

WASHBURN RACE.

IMPROVEMENTS IN

ROTARY STEAM ENGINES.

116352

PATENTED JUN 27 1871

Fig. I

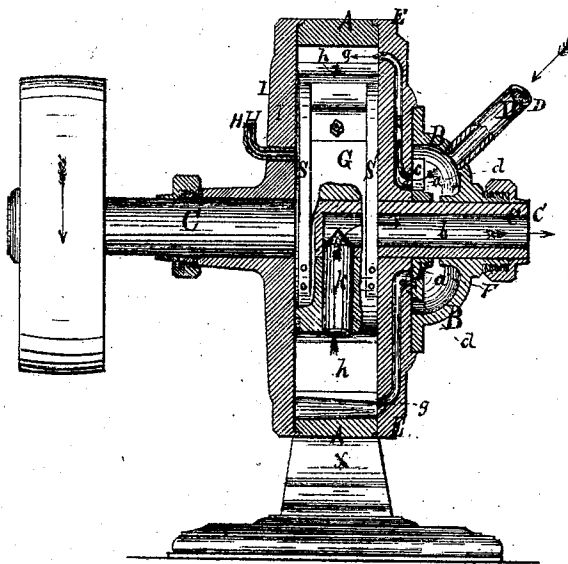


Fig. IV

Fig. II

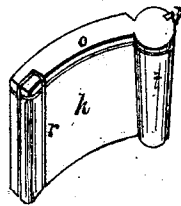
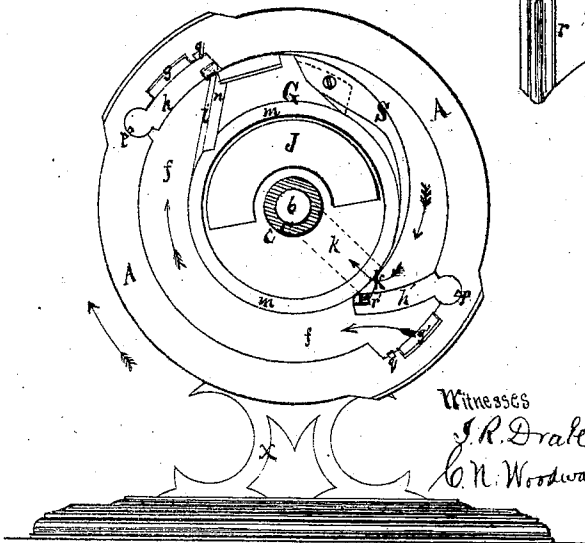
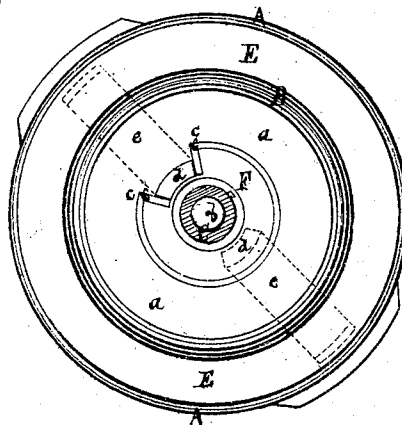


Fig. III



Witnesses

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Inventor.

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UNITED STATES PATENT OFFICE.

WASHBURN RACE, OF LOCKPORT, NEW YORK, ASSIGNOR TO WARREN ROWLAND INGHAM AND NANCY M. RACE.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. 116,352, dated June 27, 1871.

To all whom it may concern:

Be it known that I, WASHBURN RACE, of Lockport, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Rotary Steam-Engines, of which the following is a specification:

This invention relates to rotary steam-engines, and consists: First, in constructing the valve-abutments with conical knuckle-joints, whereby the same are adapted for adjustment to compensate for wear. It also consists in the provision of means for lubricating the engine, as will be hereinafter more fully described.

In the drawing, Figure 1 is an axial section. Fig. 2 is an elevation with the sideplate removed, showing the working parts. Fig. 3 is an elevation, showing the opposite side and cut-off disk. Fig. 4 is a perspective view of the valve-abutment with the packing.

A is the outer circular rim of the case, resting on the standard *x*; B, the case of the steam-chamber, attached to the outside plate E, (forming part of the main case.) *a* is the steam-chamber, and D the steam-induction pipe for the passage of the live steam. C is the shaft running through the center of the steam-chamber and case, and made hollow (shown at *b*) for the steam to exhaust through. Attached to the shaft and revolving within the steam-chamber, and working close to the face-plate E of the case, is a flat disk, F, having a single slot, *c*, formed in its edge. This disk is the cut-off; its operation is to be presently described. In the face-plate E, under this disk, are formed two steam-ports, *d d'*, directly opposite each other, and as the disk revolves the slot *c* momentarily uncovers them alternately and the steam rushes in. These openings are connected with the steam-space *f* by channels *e e'*, one on each side of the shaft, and terminate in recesses or ports *g g'* at opposite points inside the case, and are partially covered by wing-valves or abutments *h h'*. (See Fig. 2.) The steam, as it is received alternately into the connecting-channels *e e'*, and through the ports *g g'*, forces these abutments alternately against the piston, and, as it revolves, they shut off any backward escape of the steam which forces the piston forward. The piston G is of eccentric form, as shown. The case is stationary, the piston revolving inside carrying the shaft; the eccentric part working close against the inner periphery of the case, and,

as it moves around, gradually throws one wing-abutment inward, shutting off the steam from its port or channel. The other valve is opened by its release from the eccentric head and moves gradually down the incline *i* of the piston, the steam rushing into the steam-space *f*, against the piston-head *i*, forcing it forward; the abutment-valve *h* shutting it off from the back space, as before noted. The incline *i* is very important, as the valve *h* is gradually forced down, thereby moving the shaft without any jerk, and, from its regular motion, dispensing with a balance-wheel. The exhaust is accomplished by the central opening or channel, *k*, in the piston, which leads directly to the hollow shaft C, and exhausts from that into the open air. This channel *k* is situated nearly opposite the highest point *i* of the eccentric of the rotary piston, so that when the new steam is beginning to strike against the face of the eccentric the exhausted steam of the opposite side escapes through this channel. *m* is a circular metal packing-ring on the side of the piston, (with rubber between it and the piston,) which forces it against and keeps the steam from working between the piston and case. *n* is a metal packing on the side of the incline of piston-head *i*, to prevent steam from working between the eccentric head and case. The valve-abutments *h h'* also have metal packing-pieces *o o* on their sides, shown in Fig. 4, and the knuckle-joint of the valve has a rubber packing-groove, *p*, cut in dovetailed form, to prevent steam from getting behind the joint. The joints of the valve-abutments *h n* are made conical, so as to insure a tight working of them, as when they wear they can be cut off at the small end and a thicker packing-piece put on outside. Rests *q q'*, of rubber, are set in the sides or corners of spaces *g g'*, to prevent the valves from striking against the iron and resounding. The valves also have a re-enforcing piece, *r*, set in the ends where they strike the incline, &c., so that they can be easily renewed when worn out. H is an oil-pipe passing through or formed in the outer case I and opening into the hollow space J, (see Fig. 2,) just beneath the eccentric of the piston. This can be filled with oil, and will greatly facilitate the working of the machinery, as it will be thrown out by centrifugal force, and keep the piston in smooth working order from the oil that works out. This opening or hole answers another purpose, viz.,

by taking out from the piston the weight of metal sufficient to counterbalance the increased weight of this side caused by the eccentric head, which is immediately over it. S is a back-brace to the piston-head and a gradual guide to close the valve-abutments as it passes them.

The advantages of this construction are manifold. The incline on the eccentric piston allows the valves to work down gradually, and the back-braces S S' close the same gradually, thus insuring a noiseless motion. The oil-receptacle and pipe H make the engine self-oiling, the place requiring filling up only at long intervals. From its smooth running it dispenses with a balance-wheel. The working of the cut-off is accurate and simple. The parts are not liable to get out of order, and its cheapness and simplicity will recommend it at once to the notice of the prac-

tical. The motion is smooth and steady, without jar or concussion.

I claim as my invention—

1. The valve-abutments *h h'*, having the knuckle-joints made conical so as to fit closely in their working sockets, substantially as described, for the purpose specified.

2. The arrangement of the pipe H in the side of the case I, and the receptacle J in the piston for oiling the engine, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WASHBURN RACE.

Witnesses:

J. K. DRAKE,

EDWARD A. MARTIN.