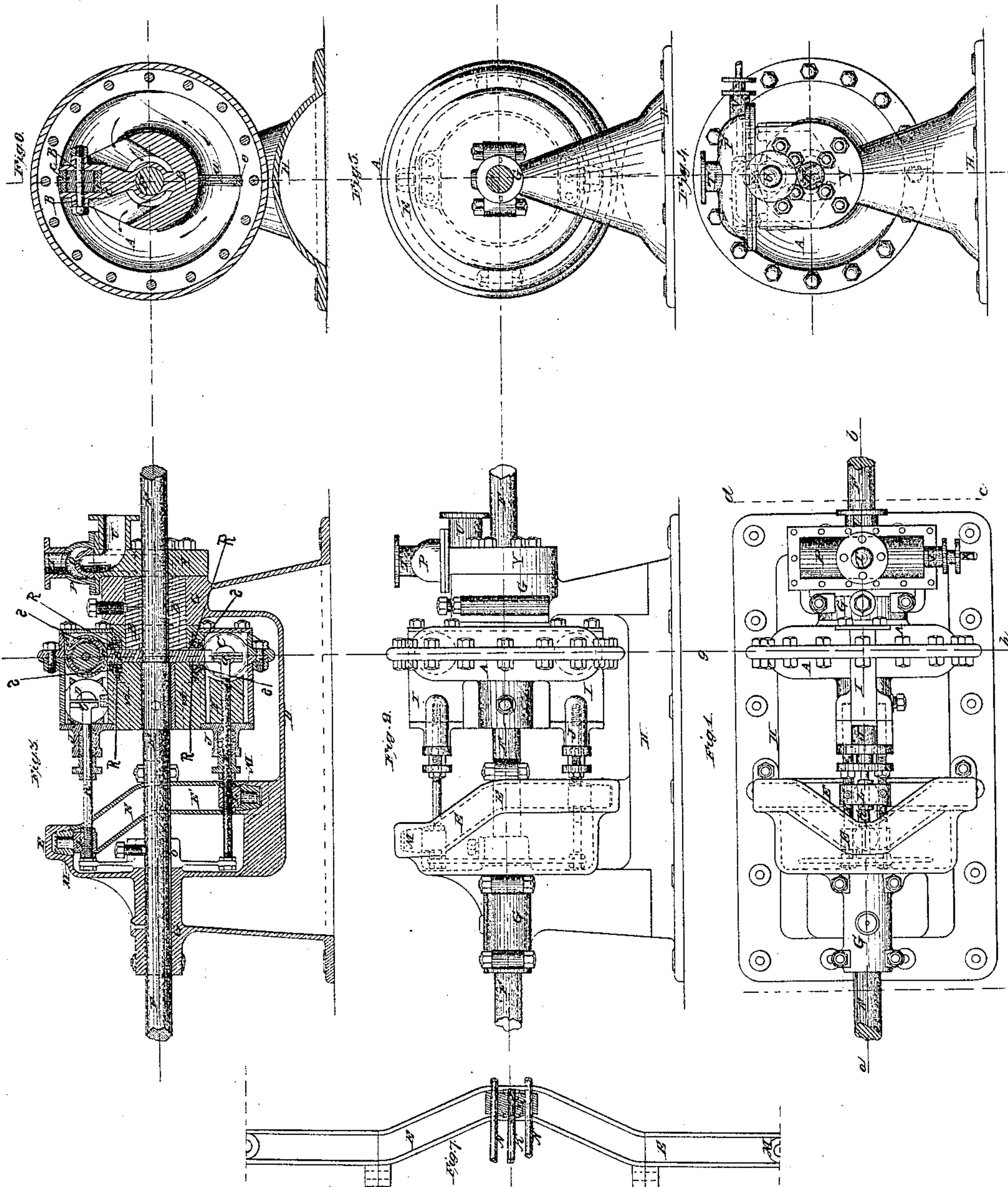


A. P. Samuel,
Rotary Steam Engine.

N^o 25220.

Patented Aug. 23, 1859.



UNITED STATES PATENT OFFICE.

AUGUSTIN P. SAMUEL, OF NEW YORK, N. Y.

ROTARY ENGINE.

Specification of Letters Patent No. 25,220, dated August 23, 1859.

To all whom it may concern:

Be it known that I, AUGUSTIN P. SAMUEL, of the city and State of New York, have invented a new and useful Improvement in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description thereof and of its mode of operation, reference being had to the accompanying drawings and to the letters of reference marked thereon and making a part of this specification.

Figure 1 is a general plan of the engine. Fig. 2 is a vertical and longitudinal view of Fig. 1. Fig. 3 is a vertical and longitudinal section through the shaft of the engine taken at *a, b*, Fig. 1. Fig. 4 is a vertical view, taken at *c, d*, Fig. 1. Fig. 5 is a vertical view, taken at *e, f*, Fig. 1. Fig. 6 is a transversal and vertical section through the center of the revolving cylinder *a*, and taken at *g, h*, Fig. 1. Fig. 7 represents the eccentricated curve developed geometrically.

The nature of my invention consists in the production of a new rotary engine, in which an annular hollow ring of a circular or other form, and which ring is equivalent to an ordinary steam cylinder, revolves with its shaft around a fixed piston, such piston being supplied with packing rings, and serving also as a distribution to the steam, and being equivalent to the cover and bottom of an ordinary steam cylinder. The steam entering such hollow ring first presses against the fixed piston, and then alternately against two movable pistons, revolving with such hollow ring, and which do not retire to the center nor to the circumference of the ring, but retire into cavities made in one of the sides of the annular ring, on a line parallel with the shaft of the engine, thereby always preserving its equilibrium. These movable pistons are moved backward and forward in the hollow part of the ring or revolving cylinder, by means of a fixed or stationary eccentricated curve, in which move two rollers fixed to the piston rod of each movable piston. These pistons are also so arranged that, when they begin to move, the piston rod attached thereto opens slide valves in such pistons, which allows the steam to pass through the pistons, and thus discharges or removes the pressure of the steam acting upon the pistons, and also establishes an equilibrium. The disposition or employment of the revolving hollow ring as the steam cylinder, furnishes an oppor-

tunity of placing the side joints, which keep the hollow ring or cylinder tight, nearer the axle of the engine, and thus reduces friction.

In Fig. 1 *A* is the revolving hollow ring or cylinder. *E* is the eccentricated curve in two parts, one half *E*, being eccentric and serving to move alternately the two movable pistons, *C, D*, into their cavities which are a part of the cylinder *A*, and the other part *E'* being of the same curve and serving merely as a guide. *F* is the motor shaft, resting in the bearings *G, G*, which are also the bearings of the engine, and which are a part of the foundation plate *H*. *J J* are stuffing boxes of the piston rods *K, K*, of the movable pistons *C, D*. *L L* are roller holders and *N N* are the guides of the piston rod *K*. *P* is the box for the distribution of the steam, and the change of the motion of the engine. *T* is the entrance of the steam to the box *P*. *U* is the exhaust, and *V* is the stuffing box to the valve rod *X*, which operates the distribution valves.

Fig. 3 shows more plainly the working of the engine. The cylinder *A*, revolves with the shaft *F*, and with the movable pistons *C, D*, around the fixed piston *B, B*, which is supplied with the packing rings *c, c'*. Such piston *B* is employed as or for the distribution of the steam the passage of which is represented by dotted lines and also furnishes a point or place of resistance to the steam, and also a bearing to the motor shaft turning in it. *a b* are sliding valves moving backward and forward in the inside of the movable pistons *C, D*, by means of the eccentricated curve *E*. As the piston rods *K, K*, begin to move, they open the valves *a, b*, thus opening a passage to the steam, and relieving the pistons *C, D*, from pressure, and after having opened such passage the rods *K, K*, take along in their motion the movable pistons until they are withdrawn into the cavities *l, l*, parts of the cylinder *A*, so that such pistons can pass alternately over the fixed piston *B*. The eccentricated curve *E* serves to move backward and forward the valves *a, b*, and also the movable pistons *C, D*, by means of the piston rods *K, K*, and the roller holders *M, M*, attached to them, and which carry the rollers *L, L*, which roll in the curve *E*. The eccentricity of the curve *E* is equal to the diameter of the fixed piston *B* and the lap of the movable pistons *C, D*, plus the width and lap of the slide valves *a, b*. *F* is the motor shaft of the

engine keyed to the cylinder A. l, l , are cavities, part of the cylinder A to receive the movable pistons C, D, when passing over the fixed piston B during the rotation of the cylinder A. J, J, are stuffing boxes to the piston rods K, K. The pieces L, L, which carry the rollers M, M, slide backward and forward along the guides N, N, seen also in Fig. 5, such guides being fixed to the shaft by the piece O. A slide valve Q lets the steam into the engine and also is used to reverse its motion. R, S, are two concentrated rings, entering each other in a conical shape the outer ring S being conical outside and inside and open at its circumference so as to expand when pressure is applied to it. The inner ring R is pressed or pushed by springs Z, against and into the outer ring S, which is thus opened and pressed against the fixed piston B and the cylinder A to prevent any escape of steam, &c., from the cylinder A. As will be seen this arrangement brings these steam joints nearer the axle of the engine than they otherwise would be, and thus reduces friction. Y is a piece used as distribution to the steam, and also to fix the piston B.

In Fig. 5 is shown by dotted lines the position of the guides N, N, in reference to the piston rods K, K, and also the piece O, which serves to fix such guides.

Fig. 6 shows the position of the fixed piston B, with its packing rings c, c . The admission and exhaust of the steam is represented by the arrows in red ink.

Fig. 7 shows the eccentric curve E geometrically developed, and shows also the position of the piston rod K, fixed to the roller holder L, and also the respective position of the guides N, N.

The motion of the engine will be understood by reference to Fig. 6. When the steam enters the cylinder A, it acts against the fixed piston B, and drives the movable piston forward, such piston carrying along with it the cylinder A and the shaft T. When the piston C has arrived at the position shown in Fig. 6, the other movable piston has retired outside the ring of the cylinder into the cavity l , as shown in Fig. 3, so that when one of the movable pistons is retired, the other is in place to receive the pressure of the steam and finish the revolution of the cylinder A.

Fig. 3 also shows the rings R, S, in their position to work. The inner ring R is pushed by the springs Z into the outer ring S, thus expanding it and pressing it against the fixed piston B and the cylinder A.

The principle of this engine is such that it can be worked at high or low pressure, and with or without cut off. It can also be applied or used as hydraulic machines, pumps, &c., and to engines worked by any kind of gases. Such applications are reserved as my property.

I am aware that in some rotary engines, parts called cylinders, have been made to revolve, but such so called cylinders were not the regular or proper steam cylinder of the engine, or the equivalent of the steam cylinder proper, which I believe has not, before my invention, been caused to revolve, at least upon the principle and in the manner above described. I am also aware that in some rotary engines pistons have been made to retire into side cavities, parallel with the shaft, but such pistons had only a reciprocating motion necessary to be so retired, and did not have also and at the same time any rotary or revolving movement with the cylinder.

What I claim as my invention and desire to secure by Letters Patent is—

1. The method of governing and working the pistons C, D, by connecting their piston rods K, K, through the roller holders L, L, and rollers M, M directly with the eccentric curve E, substantially as and for the purposes set forth.

2. I also claim the combination and arrangement, substantially as described, of the valves a , and b , with and within the movable pistons C, D, whereby such valves a, b , are opened by the first motion of the piston rods K, K, and before any motion is given to the pistons C, D, so that a passage is given to the steam within such pistons and the steam admitted on both sides thereof, for the purpose of producing an equilibrium of pressure on each side of such pistons before they are put in motion.

3. I claim also the construction and arrangement, as above described, of the packing rings r, s , acting against each other by inclined surfaces, the outer ring s , being conical or tapering on both sides, and the inner ring r , being tapering only on one side toward the ring s , and the inner ring acting against the other, by means of the spring z , or its equivalent, expanding it outward against the cylinder and inward against the piston for the purposes specified.

A. P. SAMUEL.

Witnesses:

S. R. BRENNERMAN,
S. D. LAW.