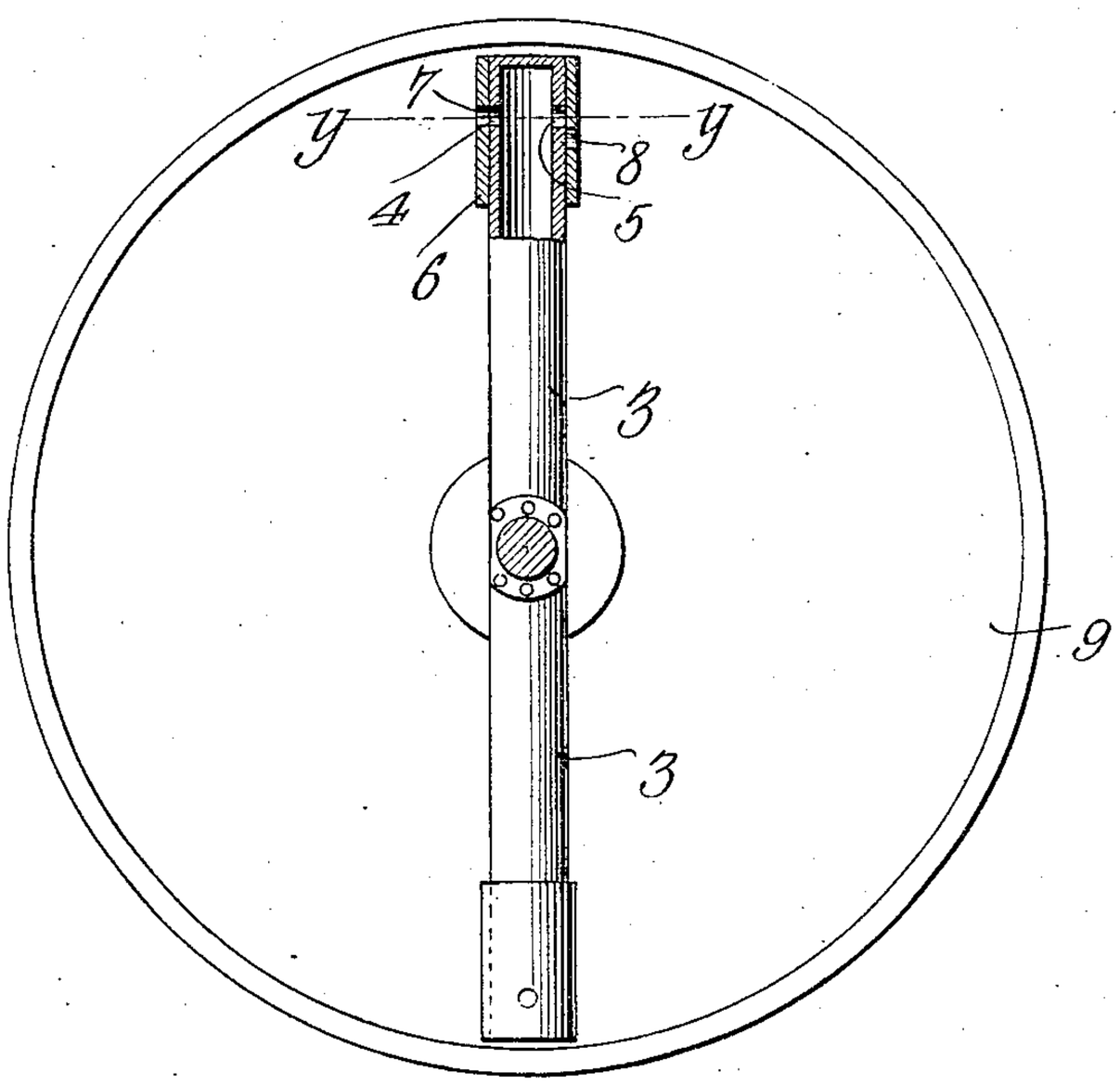


Fig. 3.

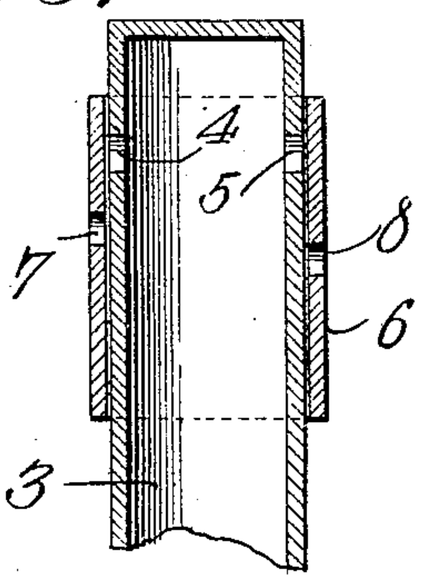


Fig. 4.

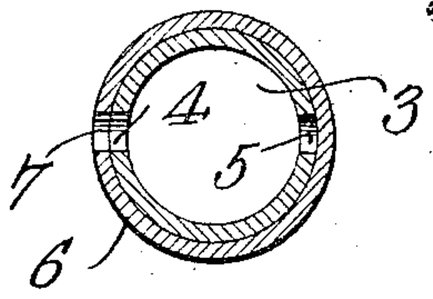
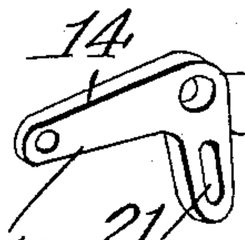


Fig. 5.



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UNITED STATES PATENT OFFICE.

LUTE L. LEWIS, OF TULSA, INDIAN TERRITORY.

ROTARY ENGINE.

No. 868,104. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed January 29, 1907. Serial No. 354,721.

To all whom it may concern:

Be it known that I, LUTE L. LEWIS, a citizen of the United States, residing at Tulsa, in the Western District, Indian Territory, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention has reference to improvements in rotary engines, and its object is to produce an engine of the reaction type wherein means are provided for driving the engine in either direction.

The invention consists essentially of an arbor through which steam, or, if desired, compressed air, may be directed to the rotor which is in the form of hollow radial arms in free communication with the hollow axis and which are provided at their outer ends with openings so located as to react against the surrounding air on a line at right angles to the axial plane of the arms and coincident with the plane of rotation thereof. These arms are arranged with openings on opposite sides and means for closing them at will, so that when one set of openings is unclosed the rotary member will be propelled in one direction, and when the other set of openings is unclosed and at the same time the first set of openings is closed, the escaping steam will cause the movement of the rotary member in the other direction. All this will be apparent from the following detailed description taken in connection with the accompanying drawings forming a part of this specification, in which,—

Figure 1 is a longitudinal section, partly in elevation, of the improved rotary engine; Fig. 2 is a cross section on the line *x*—*x* of Fig. 1; Fig. 3 is an enlarged central section of one end of one of the radial arms to illustrate a different phase of operation from that shown in Fig. 2; Fig. 4 is a cross section on an enlarged scale on the line *y*—*y* of Fig. 2; and Fig. 5 is a detail perspective of one of the bell-crank levers used in the engine.

Referring to the drawings, there is shown a shaft consisting of a solid member 1 and a hollow member 2 connected together at their meeting ends to form one continuous shaft for the engine.

The end of the hollow shaft member 2 adjacent to the junction with the solid member 1 carries two or more radial hollow arms 3—3, of which but two are shown in the drawings, but it will be understood that more pairs of arms may be used. These arms 3 are closed at their outer ends and are each provided in the plane of rotation with two perforations 4—5, and these two perforations are located on opposite sides of the said arms 3 in line one with the other. Surrounding the outer ends of each rotor 3 is a sleeve 6 having openings 7—8 displaced radially one with reference to the other, so that when the sleeve is in one position the opening 7 will match the opening 4 in the arm 3, and when the sleeve is moved to another position the opening 8 will match the opening 5 in said arm 3, in which latter position the opening 7 will have been moved out of communication with the opening 4 and the latter will be closed by the walls of the sleeve. In still another position of the sleeve both openings 4 and 5 of the arm 3 are closed. Now, it will be seen that if steam or air under pressure be admitted to the arms 3 through the hollow axle 2 and the sleeves 6 are so adjusted that the openings 4 and 7 are coincident, the compressed fluid stream issuing through the coincident openings 4 and 7 will react on the surrounding air and cause a rotative movement of the arms 3 with a power depending upon the pressure of the steam or air. If, now, the sleeves 6 be moved to a position to close the openings 4 and bring the openings 8 into coincidence with the openings 5, the arms 3 will be propelled in the opposite direction; while if the sleeves 6 are moved to still another position, wherein both openings 4 and 5 are closed, no steam escapes, and, consequently, the rotor stands still.

In order to protect the rotor it may be surrounded by a casing 9 which may be formed to permit the free escape of steam or be provided with steam exhaust openings of any appropriate construction, such, for instance, as indicated at 40, so that the steam escaping from the radial arms 3 may not be opposed. This exhaust, however, should be ample, so that within the casing 9 no back pressure is generated. The casing may be supported on the shaft of the rotor to turn therewith, and for this purpose a bearing 10 may be formed in one side of the casing for the solid member 1 of the shaft, and on the other side of the casing another bearing 11 may be formed for the passage of the hollow member 2 of the shaft. The casing, however, may be omitted, or the casing itself may be provided with the oppositely directed ports and the arms 3 omitted, suitable means being provided to open and close the ports as described. The hollow member 2 of the shaft carries a sleeve 12 upon which, on the side facing the arms 3, are formed ears 13 constituting pivot supports for bell-crank levers 14, one of which is shown in detail in Fig. 5.

One arm 15 of each bell-crank lever is connected by a link 16 to the corresponding sleeve 6 through ears 17 formed thereon, and the other arm 18 of each bell-crank lever is connected by a link 19 to a grooved collar 20 mounted and slidable upon the hollow member 2 of the shaft outside of the casing. The links 19 may have sliding bearings in the sleeve 12 and in this case the connections of the links 19 to the arms 18 of the bell-crank levers are through slots 21 formed in said arms 18 to permit the latter to move through curved paths after putting the links 19 under strain.

The grooved collar 20 is grasped by a fork 22 on one end of a link 23 connected to a lever 24 mounted in rotative relation to a rack 25 with which it is engaged by means of a tooth 26 and thumb member 27 of usual type. The rack 25 is provided with notches 28 suitably located so that when the lever is locked by the latch tooth 26 to the rack by one notch 28 the collar

20 is in a position which, through the intermediary of the links 19, bell-crank levers 14 and links 16, will hold the sleeves 6 in a position to close the openings 4 and 5 in the arms 3; and when the lever 24 is locked in other notches 28 the sleeves 6 are moved to open one or the other of the openings or ports 4—5 in the arms 3.

In order to provide for the introduction of steam or compressed air to the hollow member 2 of the shaft, the latter has screwed thereon a flange 29 engaging the flanged head 30 of a pipe section 31, it being understood that suitable packing is introduced between the meeting faces of the gland and pipe section so as to form a steam-tight joint; and another steam pipe 32 may be connection with the pipe section 31 through a valve 33 so that steam may be admitted to or cut off from the hollow member 2 of the shaft.

The solid member 1 of the shaft may be provided with a balance wheel 34 which may be also utilized, if desired, as a pulley, and this solid member of the shaft may also carry the worm 35 of a worm gear 36, the other member 37 of which may be connected through a shaft 38 to the machinery to be driven by the rotary engine.

I claim:—

1. A rotary engine of the reaction type having a rotor composed of radial hollow arms for receiving fluid under pressure, and provided with opposite ports arranged at right angles to the radial plane of the arms and in the plane of rotation thereof, and means for opening either of said ports and for closing both of the same.

2. A rotary engine of the reaction type comprising hollow radial arms mounted upon a suitable axis for rotation and provided with ports arranged at right angles to the plane of the radial arms and in the plane of rotation thereof, and sleeves carried by the outer ends of said arms and movable longitudinally thereon and also provided with ports arranged to be moved with the sleeves into and out of communication with the ports on the radial arms.

3. A rotary engine of the reaction type comprising hollow radial arms mounted upon a suitable axis and provided with ports on opposite sides at right angles to the plane of the radial arms and in the plane of rotation, and sleeves carried by said arms coincident with said ports and having other ports located in the plane of rotation but displaced in radial direction, the said sleeves being movable radially to bring one or the other of these ports into coincidence with the respective port in the arm.

4. A rotary engine of the reaction type comprising a shaft having a solid member and a hollow member, which latter is constructed to conduct fluid under pressure, radial rotatable hollow arms carried by said shaft coincident with the junction of the hollow and solid members thereof and in communication with the hollow member, said arms being closed at their outer ends and provided with ports on opposite sides in the plane of rotation, and means for opening one or the other of said ports to cause the rotation of the arms in one direction or the other.

5. A rotary engine of the reaction type comprising a rotor composed of hollow radial arms having ports on opposite sides in the plane of rotation, sleeves carried by the ported ends of said arms and having radially-displaced ports in the plane of rotation of the arms, and a connected operating link system for moving the sleeves simultaneously in a radial direction.

6. A rotary engine of the reaction type comprising a supporting shaft composed of a hollow member and a solid member coupled together, radial hollow rotatable arms connected to said hollow member of the shaft at the point of junction with the solid member and provided with ports arranged near the outer ends of said arms and on each side thereof in the plane of rotation, slidable sleeves on the outer ends of said arms having ports in the plane of rotation but radially displaced, a connected link mechanism for moving said sleeves to uncover one or the other of the ports on the two sides of the arms, and power-transmission gear carried by the solid member of the shaft.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

LUTE L. LEWIS.

Witnesses:
FRANK W. SMITH,
ALBERT BROWN.