

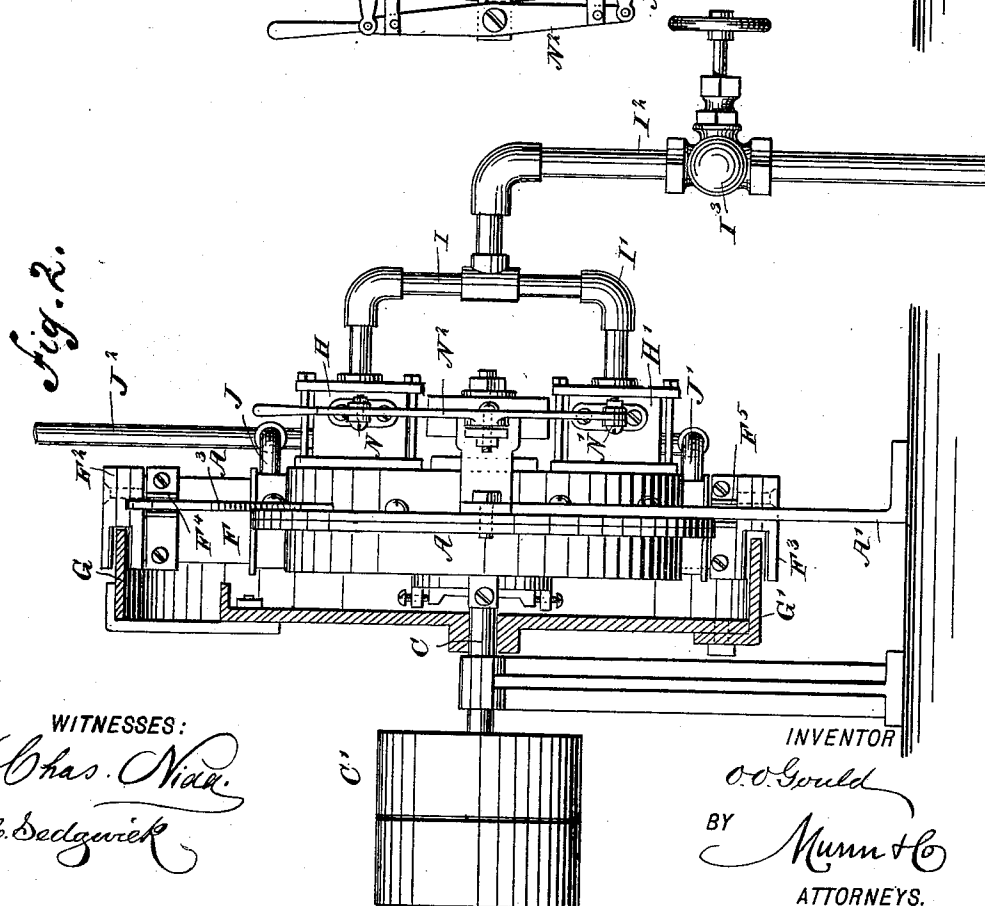
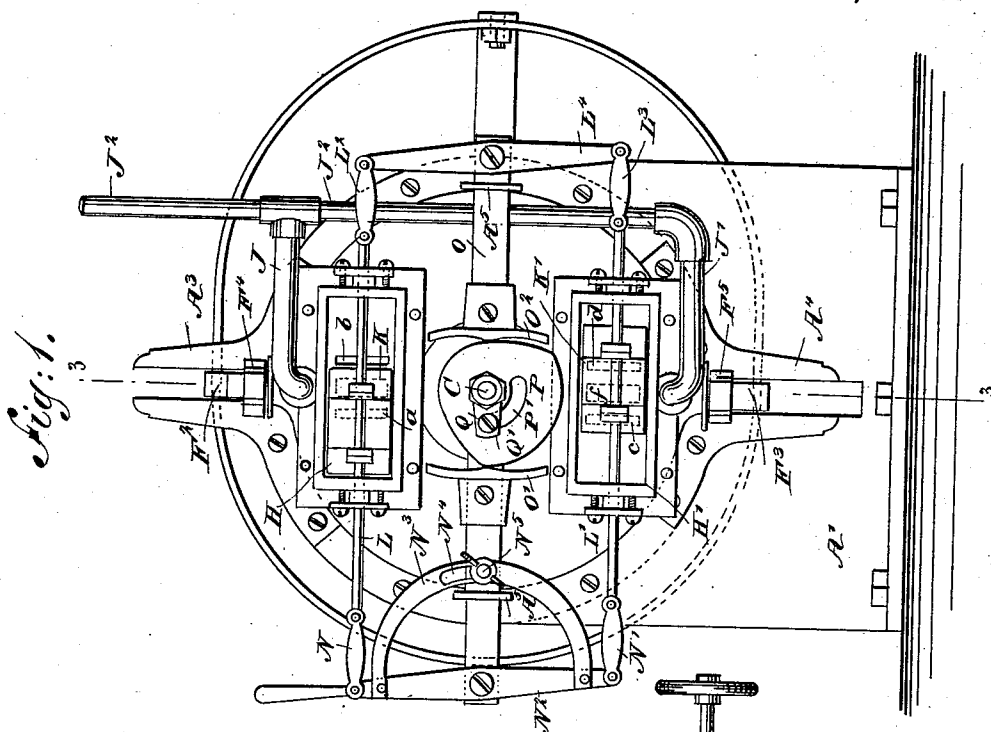
(No Model.)

O. O. GOULD.
ROTARY ENGINE.

4 Sheets—Sheet 1.

No. 506,999.

Patented Oct. 17, 1893.



WITNESSES:

Chas. Nick.
C. Sedgwick

INVENTOR

O. O. Gould
BY *Munn & Co*
ATTORNEYS.

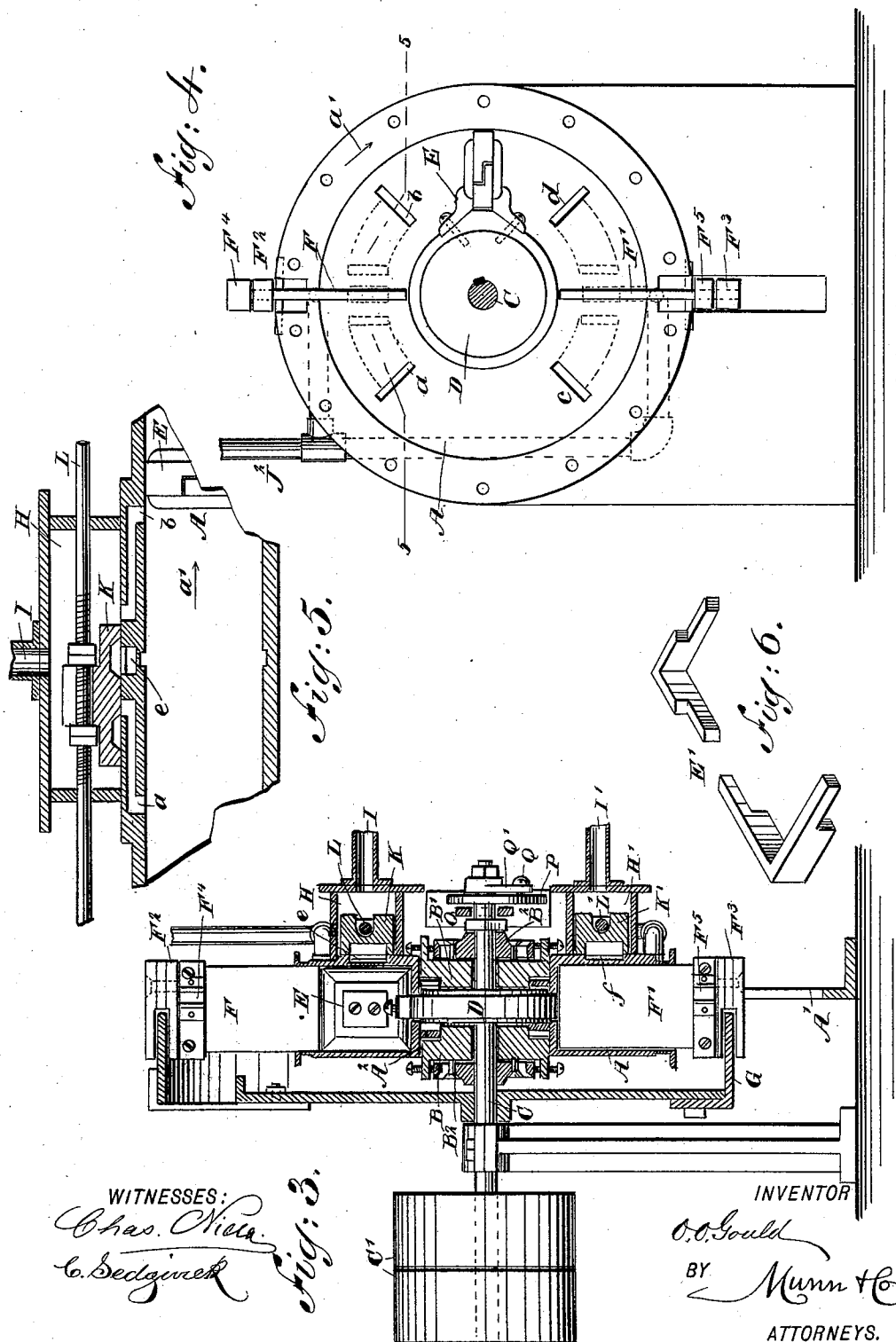
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4 Sheets—Sheet 2.

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4 Sheets—Sheet 3.

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Fig. 8.

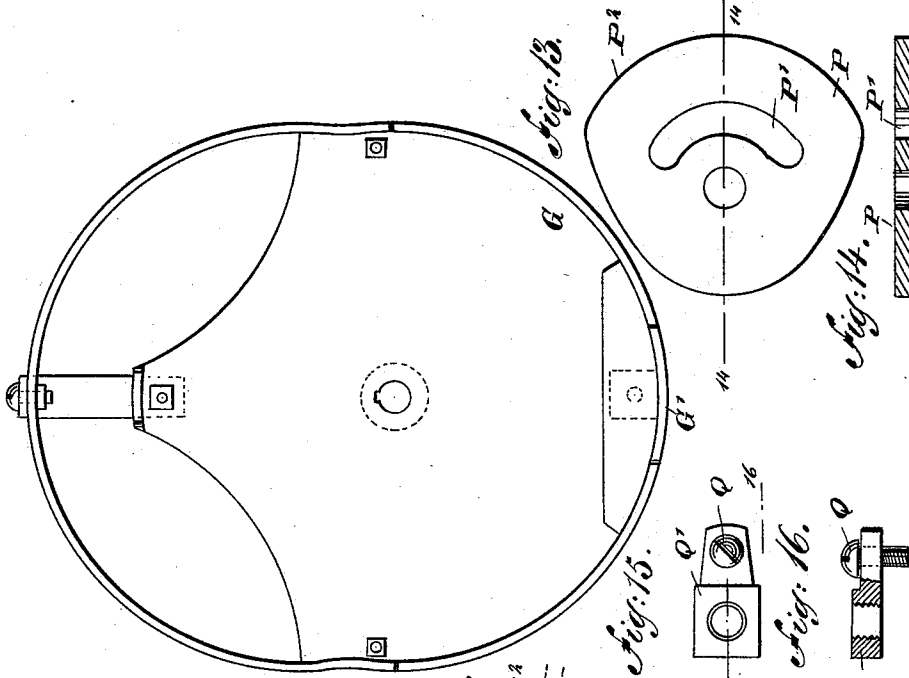


Fig. 7.

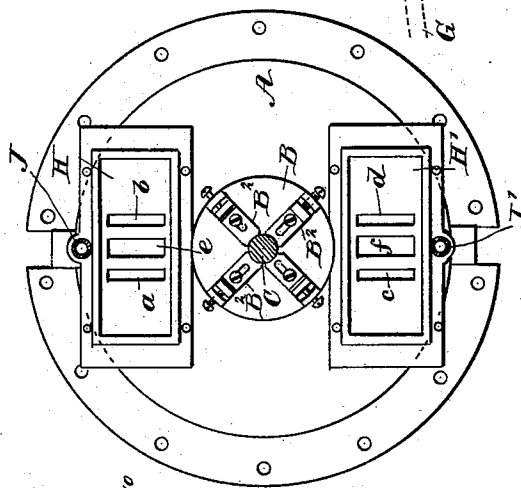


Fig. 11.



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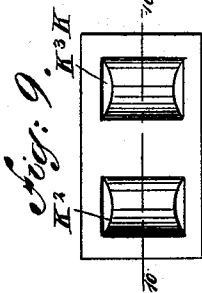
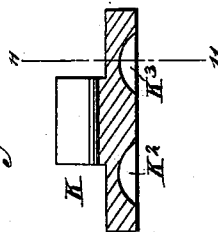


Fig. 10.



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4 Sheets—Sheet 4.

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Fig: 17.

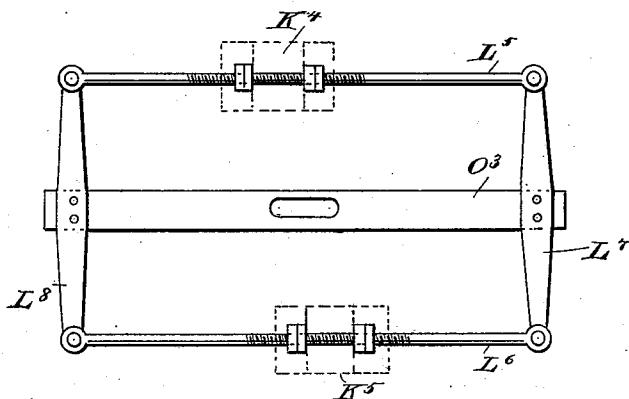


Fig: 18.

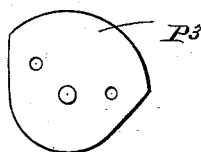
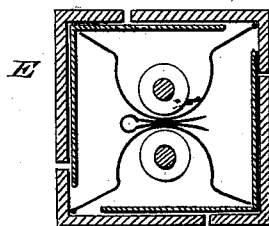


Fig: 19.



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UNITED STATES PATENT OFFICE.

ORALDUS ORVEL GOULD, OF SPRINGDALE, MICHIGAN.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 506,999, dated October 17, 1893.

Application filed May 31, 1893. Serial No. 476,081. (No model.)

To all whom it may concern:

Be it known that I, ORALDUS ORVEL GOULD, residing in Springdale township, near Cope-
5 Michigan, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary engine, which is
10 simple and durable in construction, very effective in operation, adapted to be reversed, and arranged to utilize the motive agent economically and to the fullest advantage.

The invention is an improvement in the class of rotary engines having a cylinder pro-
15 vided with steam chests, valves and gates on opposite sides of the shaft.

The improvement consists in the construction, arrangement and combination of parts
20 hereinafter described and claimed.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter described and then pointed out in the claims.

25 Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is an end elevation of the same, with the cam for moving the gates shown in section. Fig. 3 is a transverse section of the improvement on the line 3—3 of Fig. 1. Fig. 4 is a side elevation of the improvement with
30 one-half of the cylinder removed. Fig. 5 is an enlarged sectional plan view of the same on the line 5—5 of Fig. 4. Fig. 6 is a perspective view of the packings for the piston arm. Fig. 7 is a side elevation of the cylinder with
40 the steam chest covers and the slide valves removed. Fig. 8 is a face view of the cam for moving the gates. Fig. 9 is an enlarged rear face view of one of the slide valves. Fig. 10 is a sectional plan view of the same on the line 10—10 of Fig. 9. Fig. 11 is a cross section of the same on the line 11—11 of Fig. 10. Fig. 12 is an enlarged side elevation of one of the gates. Fig. 13 is an enlarged face view of one of the cams for shifting the slide valves. Fig. 14 is a sectional side elevation of the same
50 on the line 14—14 of Fig. 13. Fig. 15 is an enlarged face view of an arm for adjusting

the said slide valve cam. Fig. 16 is a sectional side elevation of the same on the line 16—16 of Fig. 15. Fig. 17 is a face view of
55 part of the valve gear for a single or non-reversing engine. Fig. 18 is a face view of the cam for the same; and Fig. 19 is a sectional side elevation of the packing for the piston.

The improved rotary engine is provided
60 with a cylinder A preferably made in two parts bolted together, as plainly illustrated in the drawings, the said cylinder being rigidly supported on a frame A' attached to a suitable foundation or other means of support.

The cylinder A is provided with a central bore A², see Fig. 3, into which fit heads B and B' in which is journaled the main driving shaft C also journaled in a suitable bearing arranged on one side of the cylinder, as
70 plainly shown in Fig. 3, the said main driving shaft being provided with the usual pulleys C' for transmitting the power developed by the rotary engine to other machinery.

On the shaft C within the central bore A²
75 is secured a disk D projecting into the interior of the cylinder and supporting at its periphery a piston E provided with suitable overlapping and spring pressed packing plates E' engaging the sides and inner cylindrical
80 surface of the rim of the cylinder, as will be readily understood by reference to the drawings, the said packing plates being shown in detail in Figs. 6 and 19.

Into the cylinder A are adapted to pass at
85 opposite sides of the center of the cylinder the gates or abutments F and F' mounted to slide radially and guided in suitable guideways arranged in the sides of the cylinder, as indicated in detail in Fig. 12. The outer ends of
90 the gates F and F' are provided with slotted heads F² engaging the continuous rim of a cam G secured on the main driving shaft C so that when the latter revolves the said cam G turns and causes an inward and outward sliding of
95 the gates F and F', it being understood that the said cam is arranged in such a manner that during one-half of the revolution one gate remains stationary in an innermost position, while the other gate is moved outward
100 to its outermost position and back again to the innermost position, as will be readily understood by reference to Fig. 1.

In order to steady the gates F and F', I

provide the said gates with guides F^4 and F^5 respectively fitted to slide in guideways A^3 and A^4 respectively, forming part of the main frame A.

5 On the front of the cylinder A and on opposite points thereon are arranged the steam chests H and H' connected by pipes I and I' respectively with a steam supply pipe I² connected with a suitable source of steam supply
10 and provided with a valve I³ for controlling the steam passing to the said steam chests H and H'. The latter are also provided with the exhaust pipes J and J' respectively, connected with a common exhaust pipe J² for
15 carrying off the exhaust steam.

In the steam chests H and H' are mounted to slide the slide valves K and K' respectively, each provided at its under side with two cavities K² and K³, as plainly shown in Figs. 9
20 and 10. The slide valves K and K' operate over the ports a , b and c d respectively, connecting the steam chests H and H', respectively, with the interior of the cylinder A, as indicated in Fig. 4, the ports a and b being
25 arranged diametrically opposite the ports c and d respectively, and the said ports a and b are located on opposite sides of the gate F' and the other ports c and d are similarly arranged relative to the gate F'. The slide
30 valves K and K' also operate over exhaust ports e and f respectively, connecting with the exhaust pipes J and J' respectively. The ports e and f are arranged midway between the openings of the ports a and b , and c , d ,
35 respectively, in the corresponding steam chests H and H', as will be readily understood by reference to Figs. 1, 5 and 7. The slide valves K and K' are secured on valve stems L and L' respectively, extending through
40 stuffing boxes in both ends of each corresponding steam chest H or H', the said valve stems being connected at their right hand ends by the links L² and L³ with a lever L⁴ and at their left hand ends by links N and N' with
45 a hand lever N² under the control of the operator. The levers L⁴ and N² are fulcrumed at their middle on a slide O mounted to slide longitudinally in bearings A⁵ secured to the frame A'.

50 On the hand lever N² is secured a segment N³ formed with a segmental slot N⁴ engaged by a bolt N⁵ held on the slide O so that when the nut of the bolt is loosened a swinging motion can be given to the hand lever N² to
55 change the position of the slide valves K and K' to reverse the engine, as hereinafter more fully described. When the bolt N⁵, however, secures the segment N³ to the slide O, then the reciprocation motion of the latter causes
60 a reciprocating of the valves K, K' in unison in the same direction.

In order to impart a sliding movement to the slide O from the main driving shaft C, I provide the said slide with the arms O' and
55 O² located opposite each other and engaged by a cam P held loosely on the shaft C and

adapted to be carried around by the pin Q of a crank arm Q' secured on the outer end of the shaft C. The pin Q engages a segmental slot P' in the said cam P (see Figs. 1, 13 and 70
14) so as to permit of changing the position of the slide O when reversing the engine, without disturbing the position of the main driving shaft and the parts connected therewith. By reference to Figs. 1 and 13, it will
75 be noticed that part of the peripheral edge P² of the cam P is concentric, so that the valves K and K' are held stationary during part of a revolution of the shaft C and when in their outermost position in the steam chests H
80 and H'. Each full revolution of the shaft C imparts a full stroke to the right and to the left to each of the valves K and K'.

In order to properly center the main shaft C in the heads B and B', I provide the lat-
85 ter with adjustable centering arms B² arranged radially and engaging with their inner ends the said shaft, as plainly illustrated in Fig. 7.

The operation is as follows: When the sev-
90 eral parts are in the position illustrated in Figs. 1, 4 and 5, then the piston E is in an angular position in the cylinder A, and both gates F and F' are in their innermost position within the cylinder as plainly indicated
95 in said Fig. 4. The valve K now uncovers the port b while the other valve K' covers up all its ports c , d and f . The motive agent entering the pipe I passes into the steam chest H through the port b and into the cyl-
100 inder A, to act on the piston E to turn the latter in the direction of the arrow a' , thus revolving the shaft C in the same direction. When the piston E travels in this direction and rotates the shaft C then the cam P is carried
105 around by the arm Q', so that a shifting of the slide O takes place from the right to the left, whereby the valve K moves over its port b and closes the same, while the other valve K' uncovers the port c at the time the piston E has
110 passed the said port. Simultaneously with this movement the gates F and F' are shifted so that the gate F' moves outward, while the other gate F remains inward, and the motive agent entering the port c , causes a further
115 pressure on the moving piston E to rotate the latter in the direction of the arrow a' . When the valves K and K' shift, as above mentioned, the cavity K³ of the said valve K connects the port b with the port e so that the
120 steam in front of the piston E passes through the port b , the cavity K³ to the exhaust port e , and finally into the exhaust pipes J and J'. When the piston E in its onward movement nears the port b , then a shifting of the valves
125 K and K' again takes place so that the port b is uncovered at the time the piston has passed the said port while the other valve K' covers its port c and connects the ports c and
130 f , with each other. Thus, the forward movement is again given to the piston E by the motive agent entering the port b , it being un-

derstood that the shifting of the gates F and F' has taken place at the time the valves K and K' shifted. The exhaust steam in front of the piston E passes through the port c and through the cavity K² in the valve K' to the exhaust port f and from the latter to the exhaust pipes J' and J². Now, when it is desired to reverse the engine, the operator loosens the bolt N⁵ and then imparts a swinging motion to the lever N², the latter turning at its fulcrum on the slide O, whereby the valves K and K' are shifted in opposite directions, so that the ports a and d then become the inlet and exhaust ports in the manner above described relative to the ports b and c, the only difference being that the piston E and shaft C now travel in the inverse direction of the arrow a'.

For single or non-reversing engines, I arrange the valve gear as illustrated in Fig. 17, in which case the slide valves K⁴ and K⁵ are secured on the stems L⁵ and L⁶ respectively, extending to the outside of the steam chest and connected with each other at their outer ends by the arms L⁷ and L⁸ also secured on the ends of the slide O³ shifted by the cam P³ in the manner above described relative to Fig. 1.

Instead of forming the cam P³ with a slot as shown in Fig. 1, I may use two apertures for engagement with the pin Q as illustrated in Fig. 18.

The operation of the single engine is the same as the reversing engine above described with the exception that the position of the valves K⁴ and K⁵ cannot be shifted by the operator at will and a reversing is not permissible.

It will be seen that an engine of this construction utilizes the motive agent to the fullest advantage inasmuch as a full head of steam

is always on the piston until the valves change, as above described.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a rotary engine, the cylinder, the central transverse shaft, the piston revolving with the latter, steam chests and ports arranged on and in the face of the said cylinder and on opposite sides of the shaft, slide valves and rods working parallel, slide, O, levers pivoted centrally to the slide on opposite side of the shaft, and working in guides, links which connect the above rods and levers, an adjustable slotted segment attached to one of said levers, and a bolt and nut for securing the segment in different adjustments a cam P fixed on the shaft and having a portion of its periphery concentric, and provided with an are reversing slot P', crank arms Q', keyed on the shaft and having a pin that works in the cam slot, the arms O' and O², attached to the slide O, and arranged for engagement with the cam, alternately sliding gates and the cam G for operating them, all combined as shown and described.

2. In a rotary engine, the combination, with the cylinder, its shaft the steam ports and slide valves on opposite sides of the shaft rods pivoted levers and a cam for operating said valves, and a piston revolving in the cylinder, of the two gates F, F', arranged radially to the cylinder on opposite sides of the same and having the slotted heads F², and the cam G, fixed on the shaft and having a peripheral rim fitting in the slots of said heads, all as shown and described.

ORALDUS ORVEL GOULD.

Witnesses:

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ALONZO CHUBB.