(No Model.)

J. F. McELROY.

ROTARY ENGINE.

No. 578,759. Patented Mar. 16, 1897.

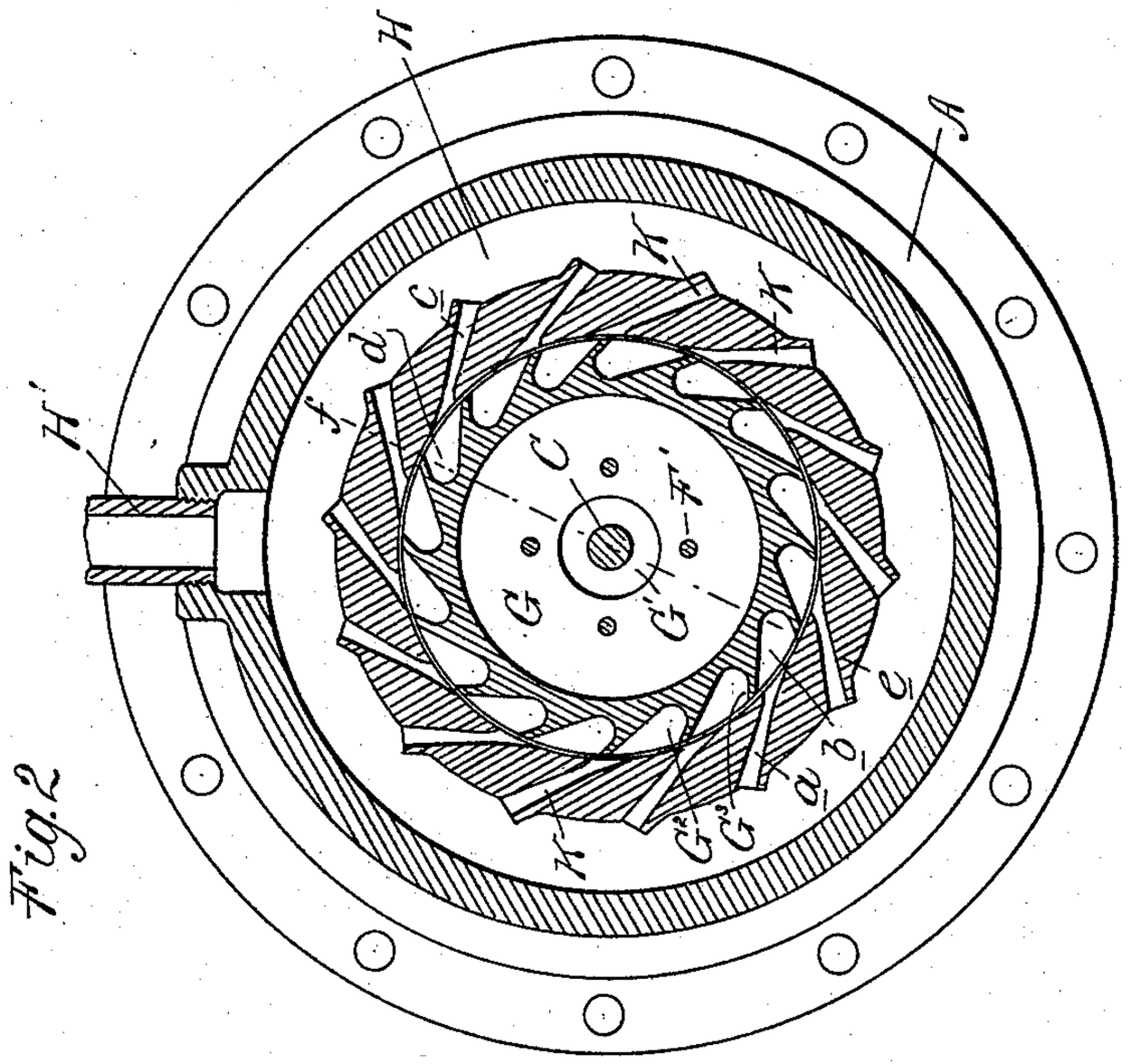

Fig. 2

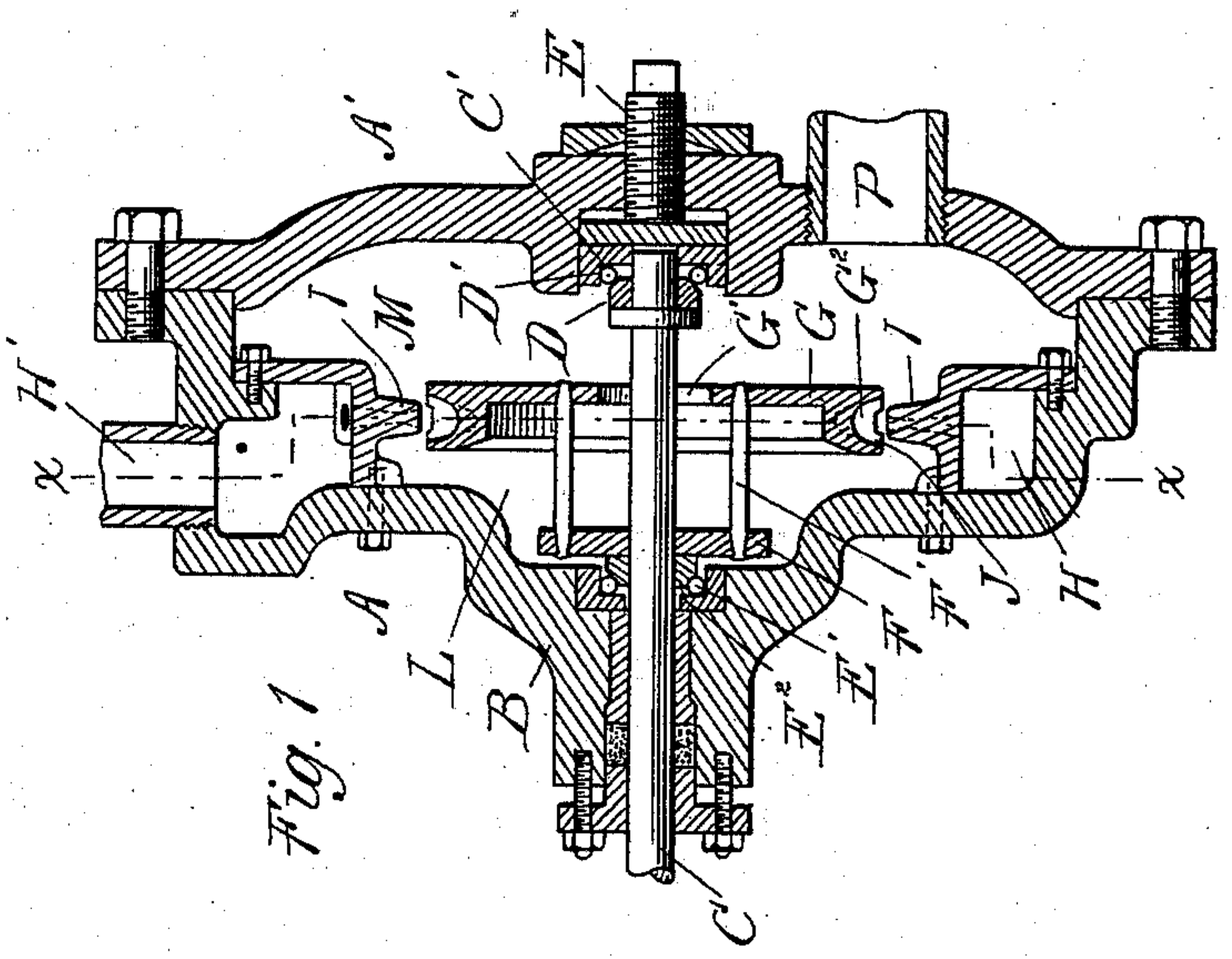

Fig. 1

Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK, ASSIGNOR TO THE CONSOLIDATED CAR-HEATING COMPANY, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 578,759, dated March 16, 1897.

Application filed October 30, 1893. Serial No. 489,469. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in the construction of a rotary engine or steam-wheel comprising a piston consisting of a wheel or disk provided with peripheral pockets, cavities, or buckets and a steam-supply having jets or nozzles adapted to discharge substantially tangentially upon the surface of the wheel, that is, as nearly as possible in the line of motion of the wheel at the point where the steam strikes the wheel and into the pockets.

The invention further consists in the construction of the pockets whereby the exhaust or the reaction of the steam from the pockets assists in driving the wheel; further, in the construction of a flexible connection between the driven wheel and its shaft; in the construction of the support for the shaft thereof, and, further, in the construction, arrangement, and combination of the various parts, all as more fully hereinafter described.

In the drawings, Figure 1 is a vertical central section on the line of the drive-shaft. Fig. 2 is a section on line *x x*, Fig. 1.

The casing is hollow, and is preferably made of the two parts A A′, bolted together at the edge, as shown. The part A, I have shown as provided with a central tubular neck B, through which the shaft C passes, suitable packing devices being provided therefor. The inner end of this shaft I have shown supported in a block C′, secured in a recess in the inner face of the casing. This block is provided with a suitable ball-race and the shaft with a collar D, having a complementary inclined bearing to support the balls D′ in the race and form a ball-bearing for the shaft.

E is an adjusting-screw for the block C′ to take up the wear in the ball-bearing.

At the inner end of the neck B is formed a suitable ball-race to receive balls E′, which bear on the collar E^2 on the shaft. The shaft being thus supported in ball-bearings and projecting to one side of the casing only, but a single steam packing is required. Any other suitable support or bearing for the shaft may be employed.

The steam wheel or piston I have shown connected to its shaft through any flexible or elastic connection, so that the vibrations of that wheel in running at excessively high speed will not be communicated to the bearings or driven devices. I believe I am the first to make such connection, and while I have shown a specific construction I do not wish to be confined thereto, but to include within the spirit of my invention any elastic connection between the wheel and its shaft.

F is a disk secured to the shaft near one end.

F′ are a series of spring-arms extending from the outer edge of the disk laterally, and are secured at their free ends to the steam-wheel G, which is provided with a central aperture G′ to permit of the vibrations of the wheel without striking the shaft.

The wheel G is provided with a series of inclined pockets or cups G^2, preferably tapering from their outer edge inwardly, the front wall G^3 extending back over the bottom of the pocket.

H is a ring in the casing, having a steam-passage therethrough and provided at one point with a supply-pipe H′ and on the inner face provided with a flange I, extending in close proximity to the outer face of the wheel, but narrower than the mouth of the pockets therein, so as to form an exhaust J or a passage for the reaction of the steam between the outer edge of the pockets and the outer edge of the flange.

K are a series of steam-supply passages or jets in the ring, preferably arranged at substantially the same inclination as the median line of the pockets, and adapted to deliver steam therein from the steam-ring as nearly as possible in the direction of the motion of the wheel.

The impact of the steam from the jets striking the front wall of the pockets will tend to rotate the same. At the same time the steam will escape through the port J at about the

same angle at which it enters and its reaction will tend to aid in driving the wheel. The steam from the pockets passes into the exhaust-chamber L and M on opposite sides of the wheel, thereby balancing the same and preventing even with back pressure end thrust on the shaft. The two chambers connect through the aperture G′ in the wheel.

While I have shown the steam-ring applied around the wheel, which is provided with peripheral pockets, it is evident that the same invention may be applied in various modified forms without departing from the spirit of my invention.

It will be observed that I have so arranged and proportioned the jets and pockets or cavities that the diametrically opposite cavities and jets are always in the same relation. For instance, take the jet *a* and cavity *b*. They will be found to be in the same relation to each other as the opposite jet *c* and cavity *d* at all times. Now taking the radius *e f*, connecting the cavities *b d*, as a dividing-line it will be seen that the intervening series (on each side of that line) of cavities and jets have a uniform progressive change in their relation to each other, the complementary pocket of each series being alike. This will be true of the series embraced between any radius and at any period in the rotation. Thus not only is the wheel balanced, but the power applied from the jets to the wheel at a given pressure is uniform at every point in the revolution of the wheel. Not only is this so as to the impact of the inflowing steam, but is equally so as to the exhaust. While I have shown this arrangement of jets and pockets as preferable, I do not wish to be limited to such arrangement as necessary. The exhaust finds exit from the exhaust-chamber through the exhaust-passage P.

What I claim as my invention is—

1. In a rotary steam-engine, the combination of a steam-ring having a series of tangentially-inclined nozzles, a wheel within the ring having a series of tapering inclined pockets arranged to receive the discharge therefrom, and an annular exhaust-passage between the outer edges of the ring and upper edge of the pockets and common to all the pockets, substantially as described.

2. In a rotary steam-engine, the combination with a casing having a steam-ring therein, and a circular series of tangentially-inclined jet-nozzles in the inner wall of the ring, of a wheel within the ring having a series of axially-inclined pockets in its periphery of a width greater than the width of the jet-nozzles and arranged centrally in line with and in close proximity to the discharge ends of the jet-nozzles, their outer edges being beyond the plane of the nozzle, thereby forming continuous exhaust-passages on opposite sides of the pockets, substantially as described.

3. In a rotary engine, the combination with a driven wheel, of a rigid shaft loosely passing therethrough, fixed bearings for the shaft and yielding supporting connections between the shaft and wheel, substantially as described.

4. In a rotary steam-engine, the combination with a circular series of jet-nozzles, of a wheel having a circular series of pockets in line with the nozzles, a shaft, and a yielding supporting connection between and fixedly secured to the shaft and wheel, substantially as described.

5. In a rotary engine, the combination of a rigid shaft journaled in stationary bearings, a driven wheel centrally apertured to loosely embrace the shaft, and an elastic supporting connection between the wheel and shaft, whereby a minimum vibration is transmitted to the bearings, substantially as described.

6. In a rotary engine, the combination of a rigid shaft journaled in stationary bearings, a centrally-apertured driven wheel loosely embracing the shaft and spring-arms connected at one end to the wheel and at the other end to the shaft, substantially as described.

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

JAMES F. McELROY.

Witnesses:
RALPH W. KIRKHAM,
MARY AGNES BURKE.