A. C. SPEER.

ROTARY ENGINES.

No. 181,112. Patented Aug. 15, 1876.

FIG. I.

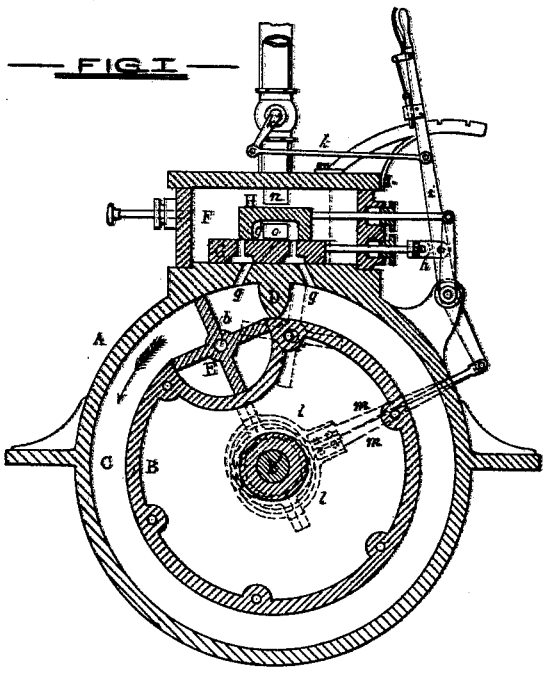


FIG. II.

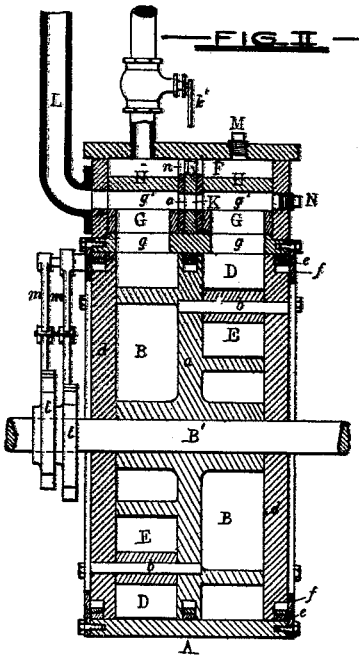


FIG. III.

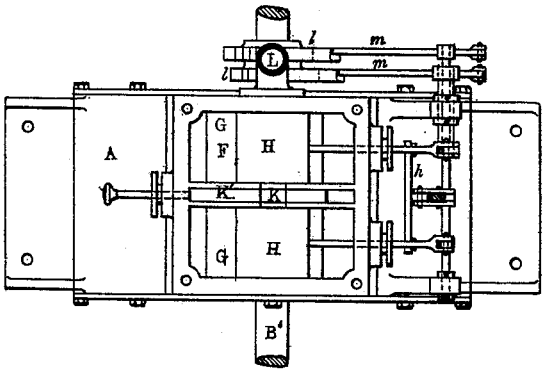


FIG. IV.

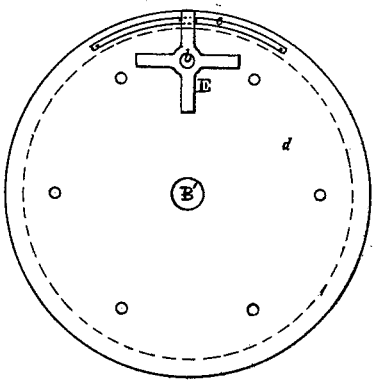
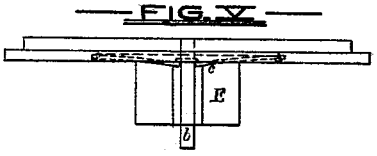


FIG. V.



WITNESSES.

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ABRAM C. SPEER, OF HART, MICHIGAN.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **181,112**, dated August 15, 1876; application filed June 26, 1876.

To all whom it may concern:

Be it known that I, ABRAM C. SPEER, of Hart, in the county of Oceana and State of Michigan, have invented certain Improvements in Rotary Engines, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my said invention, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

This invention relates to that class of rotary engines in which a series of pistons or heads secured together and to a shaft are made to revolve within a stationary cylindrical casing, in either a forward or backward direction, and in which are combined the elements of a steam-engine, liquid motor, and steam-pump, as hereinafter fully described.

In the description of my invention which follows due reference must be had to the accompanying drawing, forming a part of this specification, and in which—

Figure 1 is a longitudinal section of my improved rotary engine; Fig. 2, a transverse section of the same; Fig. 3, a plan of the invention, and Fig. 4 a sectional view of a part of the same.

Similar letters of reference indicate similar parts in all the figures.

A is the stationary cylindrical casing of the engine, and B the revolving pistons secured to the main shaft B′, and together at *a*. The pistons B are either made solid or with arms extending from central hubs to the circular shells or rims forming the bodies of the pistons.

The spaces C existing between the body part of the pistons and the cylindrical casing correspond in certain respects with the cylinders of ordinary reciprocating engines, and are supplied with steam or water in the operation of the engine. D D are stationary abutments, which project from the cylindrical casing and come in contact with the bodies of the pistons. The abutment is stationary at all times, forming a part of the cylindrical casing A, and in this respect differs from similar abutments in other rotary engines having a rotating movement around the common center. E E are rotating winged abutments, adapted to revolve, under certain conditions, upon the shaft *b*; but, when stationary, as far as any movement independently of the said shaft is concerned, they are held by means of the springs *c* partially embedded in grooves in the followers *d*.

The followers *d* are provided with packing-rings *e*, which, in connection with the glands *f*, serve to form close joints and prevent leakage from the cylinders. F is the valve-chest, secured to the outside of the casing A, in which the reversing and expansion valves, represented respectively by G and H, and hereinafter described, perform their functions.

The induction and eduction ports (represented by *g*) extend from the valve-chest F to the interior of the cylinders, and are covered in the valve-chest by the reversing-valves G. The ports in the reversing-valve of either cylinder are used as both steam and exhaust passages, and are so arranged with reference to the induction and eduction ports in the cylinder directly below it, and the expansion-valve H, as to allow of only one port being exposed in the chest at one time, the other being in communication with the exhaust-opening *g′* in the expansion-valve. By this arrangement a central position of the reversing-valve causes both ports therein to be covered by the expansion-valve, in whatever position the said expansion-valve may be placed, and the engine to be stopped. The reversing-valve stems are coupled together on the outside of the valve-chest by a yoke, *h*, which is operated by means of a lever, *i*. The lever *i* also operates the throttle or steam-valve through the medium of a rod, *k*, and arm *k′*.

The throttle-valve is so placed within its shell or case that when the lever *i* is in its central position steam is shut off from the chest, while in either extreme position communication therewith is opened, and steam admitted to the valve-chest, and through the reversing-valves to the cylinders. The expansion-valves are actuated from the main shaft B′ through the medium of eccentrics *l* and rods *m*.

The position of the eccentrics and the length of the expansion-valves determine the point at which the steam is cut off from the cylinders and expansion commences. K is a valve adapted to slide in a partition, K′, in the valve-chest F, for the purpose of controlling the steam and exhaust passages, represented respectively by *n* and *o* in the said partition, in order that one cylinder and at-

tachments may be used as a pump while the other is being employed as a steam or other motor. L is the main exhaust-pipe connected to the side of the valve-chest.

Parts of the invention not yet alluded to will be described, and their uses fully set forth, in the description of the operation of my improved rotary engine, which follows: Supposing the parts of the engine shown in sectional delineation in Fig. 1 to occupy the relative positions indicated therein: steam from the valve-chest passes through the exposed port in the reversing-valve and the corresponding port in the casing to the cylinder, where it is confined between the rotating and stationary abutments, and causes the revolution of the piston in the direction shown by the arrows.

The revolution of the piston in the above direction continues until the rotating abutment gains the position indicated in dotted lines, when the steam is exhausted through the other port in the casing, and through or under the expansion-valve H to the main exhaust-pipe L.

It will be understood that during the circular stroke of the piston, as described, the steam passing to the cylinder was cut off by the expansion-valve at a certain point, and the remaining portion of the stroke performed by the expansive force of the steam inclosed within the cylinder.

At the termination of the stroke of the piston, and after the exhaust is opened, the momentum of the piston is utilized to carry the rotating abutment past the stationary one, the said rotating abutment, in this operation, performing a quarter revolution.

As before alluded to, the rotating abutment is held, during the major portion of the circular stroke of the piston, by a spring, *c*, partially embedded in a groove in the follower *d*. The spring as it approaches the stationary abutment is depressed, thereby releasing the rotating abutment, and allowing the same to be turned, as described. After the rotating abutment has passed the stationary one, it is again secured by the spring *c*, as before.

The reversal of the engine is obtained by simply changing the position of the reversing-valve, thereby adapting the port therein—before used as the induction one—for the exhaust or release of the steam from the cylinder.

To use a part of my engine as a pump for the extinguishment of fires and other purposes, the steam and exhaust openings *n* and *o*, in the partition K′, are closed by means of the valve K, the plugs or caps M and N removed, and the supply and delivery pipes or hose attached to the openings exposed by the removal of the plugs. These alterations being completed, the engine is divided into two distinct parts—viz., the motor and the pump.

When both cylinders are employed, or the entire engine is used as a motor, the part of the stroke of either engine between the opening of the exhaust on one side of the stationary abutment, and the admission of steam on the other side of the same, is not dependent upon the momentum of the pistons and shaft, as the two rotating abutments are located upon opposite sides of the pistons.

Having thus described my invention, what I claim as new, and wish to secure by Letters Patent of United States, is—

1. In a rotary engine in which the steam or active agent is admitted thereto by means of apertures, the opening and closing of which are accomplished through the agency of slide-valves, the casing A, having stationary abutments D, combined with the revolving pistons B, shaft B′, and rotating abutments E, substantially as set forth.

2. The casing A, having the induction and eduction ports *g*, and provided with the stationary abutments D, the valve-chest F, reversing and expansion valves G H, and revolving pistons B, having the rotating abutments E, combined in a rotary engine, substantially as set forth, and for the purposes specified.

3. In combination with the valve-chest F, the valve K, adapted as means whereby the communicating aperture in the partition K′, between the two parts of the said chest, may be closed or opened, substantially as specified.

4. A rotary engine, having a double or centrally-divided piston, and a partition in the steam-chest with apertures therein, as described, which, when opened, admit steam to both sides of the said centrally-divided piston; but which, when closed, and on the attachment of supply and delivery pipes, admit of the use of the machine as a rotary motor and a rotary pump, as herein specified.

5. In a rotary engine, the throttle-valve, adapted, by means of the lever *i*, to be opened, as the reversing-valves are moved from a central to an extreme position, or one in which the pistons B are caused to revolve in either a forward or a backward direction, substantially as described.

6. The shaft B′, carrying the pistons B and rotary abutments E, the casing A, having the induction and eduction ports *g*, and stationary abutments D, the valve-chest F, reverse-valves G, and expansion valves H, the latter operated by means of eccentrics and rods from the main shaft B′, all combined in a rotary engine, substantially as herein described.

In testimony whereof I have hereunto subscribed my name this 13th day of May, A. D. 1876.

ABRAM C. SPEER.

Witnesses:

L. G. RUTHERFORD,
M. C. WHITE,
W. H. HUBBARD, Jr.