

(No Model.)

3 Sheets—Sheet 1.

C. A. FISHER.
ROTARY ENGINE.

No. 545,063.

Patented Aug. 27, 1895.

Fig. 1.

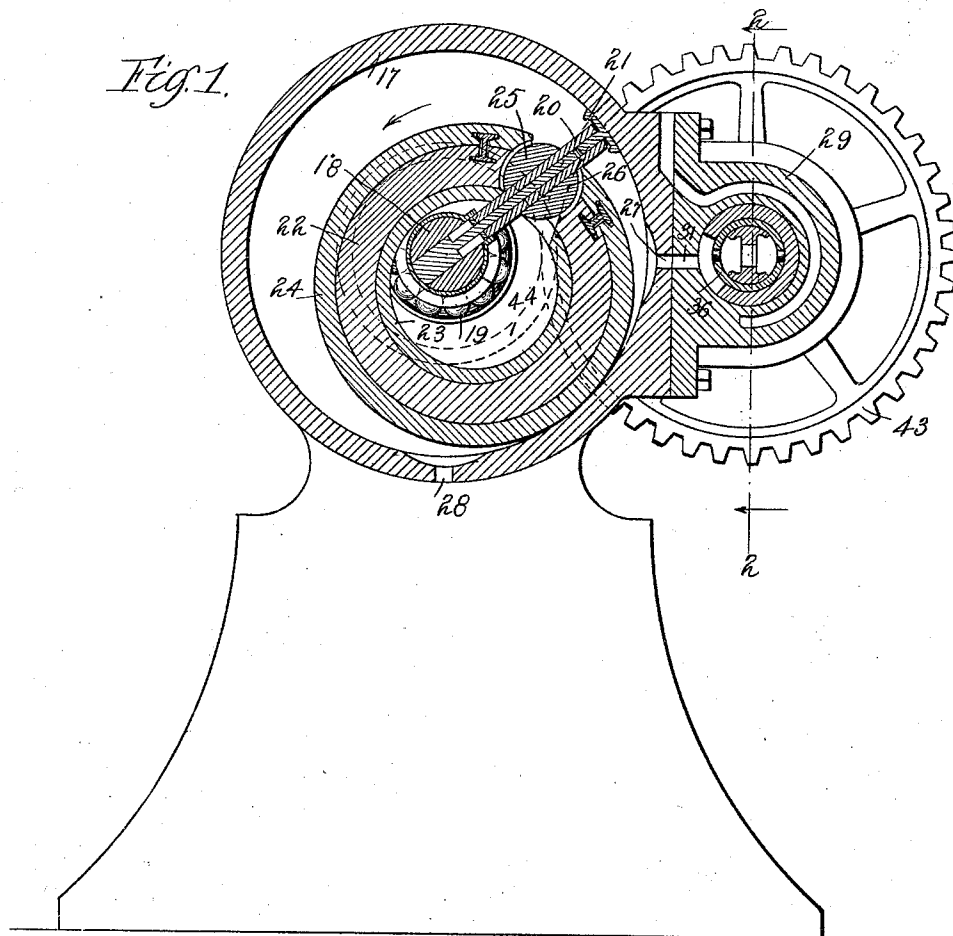
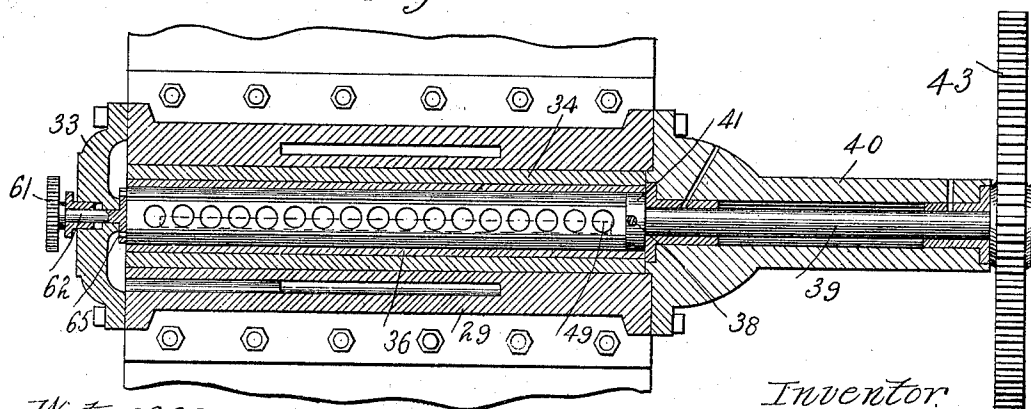


Fig. 2.



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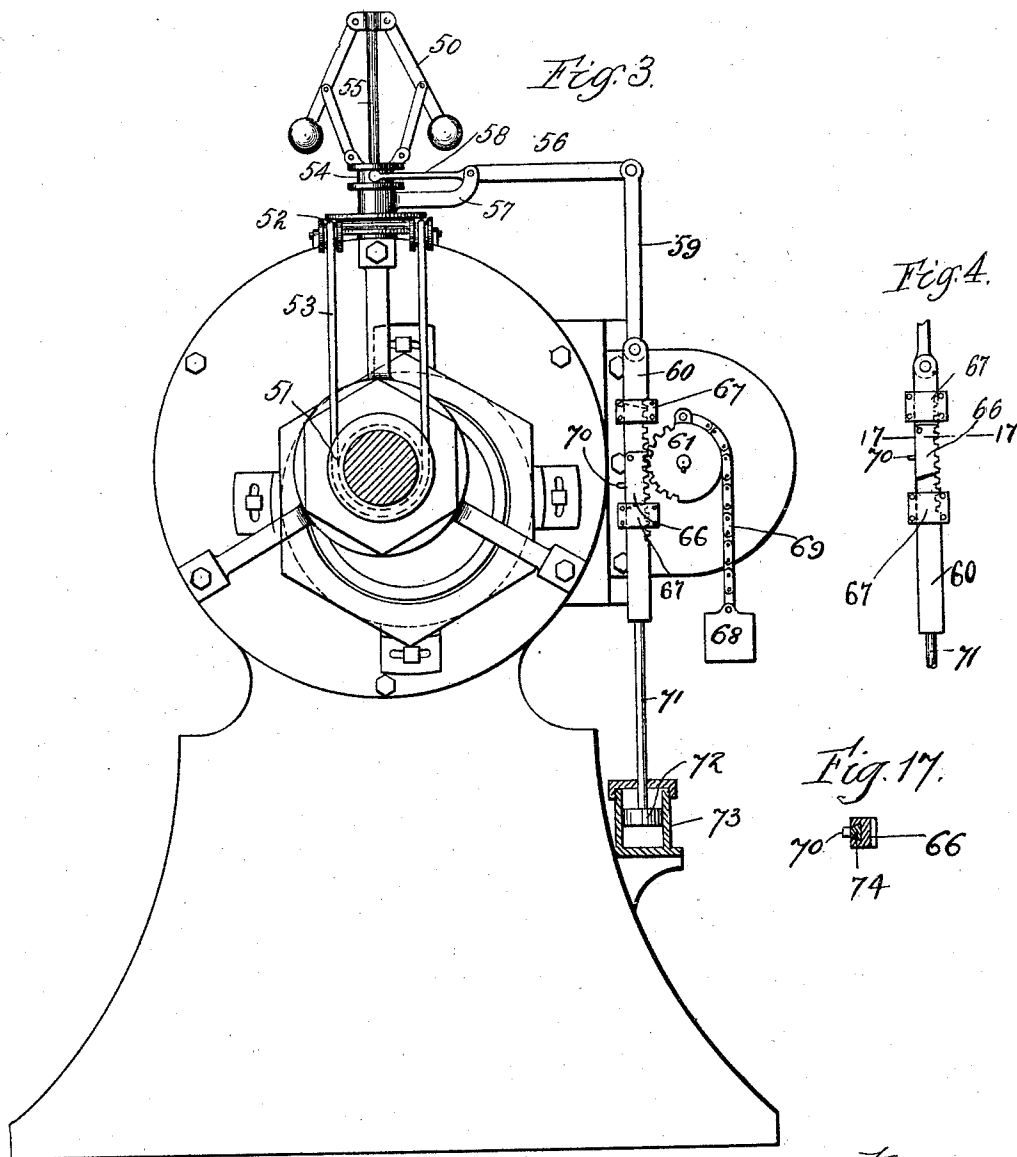
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3 Sheets—Sheet 2.

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ROTARY ENGINE.

No. 545,063.

Patented Aug. 27, 1895.



Witnesses.

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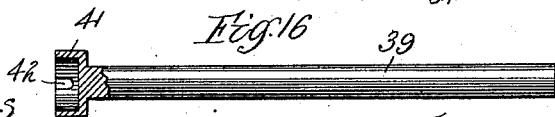
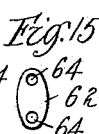
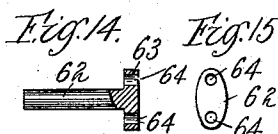
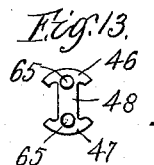
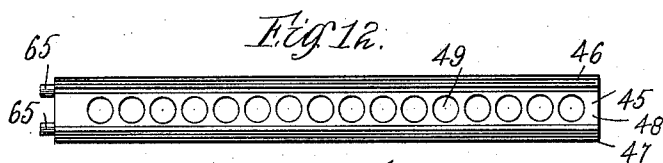
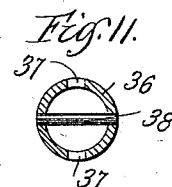
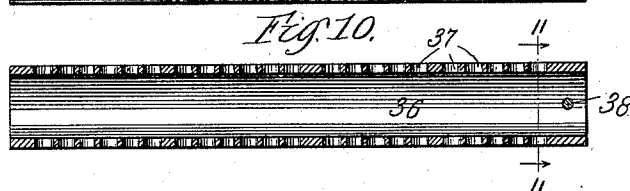
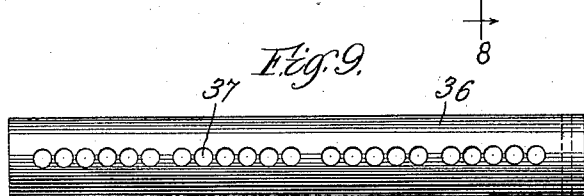
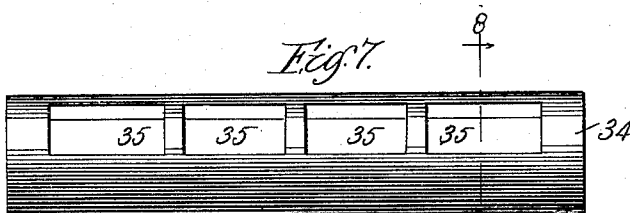
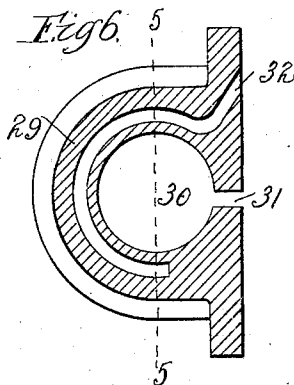
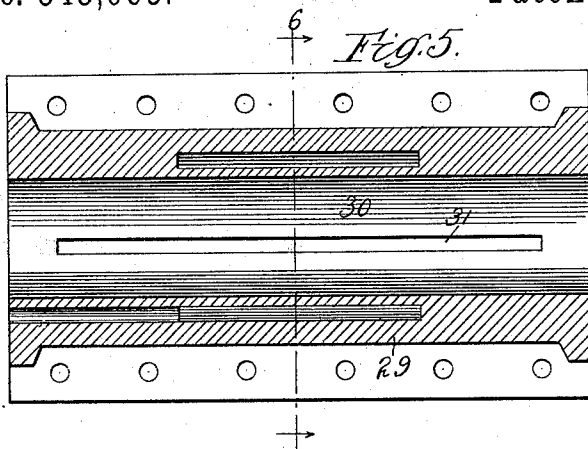
(No Model.)

3 Sheets—Sheet 3.

C. A. FISHER.
ROTARY ENGINE.

No. 545,063.

Patented Aug. 27, 1895.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES A. FISHER, OF PETERSBURG, ILLINOIS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 545,063, dated August 27, 1895.

Application filed November 13, 1894. Serial No. 528,696. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. FISHER, a citizen of the United States, residing at Petersburg, in the county of Menard and State of Illinois, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had to the accompanying drawings, in which—

10 Figure 1 is a vertical cross-section of the engine and the valve mechanism, by means of which the supply of steam to the cylinder is regulated. Fig. 2 is a longitudinal vertical section on line 2 2 of Fig. 1. Fig. 3 is an
15 end view of the engine, the piston-shaft being in section. Fig. 4 is a detail, being a view of a part of the mechanism for operating the cut-off. Fig. 5 is a vertical section on line 5 5 of Fig. 6. Fig. 6 is a vertical section on line 6 6 of Fig. 5. Fig. 7 is a side
20 elevation of the inner casing of the valve-chamber. Fig. 8 is a section of the same on line 8 8 of Fig. 7. Fig. 9 is a side elevation of the induction-valve. Fig. 10 is a longitudinal sectional view of the same. Fig. 11
25 is a vertical cross-section on line 11 11 of Fig. 10. Fig. 12 is a side view of the cut-off. Fig. 13 is an end view of the same. Figs. 14 and 15 are details of the rod by which the cut-off
30 is connected to the mechanism which operates it. Fig. 16 is a detail of the rod, by means of which the induction-valve is connected to its operating mechanism. Fig. 17 is a section on line 17 17 of Fig. 4.

35 My invention relates to rotary engines, and has to do particularly with engines similar to that which forms the subject-matter of my application for patent filed September 8, 1892, Serial No. 445,365.

40 The objects of my present invention are to provide an improved rotary engine in which the supply of steam may be very accurately controlled, and to provide improved mechanism for quickly cutting off the supply of steam in case the governor is accidentally stopped.
45 I accomplish these objects as hereinafter specified, and as illustrated in the drawings.

That which I regard as my invention will be set forth in the claims.

50 Before taking up the explanation of my invention I desire to say that the engine-cylinder, the piston contained therein, and the

other parts contained in the engine-cylinder are fully described and illustrated in my former application above referred to, and, separately considered, do not form a part of my present invention. I have shown such parts, however, for the reason that my improvements have been adapted to an engine of such construction, and I therefore chose to explain them in connection therewith; but I wish it to be understood that my improvements may be applied to any other engine to which they may be adapted.

In the drawings, 17 indicates the cylinder 65 of the engine, through which extends a shaft 18, which is mounted in suitable bearings in the heads of the cylinder, preferably ball-bearings 19 being provided.

20 indicates the piston of the engine, which 70 is mounted in the shaft 18 and is securely connected thereto. The length of the piston 20 is slightly less than that of the interior length of the cylinder 17 and its width is such that its outer edge terminates near the interior circumference of the cylinder. The piston 75 carries a shoe 21, which is adapted to bear against the inner surface of the cylinder as the piston rotates.

22 indicates a tubular wheel, which is mounted 80 upon a sleeve 23, extending eccentrically through the cylinder 17 and mounted in suitable bearings.

24 indicates an outer casing for the piston-wheel 22. 85

25 26 indicate segmental blocks, which bear against the opposite sides of the piston 20, as shown in Fig. 1.

27 indicates an induction-port in the cylinder 17, and 28 an eduction-port. 90

The arrangement of the various parts is such that steam being admitted through the induction-port 27 causes the piston 20 to move in the direction indicated by the arrow in Fig. 1, back action of the steam being prevented by the fact that the outer casing 24 95 contacts with the inner surface of the cylinder 17 between the induction and eduction ports, as illustrated. When the piston passes the eduction-port 28, the escape of the exhaust-steam is permitted. 100

The parts above described are all fully described in my application above referred to.

29 indicates what may be termed a "steam-

chest," which is secured to the cylinder 17 over the inlet-port 27, as shown in Fig. 1. Within the steam-chest 29 is a cylindrical valve-chamber 30, which communicates with the inlet-port 27 by a port 31, as shown in Figs. 1 and 6.

32 indicates a steam-passage, which extends around the valve-chamber 30 and to one end of the steam-chest 29, as shown in Figs. 2 and 5. A cap 33 is provided over such end of the steam-chest, so that the steam is directed from the passage 32 into the end of the valve-chamber 30. The passage 32 communicates with a suitable source of steam-supply.

Within the valve-chamber 30 is an interior lining 34, which is cylindrical in shape, and is provided with a number of ports 35, each of which subtends an angle of about forty-five degrees, as shown in Fig. 1. The lining 34 is fixedly secured in place in the chamber 30, its position being such that the ports 35 afford communication between the port 31 and the interior of the valve-chamber 30, as shown in Fig. 1.

36 indicates a hollow cylindrical valve, which fits snugly inside the lining 34, as shown in Fig. 1. The valve 36 is provided with one or more rows of perforations 37, two of such rows located opposite each other being preferably used, as shown in Figs. 1 and 10, so that during a portion of each half-revolution of the valve 36 one of said rows of perforations will be opposite the ports 35, as shown in Fig. 1.

At one end the valve 36 is provided with a cross-pin 38, as shown in Figs. 2 and 11 and indicated by dotted lines in Fig. 9.

39 indicates a shaft, which is mounted in suitable bearings in a sleeve 40, connected to one end of the steam-chest 29, one end of which shaft carries a cap 41, having a slot 42 in its end, which slot is adapted to receive the pin 38, the cap 41 being adapted to fit into the end of the valve 36, as shown in Fig. 2. By this construction when the shaft 39 is rotated the valve 36 will also be rotated. Upon its outer end the shaft 39 carries a gear-wheel 43, which meshes with a pinion 44, indicated by dotted lines in Fig. 1. The pinion 44 is mounted upon the piston-shaft 18, and is of half the size of the gear 43. It will be evident, therefore, that as the piston-shaft 18 rotates the valve 36 will also be rotated, its rate of rotation being half that of the piston-shaft and piston. Steam will therefore be admitted to the cylinder alternately through the two rows of perforations 37, and in this way, by reducing the rate of rotation of the valve 36, the work of operating the cut-off is greatly diminished, thereby increasing the efficiency of the engine.

Should the valve 36 be provided with only one row of perforations, the pinion 44 would be of the same diameter as the gear 43, and in case the valve 36 should have three rows of perforations the pinion 44 would be one-third the diameter of the gear 43, the relative sizes of said gear and pinion being dependent

upon the number of rows of perforations in the valve 36.

In order that the supply of steam may be regulated as desired, a cut-off 45 is provided, consisting of two segmental blocks 46 47, connected by an intermediate web 48, as shown in Fig. 13, the web 48 being provided with a number of perforations 49 to permit of the free passage of steam from one side to the other of such web. The segmental blocks 46 47 subtend the same arc as the ports 35, so that the cut-off, being placed in position within the valve 36, the admission of steam to the engine cylinder may be entirely cut off by turning the cut-off 45 into such position as to cause one of the blocks 46 or 47 to lie opposite the ports 35, as when the cut-off is arranged in such position access of steam to the perforations 37 is prevented during the entire period of their movement opposite said ports 35. In like manner the admission of steam to the engine-cylinder for any desired period within the limits of the engine may be secured by properly adjusting the cut-off 45.

The cut-off 45 is automatically adjusted by means of a governor 50, which is caused to rotate by the rotation of the shaft 18 in any suitable manner, preferably by means of pulleys 51 52 and a belt 53. Connected to the governor 50 is a recessed collar 54, loosely mounted upon a vertical shaft 55, so that it is free to rise or fall as the arms of the governor are thrown outward or inward by its rotation. 56 indicates a lever, which is pivoted upon a suitable support 57, and is provided with a fork 58 at one end, which fork fits into a recess in the collar 54. The opposite end of the lever 56 is connected by a connecting-rod 59 to a rack-bar 60, which rack-bar meshes with a pinion 61, mounted upon one end of a shaft 62, journaled in the head 33, as shown in Fig. 2. The shaft 62 carries at its inner end a cross-head 63, having recesses 64, which are adapted to receive pins 65, carried in the end of the cut-off 45, as shown in Figs. 12, 14, and 15. When, therefore, the movement of the lever 56 causes the rack-bar 60 to rise or fall the cut-off 45 will be correspondingly rotated, the supply of steam being reduced when the rack-bar 60 moves upward and increased when the said rack-bar moves downward, the downward movement of said rack-bar being caused by an increase in the speed of the governor, and vice versa.

In order to provide for cutting off the steam, in case the governor is accidentally stopped, the rack-bar 60 is provided with a hinged section 66, which is normally held in operative position by a clip 67 in which it moves, the clip 67 being so placed as to permit a limited movement of the rack-bar section 66 without its becoming disengaged therefrom. When, however, the rack-bar 60 is moved up sufficiently to release the section 66 from the clip 67, such section will move over out of engagement with the pinion 61, thereby permitting such pinion to be rotated more quickly

in the same direction under the influence of a counterbalance 18, which is connected thereto by a chain 69. In this way, when the governor is accidentally stopped, the supply of steam is automatically cut off at once and the engine stopped. In order to hold the section 66 in mesh with the pinion 61, when the engine is stopped by operating the throttle, a slide 74 is provided, which is fitted in the section 66 and is adapted to be moved longitudinally thereof by means of a pin 70, the slide being flush with the surface of said section. The arrangement is such that by moving the slide 74 longitudinally of the section 66 it may be projected beyond the lower end of said section into engagement with the lower portion of the rack-bar 60, thereby locking the section 66 in operative position. When the slide 74 is so projected, the section 66 will not move back out of engagement with the pinion 61 when the engine is stopped. In order, however, to automatically disengage the slide 74 from the rack-bar 60 when the engine is started, the pin 70 is so placed that when the rack-bar 60 is moved downward upon the starting of the engine it will strike the clip 67 and be thereby moved back as the rack-bar is moved farther downward, thereby releasing the lower end of the section 66 and permitting it to fly back if the the governor is accidentally stopped, as above described.

I do not wish to limit myself to the specific devices shown for operating the rack-bar 60 from the governor, as this may be accomplished in many other ways.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with the cylinder of a rotary engine, and a valve chamber having an induction port leading to the cylinder, of a rotary hollow valve located in said chamber and having one or more openings for the passage of steam from within said valve to said induction port, means for rotating said valve, a rotary cut-off arranged within said valve and having a web provided with one or more perforations for the passage of steam from one side of the cut-off to the other and carrying a segmental block in contact with the inner surface of the valve and adapted to close the valve openings for a longer or shorter period to prevent the induction of steam to the induction port, and means for controlling the operation of the cut-off, substantially as described.

2. The combination with the cylinder of a rotary engine, a valve chamber, and an induction port leading from said chamber into said cylinder, of a rotary hollow valve having openings for the passage of steam from within the valve and into the said induction port, a pin 38 secured transversely in one end of said valve, a shaft 39 provided at one end with a cap 41 fitting into the valve and having a slot 42 engaged with said pin, means for rotating said shaft, a rotary cut-off arranged in the said valve and adapted to control the valve

openings, and means for operating said cut-off from a governor substantially as described.

3. The combination with the cylinder of a rotary engine, of a valve chamber, an induction port leading therefrom to said cylinder, a valve 36 having one or more perforations for the passage of steam from within said valve to said induction port, a rotary cut off arranged within said valve, said cut off consisting of two segmental blocks, a web connecting said blocks, said web having one or more perforations to permit of the passage of steam from one side to the other of said cut off, and means whereby said cut off may be rotated, substantially as described.

4. The combination with the cylinder of a rotary engine, of a valve chamber, an induction port leading therefrom to said cylinder, a valve 36 having one or more perforations for the passage of steam from within said valve to said induction port, a rotary cut off arranged within said valve, said cut off having a perforated web carrying a segmental block arranged in contact with the inner surface of said valve and arranged to close said perforations for a longer or shorter period to prevent the admission of steam to said induction port, means whereby said cut off may be rotated, a shaft connected to one end of said cut off, a pinion mounted upon the end of said shaft, a rack bar meshing with said pinion, a governor, and means for raising and lowering said rack bar by the movement of said governor, substantially as described.

5. The combination with the cylinder of a rotary engine, of a valve chamber, an induction port leading therefrom to said cylinder, a valve 36 having one or more perforations for the passage of steam from within said valve to said induction port, a rotary cut off arranged within said valve, said cut off having a segmental block arranged in contact with the inner surface of said valve and arranged to close said perforations for a longer or shorter period to prevent the admission of steam to said induction port, means whereby said cut off may be rotated, a shaft connected to one end of said cut off, a pinion mounted upon the end of said shaft, a rack bar meshing with said pinion, a governor, means for raising and lowering said rack bar by the movement of said governor, said rack bar having a movable section, means for holding said movable section normally in operative position and for releasing said movable section when said rack bar is raised above a certain point, and means for automatically operating the cut off to shut off steam when said rack bar is disengaged therewith, substantially as described.

6. The combination with the cylinder of a rotary engine, of a valve chamber, an induction port leading therefrom to said cylinder, a valve 36 having one or more perforations for the passage of steam from within said valve to said induction port, a rotary cut off arranged within said valve, said cut off having a segmental block arranged in contact

with the inner surface of said valve and arranged to close said perforations for a longer or shorter period to prevent the admission of steam to said induction port, means whereby
5 said cut off may be rotated, a shaft connected to one end of said cut off, a pinion mounted upon the end of said shaft, a rack bar meshing with said pinion, a governor, means for raising and lowering said rack bar by the movement of said governor, and means for automatically operating said cut off to shut off the supply of steam when said governor stops, substantially as described.

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Witnesses:

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