(No Model.)

2 Sheets—Sheet 1.

F. MEYER.

ROTARY ENGINE.

No. 461,130. Patented Oct. 13, 1891.

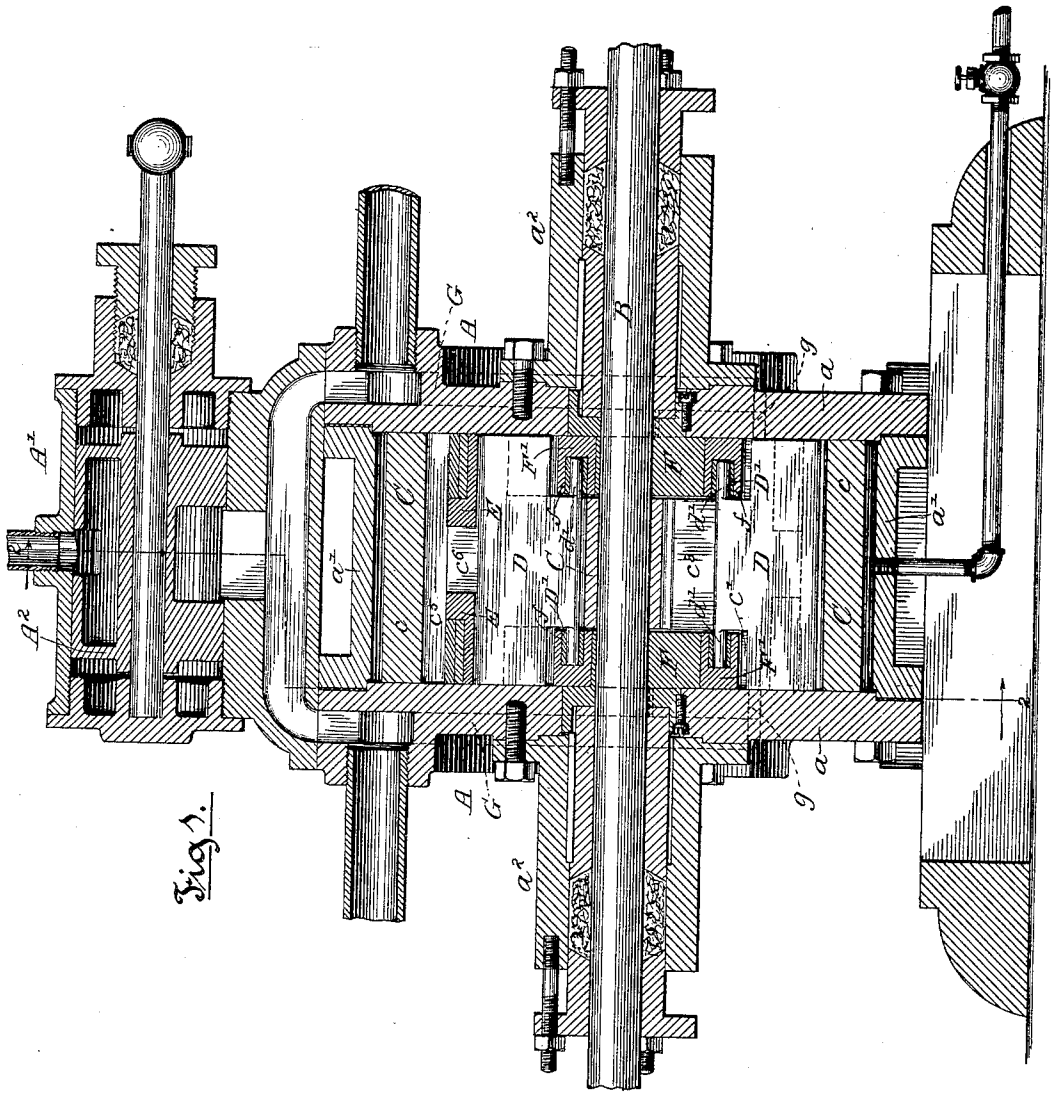

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

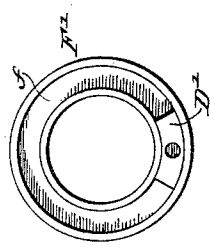


Fig. 4.

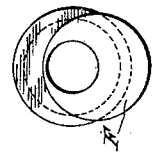


Fig. 2.

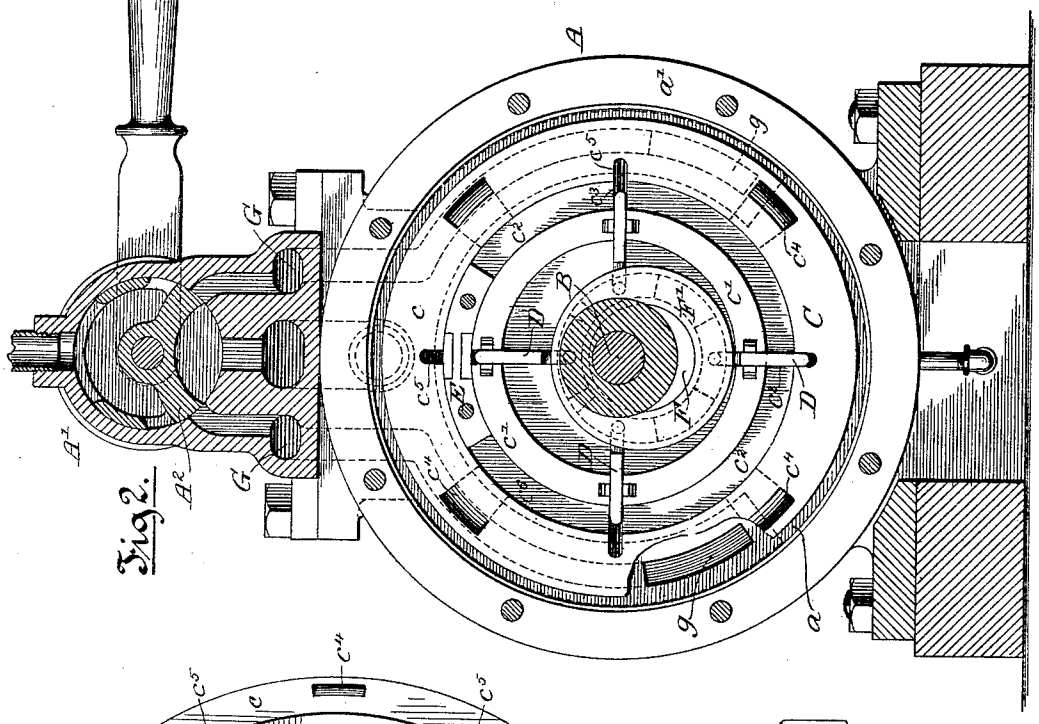


Fig. 3.

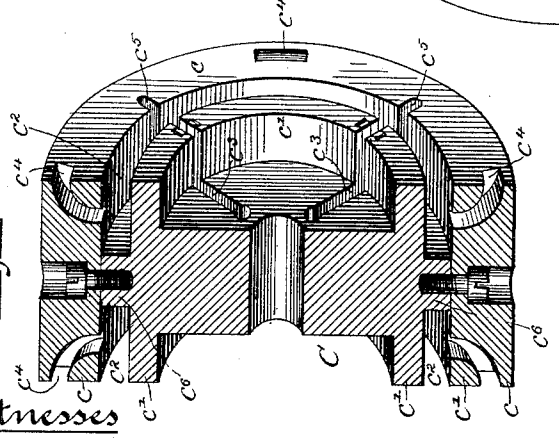
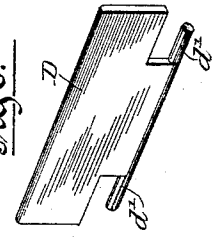


Fig. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

FREDERICK MEYER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE DUPLEX ROTARY ENGINE COMPANY, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 461,130, dated October 13, 1891.

Application filed September 16, 1890. Serial No. 365,136. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK MEYER, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates more especially to the type of rotary engines in which a rotating part has pistons mounted therein against which the steam or other expansive fluid employed acts successively to propel the engine.

One object of the invention is to provide a construction by which the steam may be used "expansively," or, in other words, may be "cut off" before the full movement of a piston under subjection to pressure shall be accomplished. To this end the steam-port in the shell does not open directly into the steam-space of the engine, but against the revolving part or disk, the latter being provided with a series of ports corresponding with the number of pistons, which ports come successively and of course only temporarily into coincidence with the port in the shell.

Another feature of the invention relates to devices for the retraction of radially-movable pistons in rotary engines, and has for its object to provide a construction by which much of the friction incident to this movement of the pistons is obviated.

To this end the invention consists in a ring loosely mounted upon an eccentric and having engagement with the pistons.

The invention also embraces certain structural features, which will be hereinafter pointed out, and specified in the appended claims.

The accompanying drawings, in connection with which my improvements are shown, represent a duplex rotary engine in which the rotating part is a disk having annular and concentric grooves on opposite sides thereof, and also having pistons radially movable therein to intercept said grooves, the stationary shell having blocks secured thereto and fitted to said grooves to form the abutments.

Figure 1 is a vertical section in the plane of the shaft. Fig. 2 is a vertical section transverse to the shaft and in direct line 2 2 of Fig. 1. Fig. 3 is an isometric perspective of one-half of the rotating and grooved disk which carries the pistons, the section-face being toward the eye. Fig. 4 is an elevation of the fixed eccentric employed at each side of the duplex engine. Fig. 5 is an elevation of the loose grooved ring which is engaged with the shoes of the pistons, one of said shoes being shown in the groove of the ring. Fig. 6 is a perspective of a double piston proposed for the duplex form of the engine.

A represents the shell or housing of the engine, comprising the opposite and parallel plates *a a* and the peripheral ring-plate *a'*.

A' is a valve-chest, here shown located upon the top of the shell, and containing an oscillating valve A^2.

B is the engine-shaft, shown protruding on both sides of the shelf through suitable stuffing-boxes a^2, provided on the latter.

C is a disk secured to the shaft B within the shell, said disk, as best shown in Fig. 3, having concentric flanges *c c'* projecting laterally from each side thereof, the flanges at each side of the disk being separated by an annular groove c^2, which forms the steam-chamber for that side of the engine.

D D are radially-movable pistons mounted in slots c^3 in the disk C and adapted to project across the grooves c^2.

E E are segmental blocks fitted, severally, to the grooves c^2 in the disk C and severally held in position by attachment to the side plates *a a* of the shell A. Said blocks E form the "abutments" in the steam-chambers of the engine, and, being stationary, while the disk having the grooves and carrying the pistons rotates, said pistons manifestly require to be retracted to allow them to pass said abutment-blocks. For the accomplishment of this purpose non-rotating eccentrics F F are provided—one for each side of the engine—being held from rotation by connection, severally, with the side plates *a a* of the shell. These eccentrics are embraced by rings F', having grooves *f* in their inner side faces, to which grooves are fitted short segmental shoes D', that are pivoted upon projections *d'* at the inner angles of the pistons. The throw of the eccentrics being arranged oppo-

site the position of the abutment-blocks, the effect of said eccentrics is to retract the pistons D out of the annular spaces c^2 as they severally pass said abutment-blocks and to project them or to allow them to again project by centrifugal action across the grooves after passing the blocks, so as to effectively receive the pressure of the steam.

In engines having the general features of construction here described, either single or duplex, the integral eccentric or eccentrics contain the groove or grooves f and the shoes pivoted to the pistons travel entirely around the grooves at each revolution of the disk C. When the engine is run at high speed, the friction of the shoes in the groove is considerable, owing to the centrifugal force of the pistons. In the present construction, in which the groove f is located in a loose ring F, applied to the eccentric, the ring rotates upon the eccentric, and the movement of the shoes in the groove f is correspondingly lessened. This division of movement and distribution of friction is found advantageous in considerably lessening the power required and in reducing the wear of the parts.

For the purpose of obtaining an expansive action of steam the passages G G, by which steam is admitted to the engine, open upon the interior of the shell against the surface of the disk C as shown at g, Fig. 2, instead of opposite the space c^2, and the steam reaches said space through ports c^4 in the disk, as indicated in Fig. 3, the outer openings of said ports c^4 being arranged to coincide successively, and, of course, temporarily, with the openings g in the shell. In the rotation of the disk C, therefore, steam will be admitted only so long as these ports are in coincidence, and the duration of such coincidence will be determined by the length of the ports at their coinciding openings. In Fig. 2 a port c^4 is represented, in dotted lines, as having just passed a port g and the working piston (the one at the bottom of the figure) has made one-half its effective stroke, or, in other words, has completed only one-half the arc of movement which it makes while extending entirely across the space c^2. The cut-off is therefore made at half-stroke, and for the remainder of the stroke the steam between said piston and the abutment acts expansively. By a change in the relative lengths of the shell and disk ports the point of cut-off may be varied to any desired extent.

The ports g are shown remote from the abutment and in position for that one which is acting as an exhaust (according to the direction in which the engine is being run, said engine being reversible) to begin to discharge steam as soon as the latter ceases to act; but these ports may be otherwise placed, if desired. Manifestly the ports g or passages G may connect directly with supply and exhaust pipes without the intervention of the reversing-valve A^2, and the ports in the shell and in the rotating disk may be variously placed and proportioned to give any desired modification of pressure or extent of expansive action.

In duplex engines of the character herein described, or, in other words, in engines having parallel flanges $c\,c'$, with the intervening annular steam-space c^2 on both sides of the disk C, the pistons heretofore employed on one side of the engine have been separate from those employed upon the other side. It is another of my improvements to make the pistons for both sides of the engine integral or continuous, as shown in Figs. 1 and 6. To accommodate these continuous or double pistons, continuous slots c^3 are cut entirely through from side to side of the disk C, and to favor the cutting of said grooves the opposite outer flanges $c\,c$ are made separate from the central portion of the disk, upon which are formed the inner flanges $c'\,c'$. The web c^6, sustaining the outer double flange from the inner or central portion of the disk, may be integral with either of these parts of said disk or it may be separate from both. The slots for the reception of the pistons of course extend through this web portion of the disk and are prolonged into the outer flanges c, as indicated at c^5.

The formation of the pistons as described—that is, each extending entirely across the disk of the duplex engine—gives the advantage of greater ease and certainty of movement on the part of said pistons in their slots, an eccentric being employed in each side of the engine and being engaged with the adjacent inner corner of each piston.

I claim as my invention—

1. In a rotary engine, the combination, with the inclosing casing, of a rotating part therein provided with an annular groove in its lateral face and having one or more pistons, an inlet port or passage in the side of the casing opposite the ungrooved portion of the lateral face of the rotating part, and an inlet-passage in the rotating part and extending from the ungrooved portion of the lateral face thereof to the groove, said latter passage being adapted to intermittently register with the passage in the casing, substantially as described.

2. In a rotary engine, the combination, with the inclosing casing having a lateral inlet-passage, of a rotating part having its lateral face in contact with said shell and normally closing said inlet, an annular groove in said lateral face, a series of movable pistons carried by said rotating part, and a corresponding series of passages in said part, each extending from the ungrooved face thereof to the groove and arranged to successively coincide with the passage in the shell, said passages in the shell and rotating part being proportioned and arranged with reference to the pistons to deliver steam through only a part of the movement of an acting piston, whereby a portion of the piston's stroke is

made by the expansive action of the steam, substantially as described.

3. In a rotary engine, the combination, with a rotating part or member and a radially-movable piston, of a stationary circular eccentric and a ring fitting and rotating on the eccentric and engaged with the piston.

4. In a rotary engine, the combination of a rotating part carrying a series of radially-movable pistons, a stationary circular eccentric, a ring fitting and rotating on said eccentric and provided with an annular groove or shoulder, and a series of shoes having sliding engagement with said groove or shoulder of the ring and pivoted to the pistons.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

FREDERICK MEYER.

Witnesses:
M. E. DAYTON,
C. C. POOLE.