No. 700,007. Patented May 13, 1902.

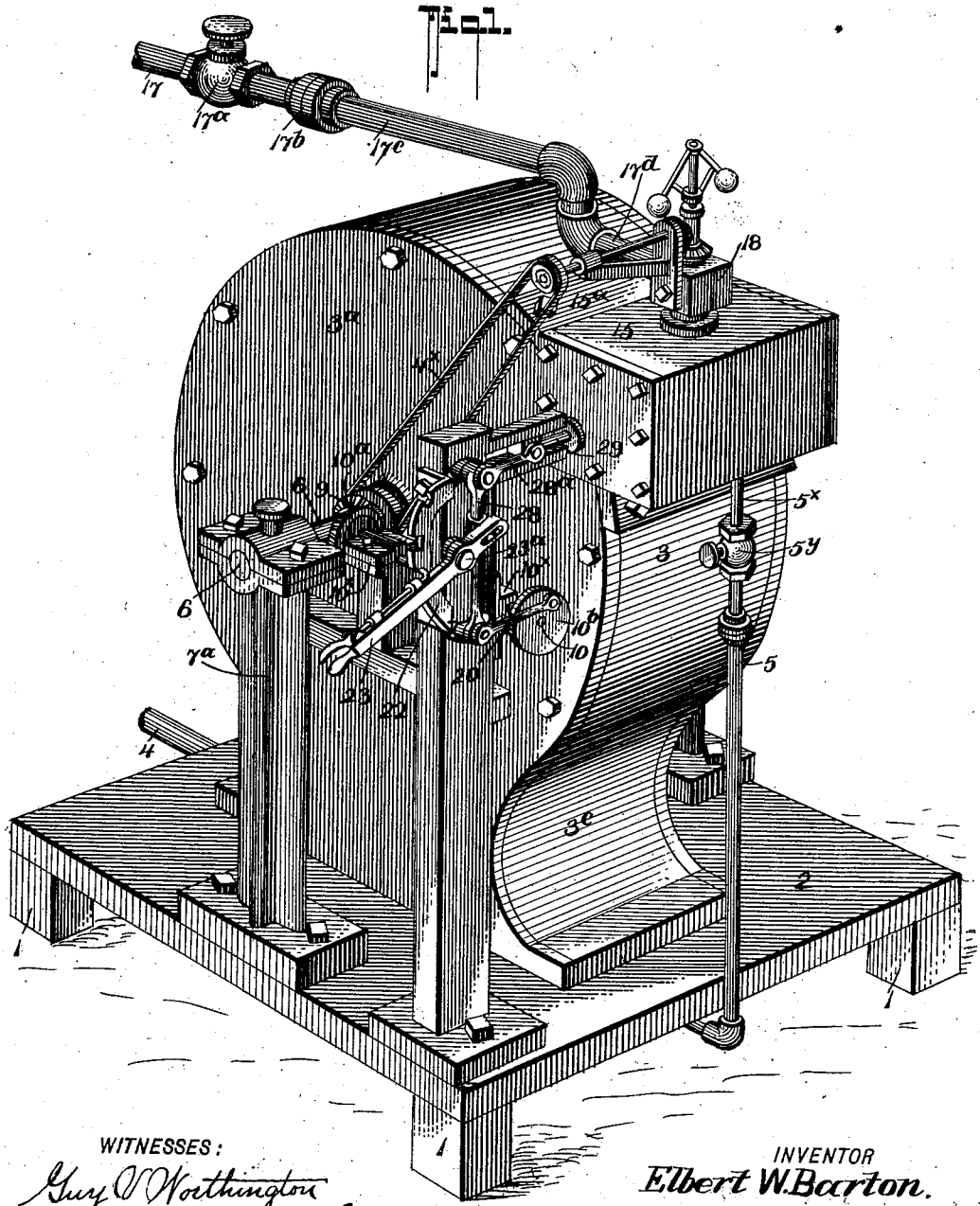
E. W. BARTON.

ROTARY ENGINE.

(Application filed Sept. 4, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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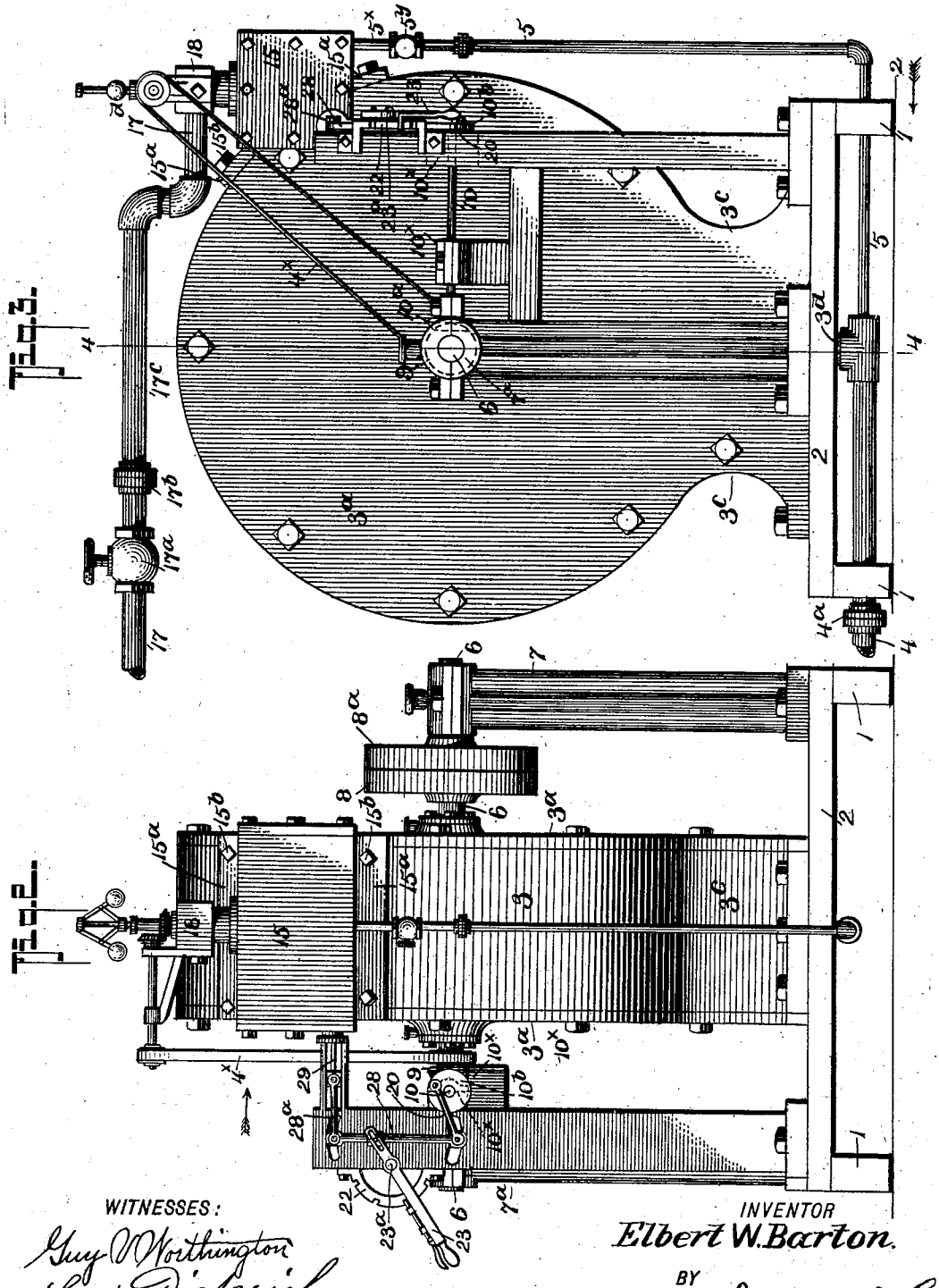

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(No Model.) 4 Sheets—Sheet 3.

Fig. 5.

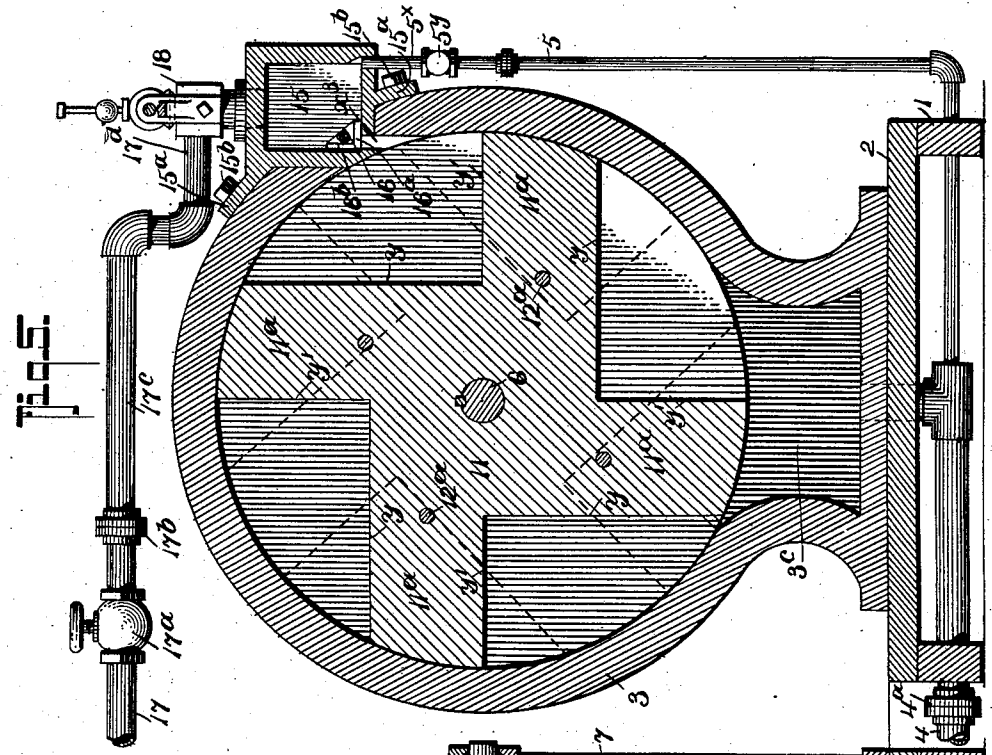
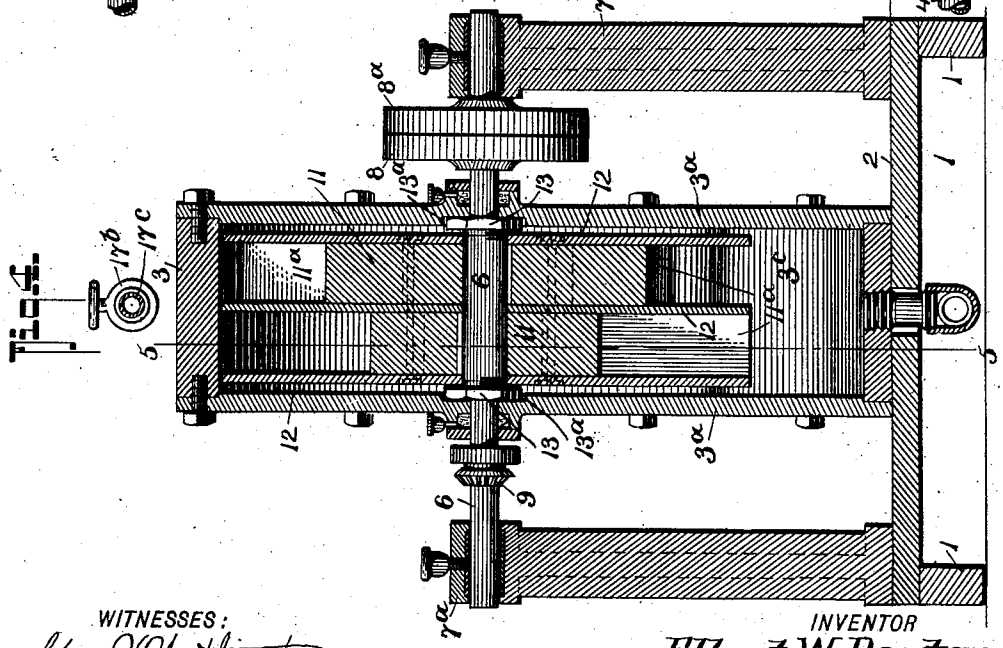


Fig. 4.



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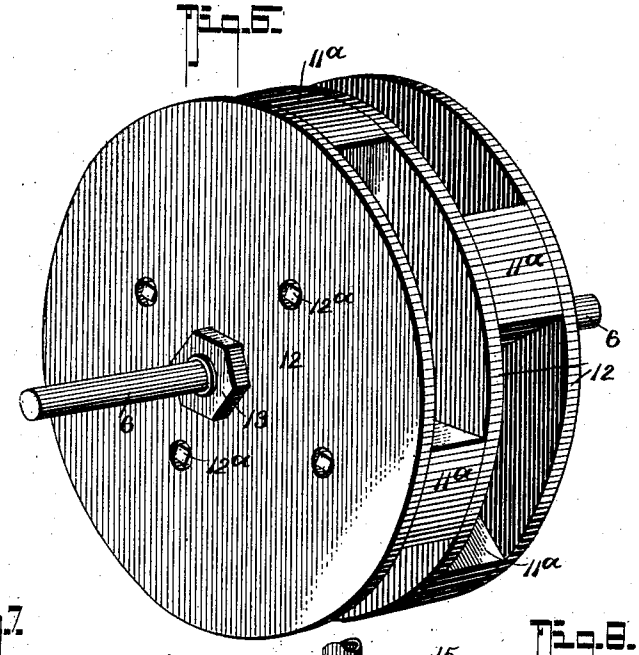


FIG. 7.

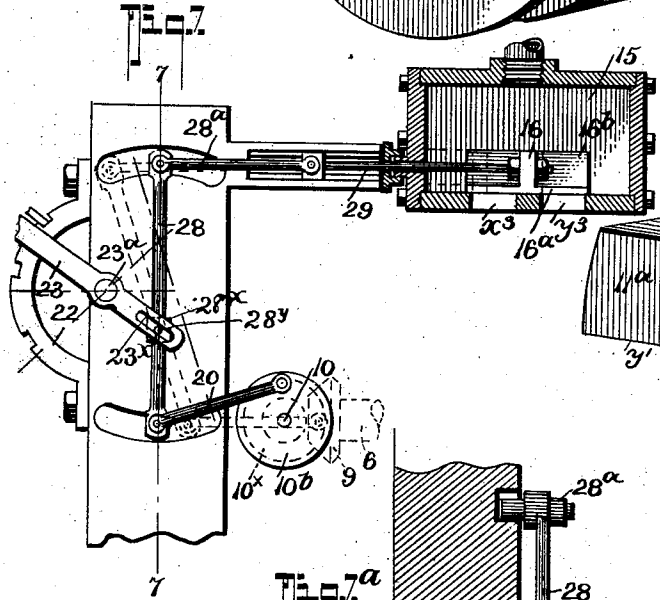


FIG. 8.

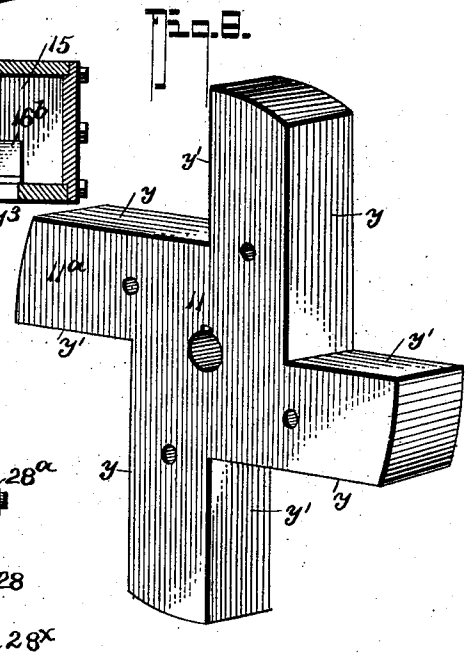
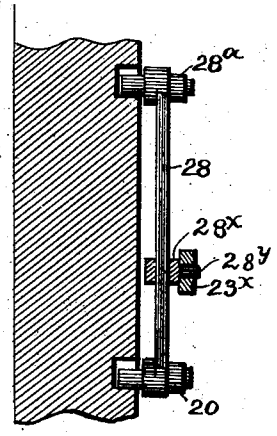


FIG. 7a.



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UNITED STATES PATENT OFFICE.

ELBERT W. BARTON, OF WINDSOR, NEW YORK.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 700,007, dated May 13, 1902.

Application filed September 4, 1901. Serial No. 74,304. (No model.)

To all whom it may concern:

Be it known that I, ELBERT W. BARTON, residing at Windsor, in the county of Broome and State of New York, have invented a new and Improved Rotary Engine, of which the following is a specification.

My invention relates to improvements in that class of rotary engines having concentric pistons; and it comprehends generically a casing, a piston having removable heads and formed of a plurality of sections joined to move in unison, and each section having radially-projecting abutments or fluid-pressure-impacting surfaces; and in its more complete nature my invention embodies a new and novel correlation of an annular piston-chamber, concentrically-arranged pistons, a steam-chest forming a coöperative part of the piston-chamber, a variable cut-off operating within the steam-chest, governor devices, and cut-off-regulating means combined and arranged in such manner as to produce an engine of this character of a compact but stable form which can be conveniently and economically built and effectively serve for its intended purposes.

In its more subordinate features my invention consists in certain novel details of construction and peculiar combination of parts, all of which will hereinafter be fully explained, and particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my improved rotary engine, the several parts being shown in an operative position. Fig. 2 is an end elevation of my improved engine viewed in the direction of the arrow 2 in Fig. 3. Fig. 3 is a side view of the same looking in the direction of the arrow in Fig. 2. Fig. 4 is a vertical longitudinal section of the same, taken on the line 4 4 of Fig. 3. Fig. 5 is a transverse section on the line 5 5 of Fig. 4. Fig. 6 is a perspective view of the piston. Fig. 7 is a detail view of the steam-chest, the cut-off operating therein, and the cut-off-controlling mechanism. Fig. 7^a is a section on the line 7 7 of Fig. 7. Fig. 8 is a detail perspective view of one of the piston members.

Referring now to the accompanying drawings, in which like characters indicate like parts in all the figures, 1 designates a suitable foundation, upon which is mounted the base-plate 2, to which the piston-holding casing is bolted. The piston-casing comprises an annular body portion 3 and the end or cap plates 3^a 3^a, which are bolted to the body 3 in any approved manner. The lower end of the casing is restricted, as at 3^e, to form an exhaust-compartment, which has a discharge in the nature of a pipe 3^d, that joins with the union-coupling 4^a, with which joins a valved offtake-pipe 4 and a second pipe 5, the purpose of which will hereinafter be explained.

6 designates a drive-shaft mounted to extend centrally through the casing, one end of which is journaled in the standard 7, and said end carries a fast and a loose pulley, (indicated by 8 8^a.) The other end of the shaft is mounted in a standard 7^a, and said end has a beveled gear 9, held to mesh with a similar gear 10^a, mounted on a drive-shaft 10, journaled in suitable bearings 10^x 10^x, formed on the extensions of standard 7^a and which has a crank member 10^b, the reason for which will presently appear.

The piston, which is concentrically arranged within the casing, in the drawings is illustrated as formed by two sections; but I desire it understood that the same may consist of a single member or three or more, if desired. Each of the disk members in the construction shown consists of a body portion 11 and a series of equally-spaced radial wings or abutments 11^a, the outer edges of which are concentric with and travel close up to the inner surface of the annular casing-body 3.

In the present case each disk-section has four wings or abutments, which are formed by cutting out the sections at quarters and on lines cut at right angles to each other, whereby to form four pockets, whose walls y y' are at right angles to each other, and the wall y' of each pair or mates are diametrically opposite and radiate from the axis of the drive-shaft.

In assembling the two piston-sections the radial abutments of one section are set relatively to the other, so as to alternate with each other, such arrangement being provided to produce, as it were, eight separate and distinct abutments, so that during one rotation of the piston it will have been under eight

distinct live or direct fluid-pressure impulses. By such arrangement of parts it is manifest that at all times the piston will be receiving a direct impulse of live steam or other fluid-pressure that may be discharged through the feed-ports.

The piston-sections are joined to form one complete rotary piston by the head-plates 12, (see Figs. 1 and 5,) bolted to the piston members by bolts 12^a, as shown, and the piston is mounted on the drive-shaft, and to properly center it adjusting-nuts 13 13 are fitted thereon and to seat in recesses 13^a in the cylinder-head, as clearly shown in the said figure.

15 designates a steam-chest, which is disposed tangentially to and is fixedly mounted on the annular casing by the flanges 15^a and bolts 15^b. This chest has two ports x^3 y^3, one for each piston-section, which are controlled by a shifting cut-off or slide 16 in the nature of an angle-plate, the bottom member 16^a of which is held to slide over to alternately cover and uncover the ports x^3 and y^3, while its vertical member 16^b is held to abut the front wall of the steam-chest 15 and be guided in its movement thereby.

17 designates the feed-pipe, which has a safety globe-valve 17^a and a union connection 17^b with a pipe-section 17^c, which empties into a pipe-section 17^d, equipped with a governor-valve 18 of any approved construction and which discharges into the chest 15. The governor 18 is geared with the main drive-shaft by a belt connection 4^x, as shown.

5^x designates a drip-pipe for carrying off condensations from the supply chest or tank 15, and the said pipe 5^x connects with the pipe 5, which empties into the exhaust-pipe hereinbefore referred to. In practice the pipe 5^x has a cut-off valve 5^y, as shown.

The cut-off slide for controlling the feed to the piston-chamber is automatically operated by the shifting mechanism best shown in Figs. 1 and 7, by reference to which it will be noticed the crank member 10^b on shaft 10 is joined by a link-rod 20 with the lower end of a rocking lever-arm 28, the upper end of which is pivotally connected with a link-rod 28^a, whose other end is pivotally connected with the cut-off slide-rod 29. The lever 28 may be pivotally supported in any well-known manner to be rocked by the rotation of the crank member or disk 10^b. I prefer, however, to provide for varying the shifting action of the lever 28, and for such purpose a variable fulcrum member 28^x, slidable on the lever 28 and having a stud 28^y to engage the slotted end 23^x of the shifting bar 23, pivoted at 23^a and having a spring-latch connection with a segmental rock 22, is provided. By providing such arrangement it is manifest that by shifting the bar 23 the fulcrum-point of the lever 28 can be changed and the throw of said lever 28 varied as may be desired. In practice the opposite ends of the lever 28 may have guide rolls or projections to travel in curved slots, as shown in Figs. 7 and 7^a, said slots being of sufficient width to permit of the shiftable arc thrusts of the ends of the lever 28.

The manner in which my engine is set up for practical use and operated is best explained as follows: The casing or cylinder is first properly mounted and the rotary piston members joined by attaching the cap-plates on the opposite sides and held clamped by the nuts on the drive-shaft that engage the seats in the heads of the casing, which, after the piston is properly fitted on the shaft, are bolted tight up in place. The several parts, including the governor, the cut-off slide, and the slide-adjusting mechanism, are then set in proper position for operation. When steam-pressure is high enough, the feed-pipe to steam-chest is opened to fill said chest, the offtake-pipe to said chest being opened long enough to draw off condensation in the chest. The handle-lever 23 is raised one notch, which is sufficient to start the engine slowly, and to increase the speed and power the said lever is adjusted accordingly, and said speed is governed by the governor in the usual manner. To stop the engine, the handle 23 is shifted back to first notch. If long stop is desired, steam is cut off by closing the globe-valve in the feed-pipe.

From the foregoing, taken in connection with the accompanying drawings, it is thought the complete operation and advantages of my invention will be readily understood.

By reason of the peculiar construction of the several parts, particularly that of the two-part piston, the steam-chest, with its two ports x^3 y^3, one for each section of the piston, and the means for shifting the slide-valve 16, the port x^3 will be opened to coöperate successively with the pockets or steam-receiving chambers of one of the piston-sections to feed the live steam into said pockets as the rear edges of wings or abutments just begin to uncover the said port x^3 and at the same time close off the port y^3 from the pockets of the other piston-section and to likewise cut off the live steam through the port x^3, as the wings 11^a, that coöperate therewith, pass the port x^3 and open the port y^3 to discharge against the radial abutments 11^a of the other piston-section, such arrangement of parts providing, as it were, a substantially continuous direct live-steam pressure against the piston.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the casing having an annular steam-chamber, having a single exhaust, a rotary piston consisting of two separate sections, each having radial abutments and steam-pockets, those on one section being disposed intermediate those of the other section, and means for clamping the two sections to form a single rotary piston; of a steam-chest forming an attached part of the casing, a governor-regulated feed-pipe there-

to, said chest having two independent ports that discharge into the piston-chamber, one for each piston-section, a single cut-off slide for controlling the said feed-ports, gearing connecting the said slide with the engine drive-shaft, said gearing including means for varying the movement of the cut-off slide, for the purposes specified.

2. In a rotary engine, as described, the combination with the annular casing having a single exhaust, and a steam-chest forming an attached part of the casing, and having two separated ports discharging into the piston-chamber, and the rotary concentrically-operating piston, said piston having two independent sets of abutments and steam-pockets alternately arranged relatively to each other; of a cut-off slide for controlling the steam-ports to the piston-chamber, said slide consisting of an angle-plate having one member engaging and guided by the side wall of the casing, and its other member slidable over the steam-ports, and mechanism connected with and automatically operated by the drive-shaft for shifting said cut-off to alternately open and close the steam-ports, said mechanism including means for varying the throw of said cut-off slide, for the purposes specified.

3. In a rotary engine of the character described, the combination with the casing having a single exhaust, an offtake-pipe therefor, and the rotary piston formed of sections each having independently-operating abutments and steam-pockets; of the steam-chest mounted on the casing, a valved drip-pipe connected with the casing and the exhaust offtake-pipe, said chest having two ports discharging into the piston-chamber, a feed for the steam-chest having governor devices, operated from the drive-shaft, a cut-off slide operating within the said chest for controlling the steam-ports, and means energized from the drive-shaft for shifting the cut-off, said means including hand set devices for regulating the speed of said cut-off movement, as set forth.

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