

969,070.

Patented Aug. 30, 1910.

2 SHEETS—SHEET 1.

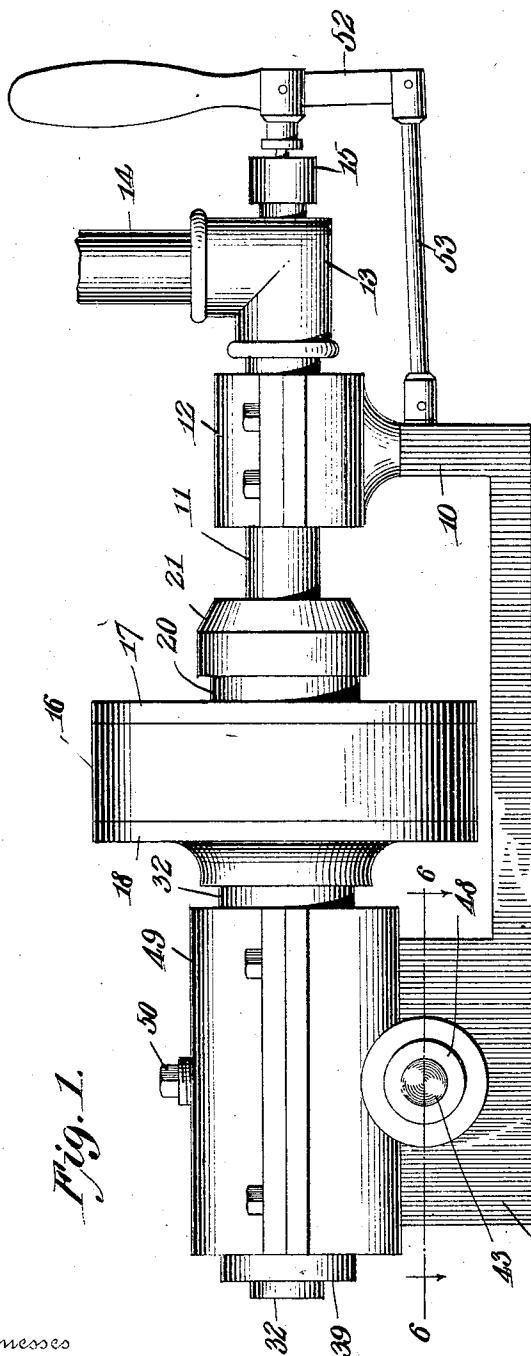


Fig. 1.

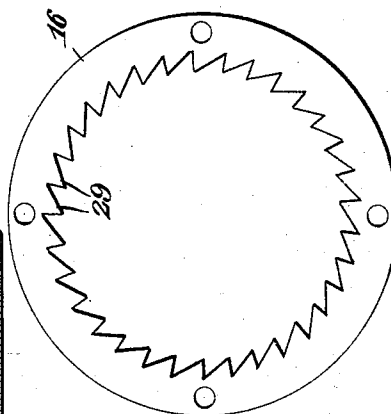


Fig. 5.

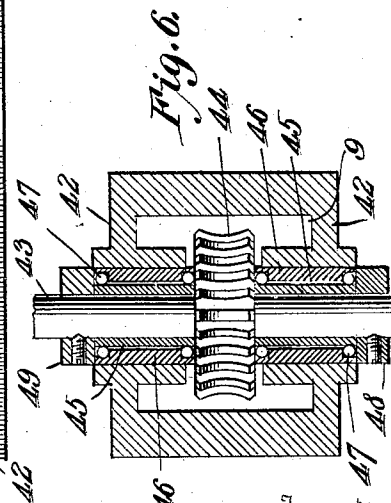


Fig. 6.

Witnesses

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2 SHEETS--SHEET 2.



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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

969,070.

Specification of Letters Patent.

Patented Aug. 30, 1910.

Application filed December 18, 1909. Serial No. 533,775.

To all whom it may concern:

Be it known that I, ROLAND E. LIST, a citizen of the United States of America, residing at Zanesville, in the county of Muskingum and State of Ohio, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines of the turbine type, and it has for its object to produce a machine of this class which shall be simple in construction, efficient in operation and in which the full expansive power of the steam shall be utilized prior to the exhaust of the steam, thus rendering the use of the improved engine economical as well as thoroughly efficient.

With these and other ends in view which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts which will be hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations and modifications within the scope of the invention may be resorted to when desired.

In the drawings,—Figure 1 is a side elevation of an engine constructed in accordance with the invention. Fig. 2 is a longitudinal vertical sectional view of the same. Fig. 3 is a detail view partly in section, showing one end of the inlet pipe and a head carried thereby. Fig. 4 is a transverse sectional view enlarged of the inlet head. Fig. 5 is an end view of the rotor casing, the heads having been removed. Fig. 6 is a sectional view taken on the plane indicated by the line 6—6 in Fig. 1.

Corresponding parts in the several figures are denoted by like characters of reference.

The base 8 of the improved engine is constructed with a box or casing 9 and with an upright or bracket 10, the latter serving to support the inlet tube 11 which may be firmly secured by means of a cap 12 bolted upon the upright or bracket 10. The inlet tube at one end has an elbow 13 communicating through a tube 14 with the source of

steam supply, as shown. The elbow is provided with a stuffing box 15.

The rotor consists of a casing including a cylindrical body 16 having heads or ends 17 and 18 detachably secured thereupon by means of screws, bolts or other suitable fastenings 19. One head, 17, is provided with a stuffing box including a gland 20 and a cap nut 21, said box containing metallic packing 22 which is pressed by a spring 23 bearing against the cap nut; the inlet tube 11 extends through the stuffing box of the rotor which is thus supported for rotation with reference to the inlet tube. The latter carries within the rotor casing a head 24 having radial passages 25 and 26 communicating at their inner ends with the inlet tube and having their outer ends closed by plugs 27. The passages 25 and 26, which are disposed in alternate order, are tilted or slanted in opposite directions, so that the inner ends of said passages will be out of registry with each other, as will best appear by reference to Fig. 3 of the drawings, while the outer ends of the passages terminate about midway between the ends of the head 24. Discharge nozzles 28, all facing in one direction, are suitably threaded into the head in such a manner as to communicate with the passages 25 and 26 adjacent to the outer ends of said passages, the nozzles 28 being disposed tangentially with reference to the head, so that the steam discharged therethrough will impinge upon the blades 29 formed interiorly upon the cylindrical body of the rotor, as clearly seen in Fig. 5.

Suitably connected with the head 18 of the rotor, as by a thread 30, is a tubular shaft 31 having a flange 32 abutting upon the rotor head and upon one end wall of the casing, the end walls of said casing constituting bearings upon which the tubular shaft is supported for rotation; the shaft and the bearings being provided with hardened collars or bushings 33 and 34 which are coöperating to constitute ball races in which anti-friction balls 35 are placed for the purpose of reducing friction. The tubular shaft 31 carries a sleeve 36 secured by means of set screws 37 and having a threaded portion constituting a worm 38. The sleeve 36 abuts terminally upon the bushings in the bearings formed by the end walls of the casing, thereby preventing displacement or

loss of the anti-friction balls adjacent thereto. The collar 32 upon the tubular shaft 31 and a set collar 39 secured by a set screw 40 upon said shaft abut upon the outer ends of the said bushings, thus preventing displacement or loss of the anti-friction balls adjacent to said collars. The front and rear walls of the casing 9, shown at 42, in Fig. 6, afford bearings for a shaft 43 carrying a worm gear 44 meshing with the worm 38, hardened bushings 45 and 46 being mounted respectively upon said shaft and in the bearings, anti-friction members, such as balls 47 being provided, said anti-friction balls being retained by the worm gear at the inner ends of the bushings and by collars 48 mounted upon the shaft 43 adjacent to the outer end of the bushing. The casing 9 constitutes a lubricant receptacle, which is supplied with oil through an opening in the lid 49 which is bolted or otherwise secured upon the casing, said opening being normally closed by a removable plug 50.

Slidably supported in the tube 11 is a piston 50' having a stem 51 which extends through the said inlet tube and projects through the stuffing box 15, said stem being connected at its outer end with a lever 52, which in turn is connected with the upright 10 of the base by a link 53. By manipulating the lever 52, the piston may be moved in such a manner as to partially or entirely obstruct the steam passages 25 and 26, thus regulating the admission of steam without making it necessary to resort to the throttle, which is usually provided upon the pipe 14, but which it has not been deemed necessary to show in the drawing.

From the foregoing description, taken in connection with the drawings hereto annexed, the operation and advantages of this invention will be readily understood by those skilled in the art to which it appertains. Steam admitted through the inlet pipe will be discharged through the passages 25, 26 and the nozzles 28 upon the blades of the rotor which is thus rotated by the impact as well as by the expansive force of the steam. The spent steam will be discharged through the exhaust passage formed by the tubular shaft 31, being literally crowded out by the incoming live steam. Motion is transmitted from the rotor-carrying shaft 31, which revolves at a very high rate of speed, through the worm gearing to the shaft 43 and from the latter to the machinery to be driven in any suitable and well known manner.

This improved engine, as will be seen, is very simple in construction, and it contains but few parts; it is of such a nature that it

may be efficiently utilized for marine or automobile propulsion, as well as for the purpose of a stationary engine.

Having thus described the invention, what is claimed as new, is:—

1. In an engine of the character described, a rotor casing having one head provided with a stuffing box, a stationary inlet tube extending therethrough, a tubular exhaust shaft connected with the other head of the rotor casing, bearings wherein said tubular shaft is supported for rotation, and a head mounted upon the inlet tube within the rotor casing and having steam passages provided with terminal nozzles directed against the blades formed interiorly upon the body of the rotor casing.

2. In an engine of the character described, a rotor casing including a cylindrical body having blades upon its interior surface and heads secured upon the ends of the body, a stationary inlet tube, a head upon said tube within the rotor casing and having steam passages provided with terminal nozzles directed against the blades of the casing, a piston movable in the inlet tube and capable of obstructing the inner ends of the steam passages in the head, means for actuating said piston, a tubular exhaust shaft connected with the rotor casing, and bearings upon which said exhaust shaft is supported for rotation.

3. In an engine of the character described, a rotor casing consisting of a cylindrical body supported for rotation and having interiorly disposed blades, and a head supported upon a steam supply pipe which extends through a packing box in the rotor casing, said head being provided with staggered steam passages communicating at their inner ends with the supply pipe and closed at their outer ends and with nozzles threaded into said head and communicating with the steam passages adjacent to the outer ends of the latter, said nozzles being directed to the blades of the rotor casing.

4. In an engine of the character described, a base having bearing members including a lubricating receptacle, a rotor casing, an inlet tube supporting one end of said casing, a tubular exhaust shaft connected with the other end of the casing, and bearings for said shaft including the end walls of the lubricating receptacle.

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

ROLAND E. LIST.

Witnesses:

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H. C. ROUSH.