

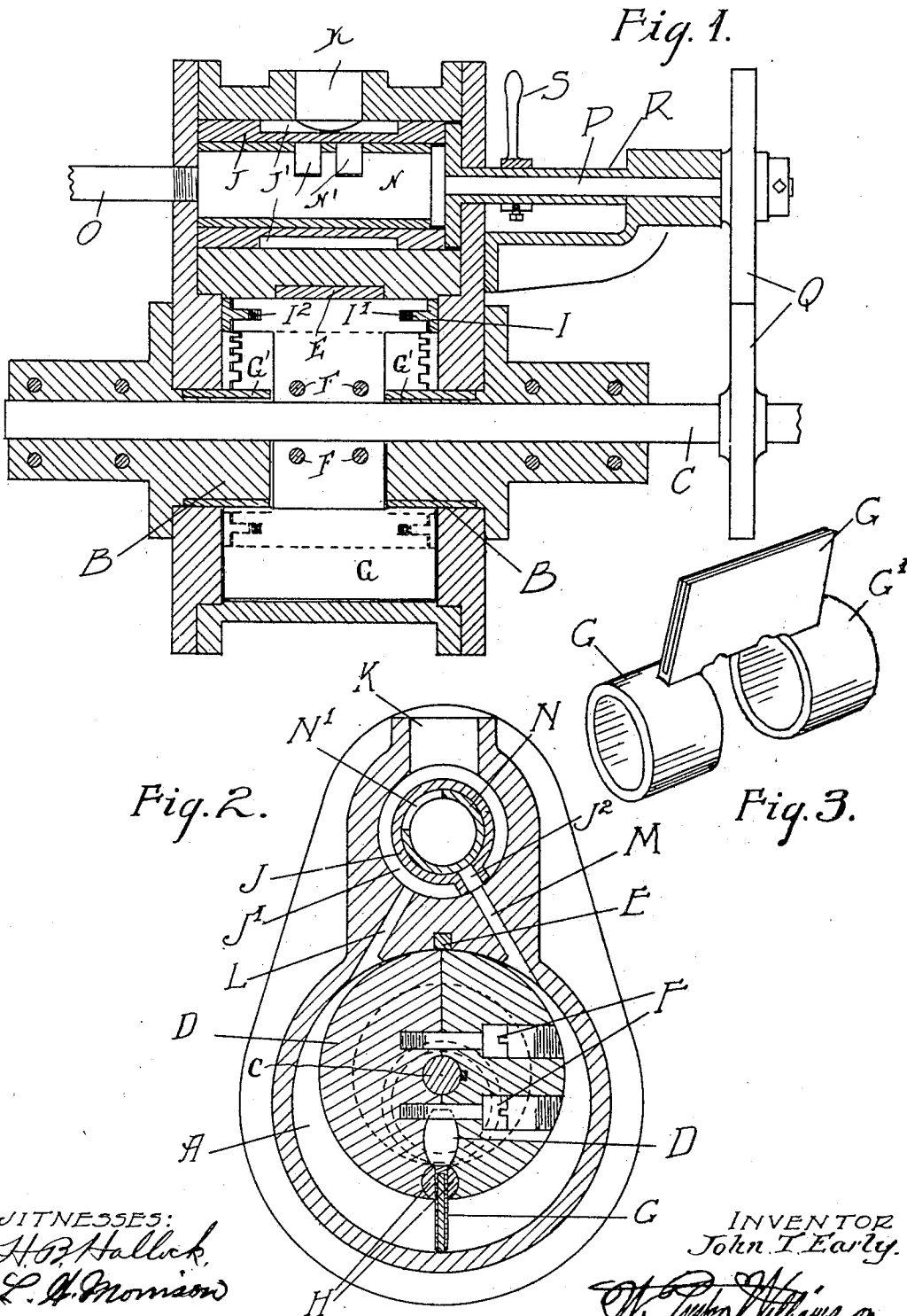
No. 775,212.

PATENTED NOV. 15, 1904.

J. T. EARLY.
ROTARY ENGINE.

APPLICATION FILED MAY 19, 1904.

NO MODEL.



UNITED STATES PATENT OFFICE.

JOHN T. EARLY, OF PHILADELPHIA, PENNSYLVANIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 775,212, dated November 15, 1904.

Application filed May 19, 1904. Serial No. 208,717. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. EARLY, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention relates to a new and useful improvement in rotary engines, and has for its object to provide a simple, durable, and efficient engine of this description in which a continuous revolving piston works in conjunction with the walls of a round stationary cylinder, said piston being secured to a shaft mounted eccentrically to the bore of the cylinder, a piston-blade against which the steam expands adapted to revolve concentrically with the cylinder and at all times be radial therewith.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical longitudinal section through my improved engine; Fig. 2, a vertical cross-section through my improved engine; Fig. 3, a perspective view of the piston-blade and its bearing-rings.

A represents the cylinder, and extending in a distance each side of the cylinder are trunnions B, formed concentric with the cylinder.

C is the driving-shaft, extending longitudinally through the cylinder, but eccentric thereto.

D is the round piston, fitted inside of the cylinder and mounted upon the shaft C concentric therewith. Said piston D is of such a size that one portion of its periphery will always be in contact with the wall of the cylinder A, and at the point where the piston D contacts the cylinder A packing E is placed within the body of the cylinder, so as to prevent the escape of steam between the piston

and the cylinder. This packing is preferably set within the body in a line diagonal to the longitudinal axis of the piston for the purpose of preventing any jar or shock at this point. The piston D is cut away at each end and is only secured to the shaft C in between the inner ends of the two trunnions B, as plainly shown in Fig. 1. The piston D is made in two halves, so as to be secured to the shaft C, these halves being secured together by screws or bolts F, adapted to draw the two halves together upon the shaft C.

G is the piston-blade, which extends entirely across the cylinder, and formed with this piston-blade are the two bearing-rings G', which are adapted to fit over the trunnions B, so that the piston-blade will revolve concentrically with the cylinder A, the outer end of said piston-blade being always in contact with the wall of the cylinder, and this piston-blade will have inserted therein suitable packing to prevent the steam escaping from around the blade. The piston D is cut away at the point D' to allow the blade G to slide therein. As the piston-blade and piston are pivoted eccentrically to one another, there would be only two points where the piston-blade would be radial with the piston, and in order to provide a compensating bearing at the point where the piston-blade extends through the piston I provide upon each side of the piston-blade the semicircular blocks extending longitudinally of the piston, the flat side of said blocks coming in contact with the piston-blade, and as these semicircular blocks fit within semicircular grooves these blocks may turn as the blade passes out of alinement with the radius of the piston, and therefore provide a bearing in close contact with the blade at all times. Numerous devices could be utilized for adjusting said blocks to take up the wear, and therefore I do not claim in this particular application any particular means for adjusting said blocks, and it will also be understood that, if desired, packing may be secured upon the inner faces of the blocks to prevent steam escaping between the blade and said blocks.

For the purpose of preventing steam around the ends of the piston I provide said ends with

the movable rings I, each ring having a flange I' extending inward therefrom, which is adapted to fit in an annular groove formed in each end of the cylinder. Springs I² lie within the grooves and are interposed between the cylinder and the flanges I' and tend to force the ends I outward against the ends of the cylinder, and the outer ends of the cylinder upon each side of the grooves and the inner faces of the rings upon each side of the flanges may be provided with interlocking teeth, as shown in Fig. 1, to prevent the escape of steam.

J represents the exhaust and reversing valve, which is in the form of a sleeve having an annular cavity J' formed around the outside of the same, said cavity extending entirely around the valve except for a short distance where the inlet-port extends through the valve.

K is the exhaust leading from the valve J.

L is the exhaust-port leading from the cylinder to the valve J.

M is the inlet-port leading from the cylinder to the valve mechanism, and this inlet-port M communicates with the passage J², formed entirely through the shell of the valve J.

N is the cut-off valve, which is adapted to be continuously revolved, and this valve is also in the form of a sleeve having an opening N' formed therethrough, preferably about one-quarter of its diameter. Thus it will be seen that when the opening N' passes the passage J² steam will enter through the inlet-pipe O into the interior of the valve N, through the inlet-port M to the cylinder, and the expanding steam will impinge against the blade G and rotate the piston because of the fact that the blade passes through the same, and thus communicates motion to the driving-shaft C. The steam in front of the blade G will pass through the exhaust-port L, around the annular passage J', and out of the exhaust K.

The cut-off valve N is connected to a shaft P, extending outside of the casing of the machine, and this shaft is adapted to be continuously revolved through any suitable means from the main shaft C, here shown as by means of the two gears Q. The exhaust and reversing valve J is connected to a sleeve R, which surrounds the shaft P and extends also to the exterior of the machine, a lever S being connected to this sleeve. It will thus be seen that the engine may be easily reversed by turning the exhaust-valve so that the passage J² is in alinement with the port L, and then the port M will form the exhaust-port and the engine will be caused to revolve in the opposite direction.

It will thus be seen that by this construction of engine the ports are very short between the points of cut-off and admission to the cylinder and that both ports enter the cyl-

inder within an arc of sixty degrees and that by this valve mechanism the reversing mechanism of the engine is extremely simple.

Of course I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is—

1. In a rotary engine, a cylinder, a driving-shaft extending through the cylinder eccentrically thereto, trunnions extending inward a distance from each end of the cylinder, said trunnions formed concentric with the cylinder, said trunnions being of such a size as to allow the driving-shaft to pass therethrough, a circular piston formed concentric with the driving-shaft and secured to said driving-shaft between the inner ends of the trunnions, said piston always impinging against the walls of the cylinder at one point, a piston-blade mounted to revolve radially with the cylinder upon the trunnions, the piston cut away to allow the piston-blade to slide radially therein as the piston and blade revolve, semicircular bearing-blocks arranged upon each side of the blade within the piston, exhaust and inlet ports entering the cylinder within an arc of sixty degrees, an exhaust and reversing valve in the form of a cylinder having a passage formed through the shell thereof adapted to communicate with the inlet-port, a groove formed around the outside of said valve extending from the exhaust-port to the exhaust-pipe or atmosphere, a continuously-revolving cut-off valve in the form of a cylinder fitted to revolve within the reversing-valve, an opening formed through the shell of said cut-off valve adapted to register at predetermined times with the passage through the reversing-valve, a steam-inlet pipe communicating with the interior of the cut-off valve, and means for revolving the reversing-valve so as to change the passage through the valve from one port to the other for the purpose of reversing the engine, as specified.

2. In a rotary engine, a cylinder, trunnions extending into the cylinder a distance at each end, said trunnions formed concentric with the cylinder, a driving-shaft extending through the trunnions and through the cylinder eccentrically thereto, a circular piston secured upon the driving-shaft concentrically therewith, a piston-blade adapted to revolve upon the trunnions radially with the cylinder, the piston being cut away upon one side to allow the piston-blade to slide radially therein as the blade and piston revolve, an inlet and exhaust port extending from the cylinder, an exhaust and reversing valve consisting of a sleeve having a passage formed through the shell thereof, said passage adapted to communicate with the inlet-port, a passage formed around the outside of the valve extending from the exhaust-port to the exhaust, means for revolving said

valve from the exterior of the machine to change the passage from one port to the other for the purpose of reversing the engine, a cut-off valve in the form of a cylinder adapted to
5 continually revolve within the exhaust-valve, said cut-off valve provided with an opening formed through the shell thereof adapted to pass across the passage through the exhaust-valve, a steam-inlet pipe entering the center
10 of the cut-off valve, and means for continually revolving the cut-off valve from the main shaft, as and for the purpose specified.

3. In a rotary engine, a cylinder, a driving-shaft extending through the cylinder eccentrically thereto, a piston secured upon the
15 driving-shaft concentric therewith, said piston always in contact with the wall of the cylinder at one point, a piston-blade mounted to revolve concentric with the cylinder and radially therewith, said blade being in contact with
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the ends and wall of the cylinder, the piston cut away to allow the piston-blade to slide radially therein, packing-rings arranged at each end of the cylinder, springs adapted to force
25 said packing-rings out against the ends of the cylinder, flanges formed with the packing-rings and adapted to extend in the ends of the piston for the purpose of preventing steam
30 escaping therearound, and valve mechanism and ports for admitting steam to and exhausting steam from the cylinder, as and for the purpose specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

JOHN T. EARLY.

Witnesses:

MARY E. HAMER,
L. W. MORRISON.