L. L. LEWIS.

ROTARY ENGINE.

APPLICATION FILED APR. 27, 1908.

912,315.

Patented Feb. 16, 1909.

3 SHEETS—SHEET 1.

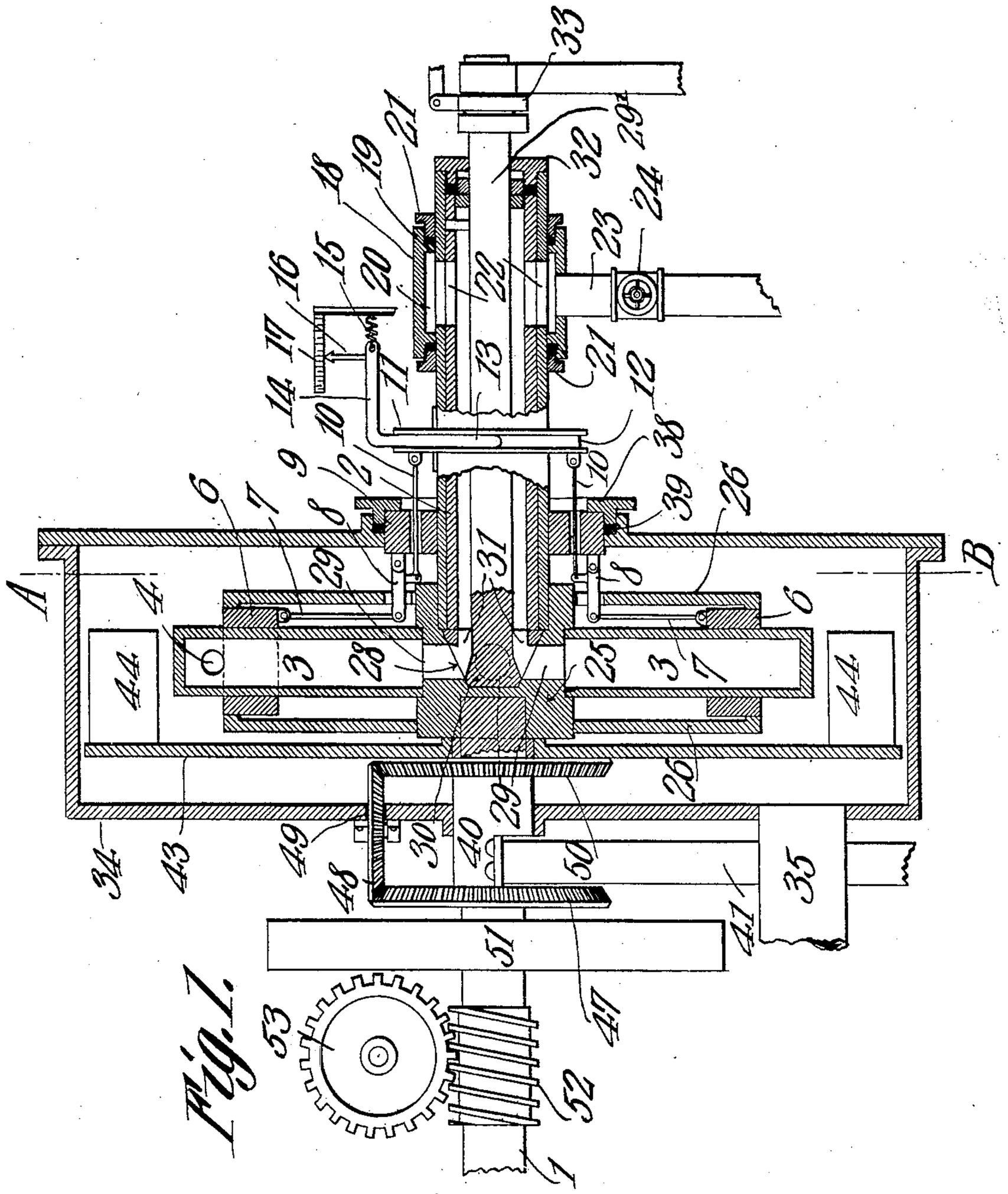

Fig. 1.

Witnesses

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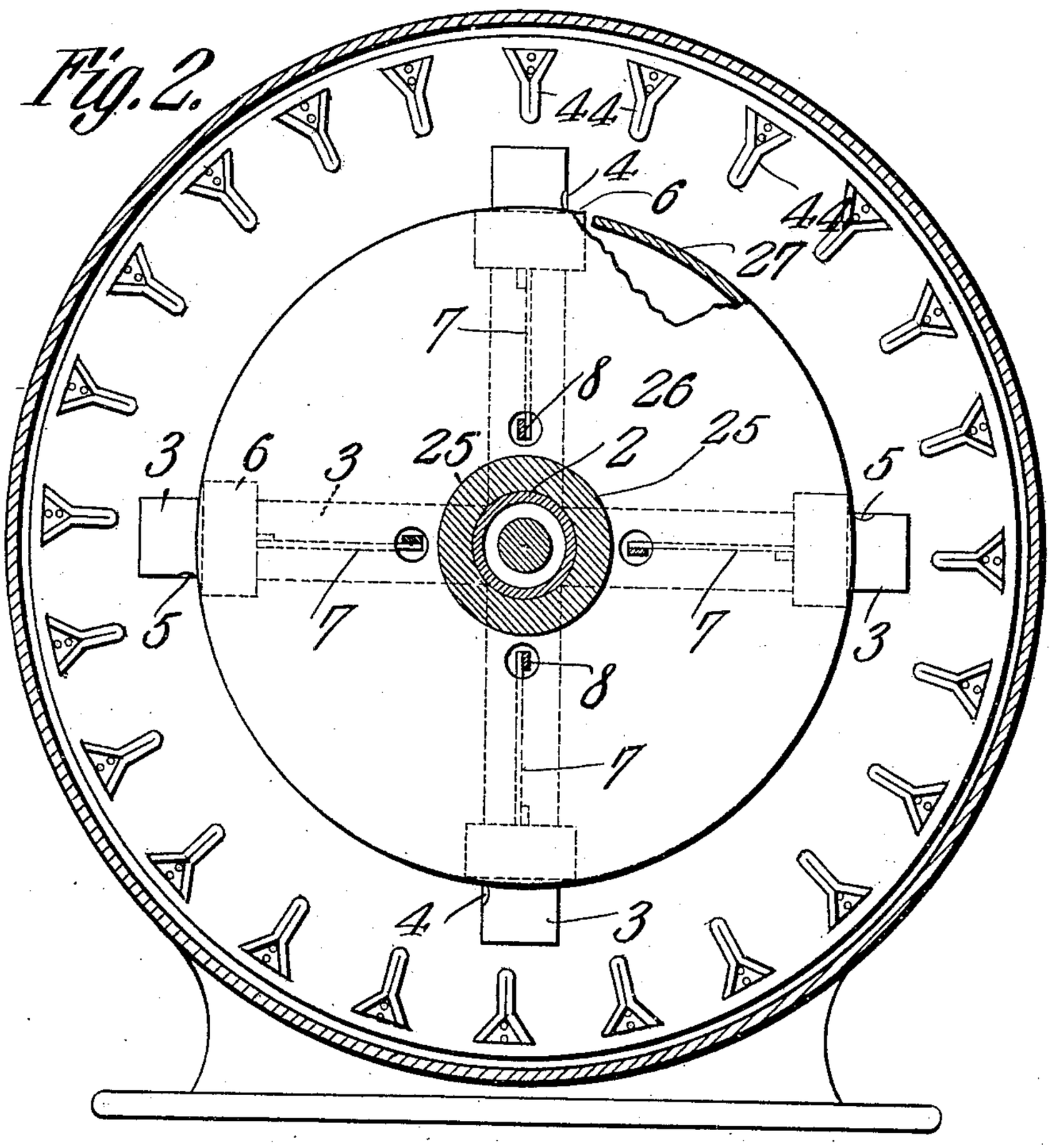
3 SHEETS—SHEET 2.

Fig. 2.



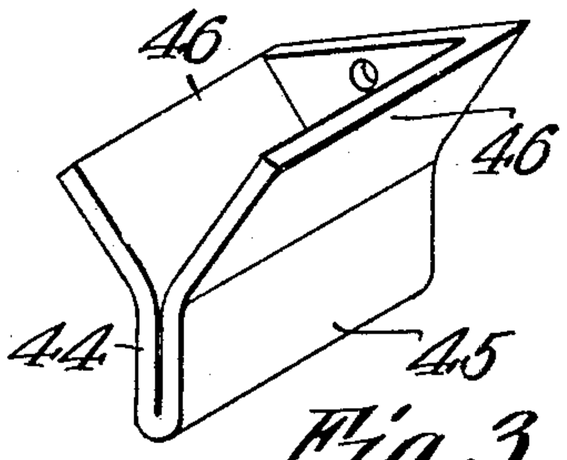


Fig. 3.

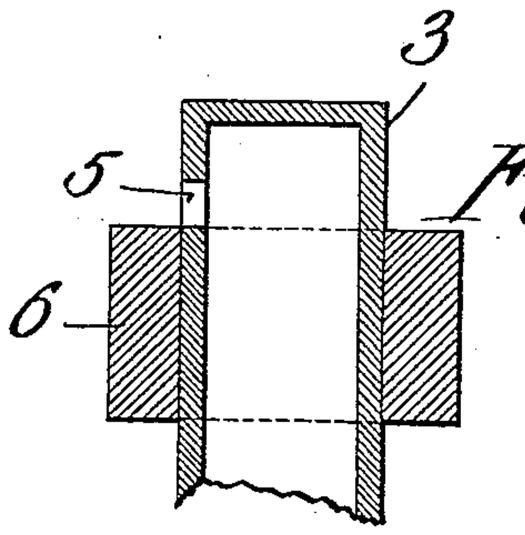


Fig. 4.

Witnesses

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3 SHEETS—SHEET 3.

Fig. 7.

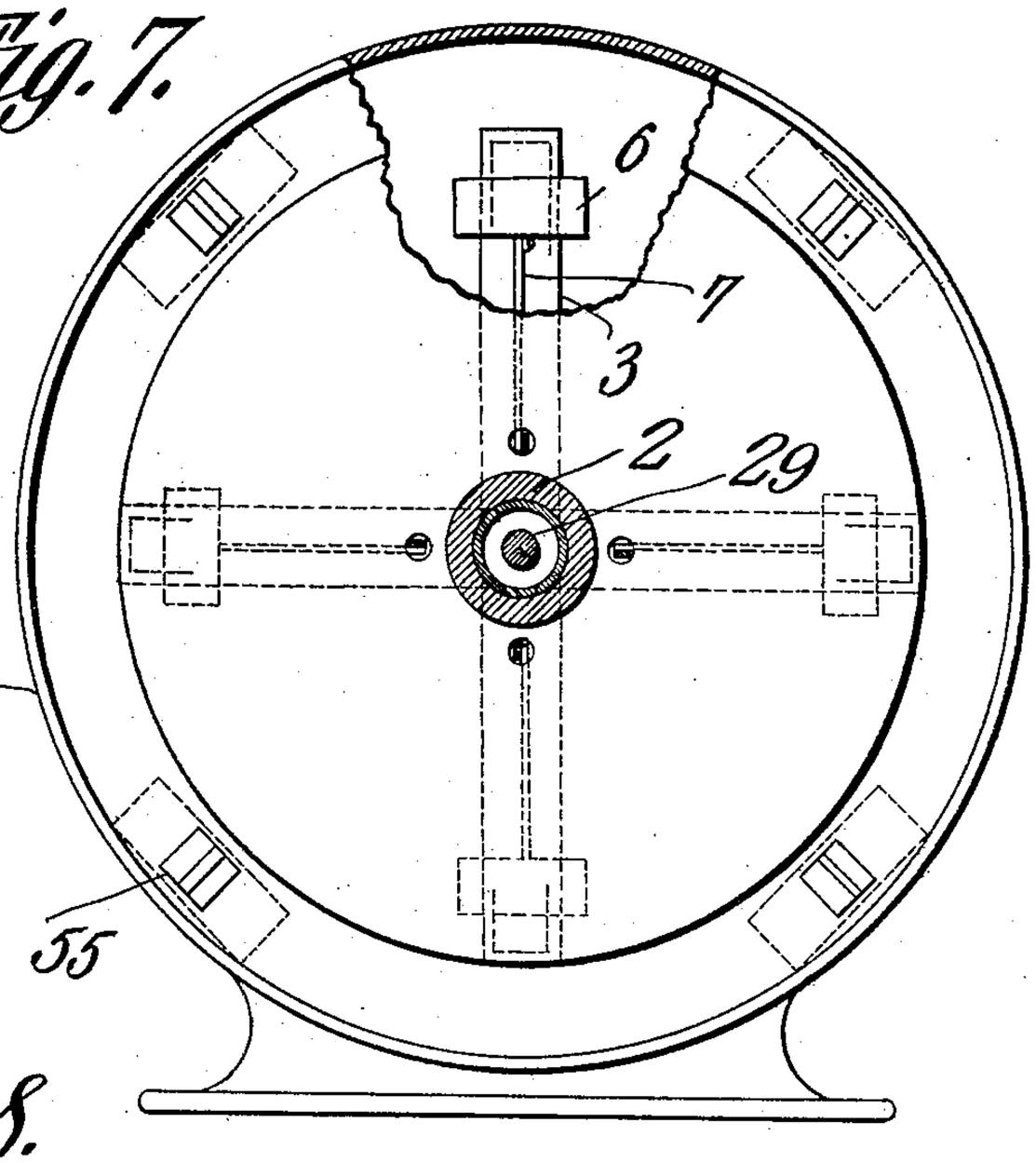


Fig. 8.

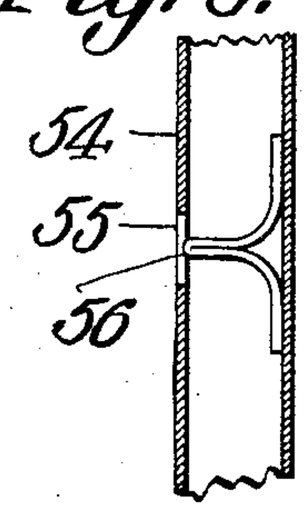


Fig. 6.

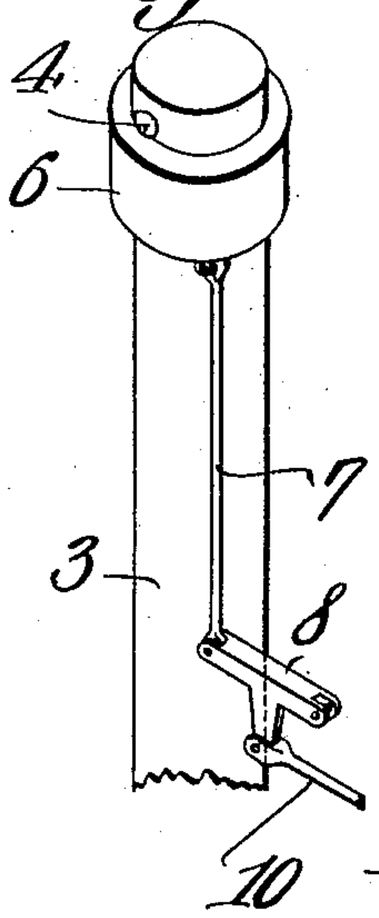


Fig. 9.

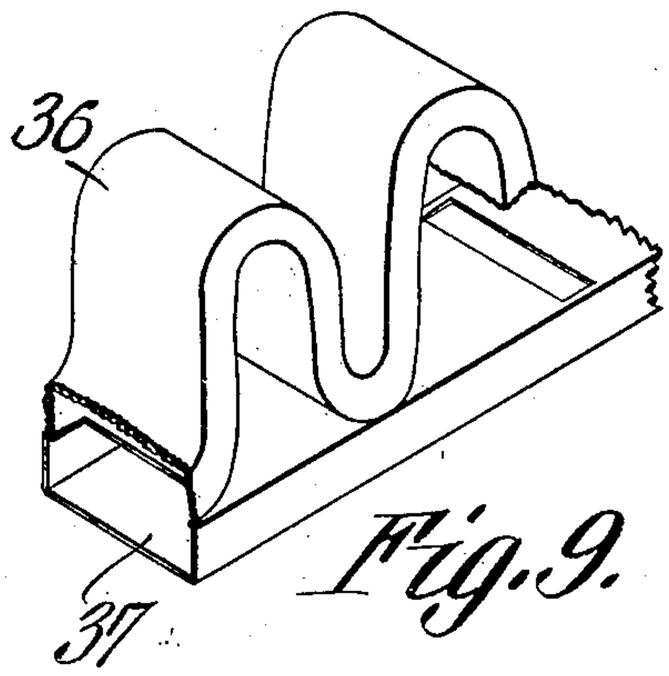
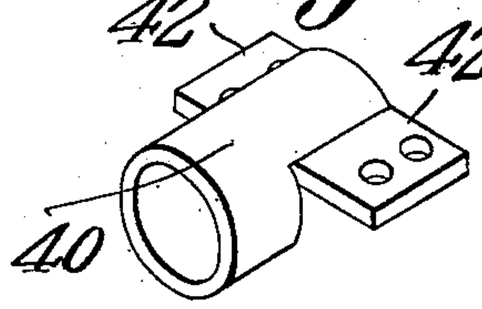


Fig. 5.



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UNITED STATES PATENT OFFICE.

LUTE L. LEWIS, OF TULSA, OKLAHOMA.

ROTARY ENGINE.

No. 912,315. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed April 27, 1908. Serial No. 429,466.

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 county of Tulsa, Oklahoma, 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 and to utilize more effectively the steam jets issuing from the rotor for driving a supplemental rotor which may be coupled up to the drive shaft in the same sense as the main rotor.

The present invention is an improvement over the engine for which Letters-Patent #868,104, were granted to me on October 15, 1907, and is in some respects similar to the structure of the patented device although I have rendered such structure more efficient by adding another rotary element receiving the impact of the steam after issuing from the primary rotary element so as to be driven in the opposite direction and thus by suitable gearing aid in imparting rotative movement to the shaft. Furthermore, the present invention comprises means for protecting the arms of the prime rotor from the effect of air currents and also provides means whereby the speed of the engine may be governed and such speed may be indicated to the observer. Furthermore, provision is made for the introduction of steam to the rotor through a hollow shaft so that it may enter at points diametric to said shaft instead of in the axial line thereof, as indicated in my aforesaid patent.

The invention will be best understood by a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings:—

Figure 1 is a longitudinal vertical section through the machine with parts shown in elevation. Fig. 2 is a section on the line A—B of Fig. 1, Figs. 3 to 6 inclusive, are detail views, Fig. 7 is a view of the prime rotor and casing therefor, with the secondary rotor omitted, Fig. 8, is a detail section of a portion of the casing shown in Fig. 7, Fig. 9 is a perspective of a condenser that may be used in connection with the rotary engine.

Referring to the drawings, there is shown a shaft consisting of a solid member 1 and a hollow member 2 which may be suitably connected together at their meeting ends to form one continuous shaft for the engine. The end of the hollow shaft adjacent to its junction with the solid member carries a number of pairs of hollow radial arms 3—3 of which but two pairs are shown in the drawings, but it will be understood that more pairs of arms may be used. These arms are closed at their outer ends and each pair is provided in the plane of rotation with perforations 4 or 5, the perforations 4 of one pair being on the side opposite to the perforations 5 of the other pair. If, now, the steam be admitted to the hollow shaft and the arrangement be such that one pair of arms 3 is in communication therewith, the steam under pressure will issue through the openings at the ends of the arms and reacting against the air will impart a rotative movement to the arms 3 in opposition to the direction of issuing of the steam. When the steam is admitted to the other pair of arms then the rotor is caused to rotate in the opposite direction.

It is desirable that the engine be self regulating, and for this purpose there is mounted upon each arm 3 a sleeve 6 with its outer edge normally closer to the axis of the arm 3 than is the port or opening 4 or 5 therein, it being understood that there is a sleeve 6 on each arm. These sleeves are each connected by a link 7 to bell-crank lever 8 mounted on a collar 9 fast on the shaft section 2, and the lever 8 is connected by a link 10 to a collar 11 mounted on the shaft section 2 for rotation therewith but capable of longitudinal movement thereon. The collar 11 is provided with a circumferential groove 12 engaged by a fork 13 connected to an arm or rod 14 under the control of a spring 15, and this rod 14 carries an index or pointer 16 capable of traveling over a scale 17. The sleeves 6 are made bulky enough so as to tend under the action of centrifugal force, to expand the spring 15 through the intermediate connections, when the rotor is in motion. The structure is such that after a certain critical speed has been reached each sleeve 6 will move outward over the respective arm 3 against the action of the spring 15 and so throttle to a greater or less extent the ports or openings 4 or 5 as the case may be. In this manner the speed of the rotor is governed by limiting the stream of steam or other fluid under pressure, if such be used issuing from the ports in the ends of the

radial arms 3. By suitably graduating the index or scale 17 the speed of the rotor may be determined by the observer.

In order to admit steam into the hollow shaft the latter is surrounded by a sleeve 18 formed near its ends with internal annular ribs 19 whereby there is inclosed a chamber 20 entirely around the shaft, and the escape of steam through the ends of the sleeve 18 is prevented by glands 21 and suitable packing. Radial ports 22 are provided through the shaft coincident with the chamber 20 and entering this chamber 20 is a steam inlet pipe 23 with a throttle valve 24.

The arms 3 may be carried by a hub 25, and this hub carries two disks 26 one on each side of the arms 3, and except where the arms 3 project beyond the periphery of the disks they may be closed in by the peripheral connecting strip 27. By this means the arms in rotating are protected from the effects of the surrounding air, and the links 7 are also likewise protected. The hub 25 is fast on the shaft and so participates in its movement.

The hub 25 is provided on the side coincident with the hollow shaft section 2, with a conical recess 28 and radiating from this recess are ports or passages 29 leading into the respective arms 3. In the structure illustrated in the drawings there are four such passages since there are four arms shown therein.

Extending axially through the shaft section 2 there is a rod 29 terminating in a head 30, of conical shape, having a steam-tight seat in the recess 28 of the hub 25. This head 30 is provided with two diametrically opposite passages 31, so disposed as to put either diametric pair of arms 3 in communication with the interior of the hollow shaft section 2. By this means either pair of arms 3 may receive steam and since the openings 4 and 5 point oppositely, the rotor is driven in one or the other direction according to which pair of arms receive the steam.

The rod 29 extends through a packing gland 32 at the end of the shaft section 2, and exterior thereto this rod receives a friction member 33 of any suitable type so that the rod 29 may be slowed down, and the steam passages 31 be thereby brought into coincidence with the other pair of arms 3. The rotor is thereby reversed when the friction member may be disengaged from the rod. Suitable means, such as a pin on the rod, engaging a slot in the interior wall of the shaft section 2, may be used to limit the independent rotative movement of the rod 29.

Housing the rotary member of the engine is a cylindrical casing 34 provided at any appropriate point with an exhaust conduit 35 which may communicate with the exterior of the building in which the engine may be placed, or the steam may be passed through a suitable condenser like that shown in Fig. 9, where there is shown a sinuous pipe 36 made of thin metal with large radiating surface, and having its coils individually connected with another pipe 37 leading if desired to the water supply tank of the boiler furnishing the engine with steam. Through one side wall of the casing 34 the collar 9 is extended and is rendered steam tight by a suitable packing gland 38, and packing ring 39. The other side wall of the casing is sustained upon a journal box 40 carrying the corresponding portion of the shaft section 1, and this journal box may be mounted upon a pedestal 41. A separate view of the journal box is shown in Fig. 5 where it will be observed that it has wings 42 formed on it for securing it to the pedestal 41. This journal box extends into the casing and up to and against the hub 25 so as to prevent lengthwise movement of the shaft within the casing. Mounted upon the journal box 40 which is cylindrical in exterior shape is a disk or web 43 free to rotate upon the journal box and of greater diameter than the spread of the arms 3 but still contained within the casing 34. Projecting from near the periphery of the web 43 on the side adjacent to the arms 3 is a circular series of Y shaped vanes 44 each formed of a central stem 45 and divergent sides 46. The stem 45 and sides 46 are in the path of the stream of steam or other compressed fluid issuing from the ports 4 or 5, as the case may be.

Fast on the shaft section 1 exterior to the casing and beyond the journal box 40 is a bevel gear 47 meshing with a bevel pinion 48 fast on the casing and projecting to the interior thereof through a slot 49 and in turn meshing with a bevel gear 50 fast on the web 43.

When steam is allowed to issue through the ports 4 or 5, the reaction will cause the rotation of the arms 3 in a given direction, as before explained. The stream also impinges against the vanes 44 and causes a rotation of the web 43 in a direction contrary to the rotation of the arms 3, but this movement is converted into a rotation in the same sense as the shaft by means of the bevel gearing.

The shaft section 1 may be provided with a balance wheel 51 which, under some circumstances, may also be utilized as a pulley, and this shaft section 1 may also carry a worm 52 meshing with a worm-wheel 53 for the transfer of power from the shaft to driven machinery.

The arms 3 directly secured to the shaft may be considered as the primary rotor, and the web 43 with the vanes 44 coupled to the shaft through intermediate gearing, may be considered as a supplemental rotor.

In Fig. 7, the supplemental rotor is omit-

ted and the arms 3 are inclosed in a casing 54 having openings 55 through one side. Coincident with the openings 55 are deflector plates 56 curved oppositely so as to direct the steam through the openings 55, when the rotor is moving in either direction. The condenser of Fig. 9 may be used with the structure of Fig. 7 as well as with that of Fig. 1.

What is claimed is:—

1. A rotary engine of the reaction type having a rotor composed of radial hollow arms for receiving fluid under pressure, one pair of said arms being provided with ports oppositely directed with reference to another pair of arms, with all the ports in the plane of rotation of the arms and at right angles to the length thereof, a secondary rotor provided with vanes in the path of streams of fluid under pressure issuing from the ports in the arms, means for placing either pair of arms in communication with the steam supply and for closing the other pair of arms to the steam supply, and means for coupling the secondary rotor to the shaft of the primary rotor for driving the shaft in the same sense as the primary rotor.

2. A rotary engine of the reaction type having pairs of hollow radial arms mounted upon a suitable axis for rotation and each pair of arms provided with ports at right angles to the longitudinal axis of said arms and oppositely disposed in the plane of rotation thereof, with reference to the ports in the other pair of arms, an adjustable valve structure carried by the common hub of the arms and provided with ports arranged to be moved into communication with a respective pair of arms, a sleeve exterior to the ported end of each arm and normally out of coincidence with the port in the respective arm, and means yieldable to centrifugal force permitting the sleeves to throttle the ports in the said arms.

3. In a rotary engine, a rotor composed of a plurality of radial arms having ports near their outer ends, a centrifugal throttling means on each arm for the said ports therein, and a common resisting means to the action of centrifugal force for all the throttling means on the several arms.

4. In a rotary engine, radially-disposed arms having ports on opposite sides in the plane of rotation, means for placing respective arms in communication with the fluid supply for determining the direction of rotation of the arms, a throttling member carried by the arms and acting on the ports to regulate their effective size, connections between the throttling means and a stationary portion of the machine, and means there located for indicating the extent of movement of the throttling means.

5. In a rotary engine of the reaction type, radial hollow arms having ports at their outer ends on opposite sides, means for rendering the ports on one or the other sides of the arms active, and a casing member rotatable with the arms and inclosing the same except at their ported ends.

6. A rotary engine of the reaction type, comprising hollow radial arms having their outer ends provided with ports for the escape of compressed fluid in the plane of rotation of the arms, a casing inclosing the arms except at their ported ends, vanes exterior to the arms and supported from the axis of the said arms, connections between the vane supporting means and the shaft carrying the arms, and another casing inclosing said arms, the vanes and their supporting means.

7. A rotary engine of the reaction type comprising a supporting shaft having a hollow portion, means for introducing steam into said shaft at right angles to its axis of rotation, radial arms carried by said shaft and provided at their ends with ports in the plane of rotation thereof, means for opening and closing said ports controllable from a fixed portion of the machine, a centrifugal member for determining the effective area of the active ports, a rotatable casing inclosing the arms except at their ported ends, a rotatable series of vanes in the path of the fluid streams issuing from the ports in the arms and connected to the shaft, and a stationary casing inclosing the rotatable arms and their casings and the series of vanes.

8. In a rotary engine a supporting shaft having a hollow section, a hub thereon provided with a conical seat and radial ports, radial ported arms carried by the hub and in communication with the ports therein, a conical ported head in the conical seat in the hub for opening the arms to communication with the interior of the hollow shaft section and means for turning the ported head in its seat.

9. In a rotary engine a supporting shaft having a hollow section a hub thereon provided with a conical seat and radial ports, radial ported arms carried by the hub and in communication with the ports therein, a conical ported head in the conical seat in the hub for opening the arms to communication with the interior of the hollow shaft section and friction means for causing the rotation of the ported head in its seat to reverse the engine whether the latter be running or standing still.

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:
CHAS. H. BRYAN,
E. R. DUNCAN.