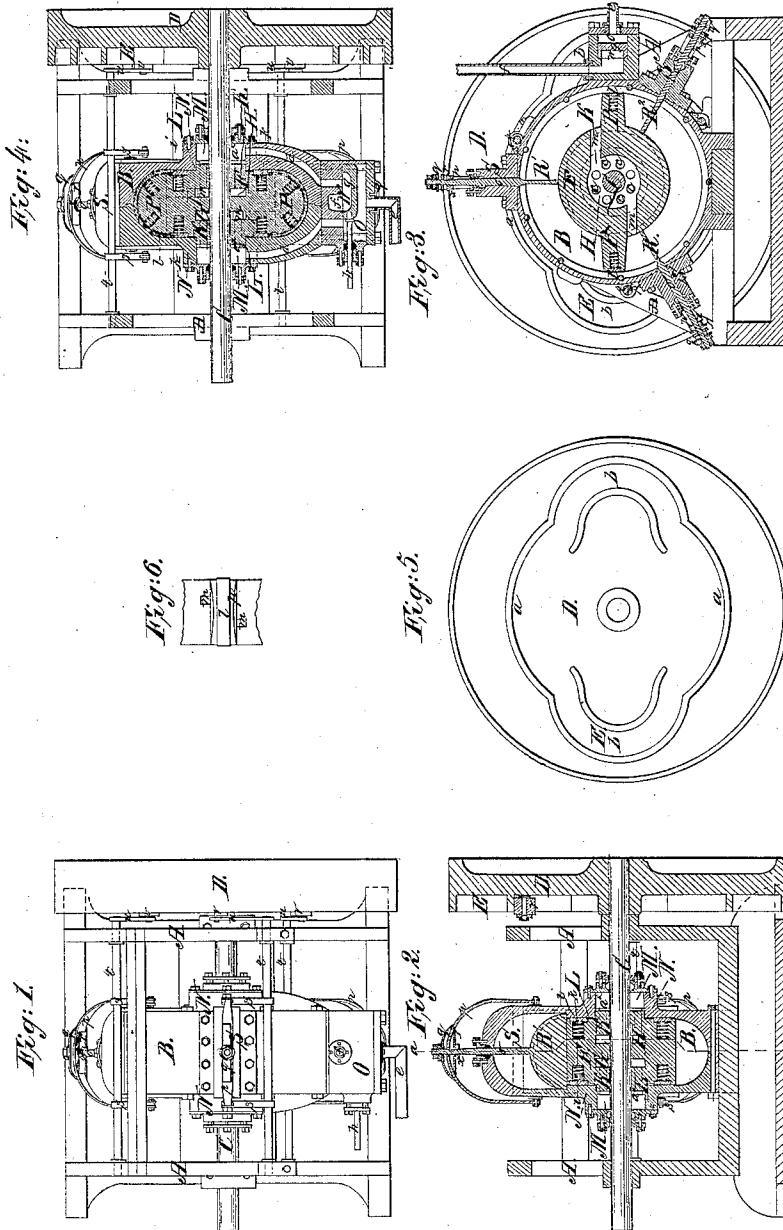


M. H. Collins,
Rotary Steam Engine.
No 58,602. Patented Oct. 9, 1866.



Witnesses:
Samuel W. Peiper
George Andrews.

Inventor:
Michael H. Collins.
By his attorney,
P. B. Lecky

UNITED STATES PATENT OFFICE.

M. H. COLLINS, OF CHELSEA, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND
WM. H. HOLLAND, OF SAME PLACE.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. 58,602, dated October 9, 1836.

To all whom it may concern:

Be it known that I, MICHAEL HENRY COLLINS, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented an Improved Rotary Steam-Engine; and I do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a longitudinal section, Fig. 3 a transverse section, and Fig. 4 a horizontal section, of it. Fig. 5 is an inner side-view of the fly-wheel cam for operating the sliders or steam abutments or gates, to be hereinafter described.

This rotary engine is somewhat analogous to the well-known Galloway rotary engine, as described on pages 283 to 295 of a work published in 1836, and entitled "History and Progress of the Steam-Engine: by Elijah Galloway, Civil Engineer." Although the general principle of operation of the two engines is the same, they differ materially in their construction, and it is on these differences that my invention is based.

In my improved engine I employ two rotary pistons and three sliders or movable steam-abutments, which, for the sake of brevity, I term "gates," whereas in Galloway's engine there is but one piston and two gates—that is, instead of employing two gates to each of my pistons, I make use of an odd number of gates, viz., three to two pistons. This arrangement enables me to apply the steam simultaneously on opposite sides of the shaft of the engine, and to counterbalance one piston by another, whereby the engine is caused to work smoother and with less liability of wear of parts. Furthermore, I form in the piston-hub two steam-chambers, with steam-passages leading out of them through the outer end and the circumference of each. These hub-chambers communicate with the valve-chest by means of a small axial chamber and a conduit formed in each of the ends of the cylinder. Other changes or improvements will be hereinafter explained.

Another great advantage of my construction of rotary engine over that of Galloway is that I dispense with all valves as used by him except that of the valve-chest.

In the drawings, A denotes the supporting-

frame of the engine. B is the cylinder, whose internal transverse section has the form as exhibited in the drawings.

C is the driving-shaft, which goes through the cylinder axially and carries a fly-wheel, D, which may be formed to answer the purposes of a pulley or band-wheel. On the inner face of this wheel is a grooved cam, E, shaped as shown in Fig. 5. This cam is to aid in operating the gates, parts *a a* of it being concentric and parts *b b* of it being eccentric to the axis of the driving-shaft.

A cylindrical drum, F, is fixed to the shaft C, and arranged within the case or cylinder B concentrically with respect to such shaft and cylinder. The interior space of this drum is divided into two chambers, G H, by means of a cross-partition, I, going through its middle.

Cylindrical extensions or journals K K from the ends of the drum enter corresponding openings L L, leading into small cylindrical chambers M M formed in the two heads N N of the cylinder. A series of openings, *c c c*, is made in the end of each of the extensions K, in order that the chambers G and H may freely communicate with the chambers M M. From each chamber M a conduit or port, *d*, passes to a valve-chest, O, fixed on the periphery of the cylinder. The said valve-chest has an induction-pipe, *e*, leading into it and an eduction-passage, *f*, leading from it, and, besides, within it is a slide-valve, *g*, provided with a rod, *h*, by which it may be moved so as to cause the steam to enter either of the ports *d d* and escape by the other and through the eduction port or passage *f*. The said slide-valve is for the purpose of effecting the reversing of the movement of the engine.

A packing-ring, *i*, to be forced outward either by the steam or by springs *k k* acting against it, is applied to each end of the drum or hub F and in a corresponding channel formed therein concentrically with the driving-shaft. This packing-ring rests against the contiguous inner face of the cylinder and serves to prevent the escape of steam from the spaces between the pistons and the gates. *a² a²* are small packing-rings, which serve to prevent the escape of steam by the journals or parts against which they operate.

There extend from the periphery of the drum

two semicircular projections or pistons, P P, each having a semicircular packing, *l*, applied to its periphery and in a groove made therein, the same to be pressed outward by springs or by the action of steam. On opposite sides of each of these pistons and close to them there are two passages, *m m*, which go through the rim of the drum F, one of such passages leading out of one and the other out of the other of its two chambers. Fig. 6 is an edge view of one of the pistons with such passages.

The three gates which co-operate with the pistons are represented at R, R¹, and R². Each has a spindle, O¹, extending from it. Furthermore, each gate is arranged in a slot made radially in the periphery of the cylinder and opening into a gate case or bonnet, S, fixed to and extending from such periphery in manner as exhibited in the drawings. The spindle goes through and projects beyond the gate case or bonnet, such case being so made as to enable the gate to be entirely withdrawn from the space or path in the cylinder in which the pistons revolve. Furthermore, that part of each gate-spindle which extends beyond the gate-case goes through a yoke or bow, *p*, and has two springs, *q r*, applied to it, one being above and the other being below the bow. They rest against such bow in manner as shown in Figs. 1, 2, and 3. To the extremity of each of these yokes two arms, *s s*, are jointed, such arms being projected from one of three horizontal shafts, *t t t*, which are supported in bearings in the frame A, and are arranged as represented in the drawings. Each of the said shafts has a crank, *u*, projecting from one end of it, and being provided with a friction-roller, *v*, to operate with the cam in the lower side of the fly-wheel. The arrangement of these cranks and rollers is exhibited in Figs. 1 and 5.

When the above-described rotary engine is in operation the steam will flow into one of the chambers G H, and by its peripheral opening will escape from it into the cylinder, and, acting against the pistons and gates, will cause

the drum and the driving-shaft to be revolved. Each of the gates will be raised at the proper time for the piston to pass it, after which it will be closed down upon the drum, in order that the steam may act against it and the piston, to propel the latter. The waste-steam will flow from the cylinder through the peripheral opening of the other of the chambers G H, from whence it will be discharged into the chamber *w* of the slide-valve, and from thence escape by the exhaust-passage *f*.

The purpose of the longer spring, *q*, applied to each of the yokes, is to enable the force which the yoke receives from the cam to gradually operate in overcoming the pressure of the steam, tending to hold the gate down. As soon as this pressure is overcome the spring, by being relieved, will suddenly lift the gate, so as to allow of the passage of the piston, and will accomplish this much quicker than it can be done by the cam. The lower spring, *r*, serves to relieve the yoke from the upward blow which it would otherwise receive from the lower nut, *x*.

What I claim in the above-described rotary engine as my invention or improvements is as follows:

1. The combination and arrangement of the chambered drum F, made substantially as described, with the two pistons and their gates and ports *d d*, arranged in the case or cylinder, as specified.
2. The arrangement and combination of the springs *q r* with each of the yokes *p*, the same being as and for the purpose specified.
3. The construction of each piston and that part of the case against which it operates, viz., curved on their peripheries, substantially as represented, in combination with the cylindrical drum, arranged with respect to them, as specified.

M. H. COLLINS.

Witnesses:

R. H. EDDY,
F. P. HALE, Jr.