No. 877,854. PATENTED JAN. 28, 1908.

A. MERCER.

ROTARY ENGINE.

APPLICATION FILED JUNE 8, 1907.

2 SHEETS—SHEET 1.

Fig. 4.

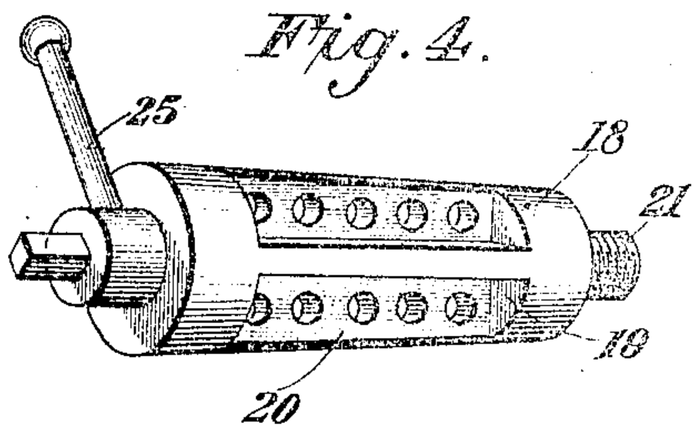
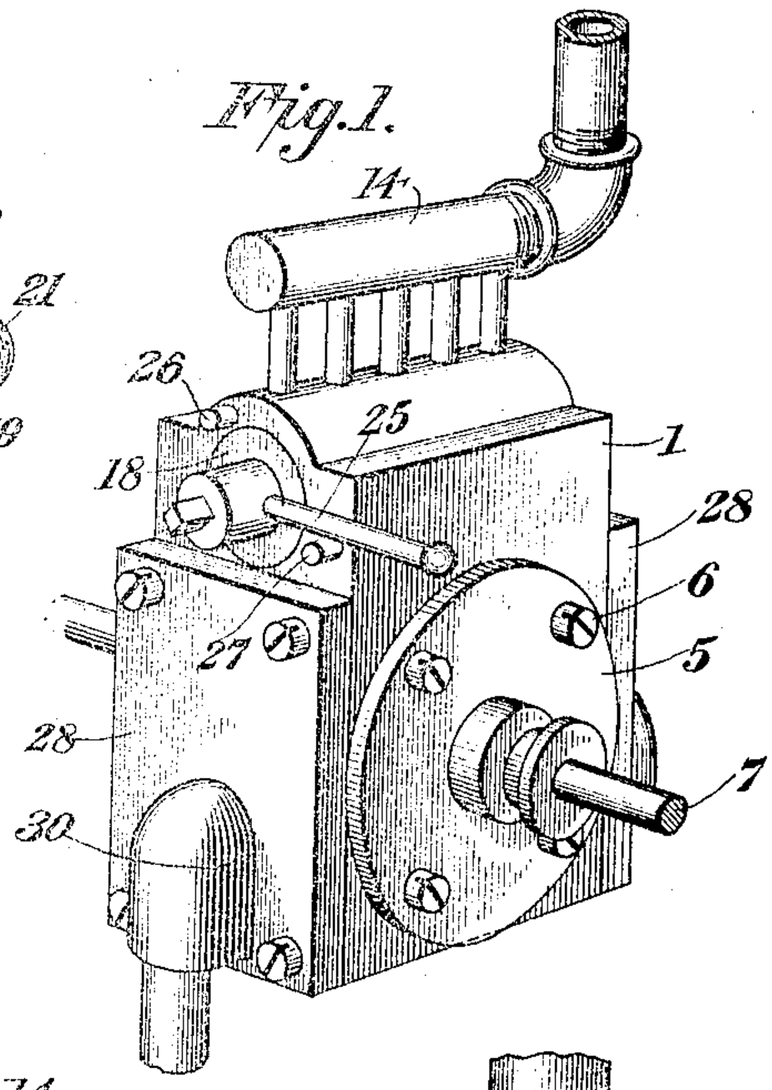


Fig. 1.



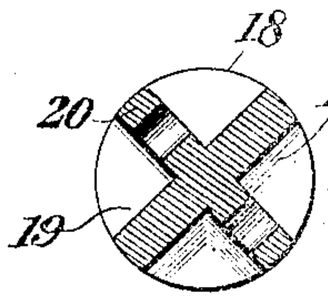
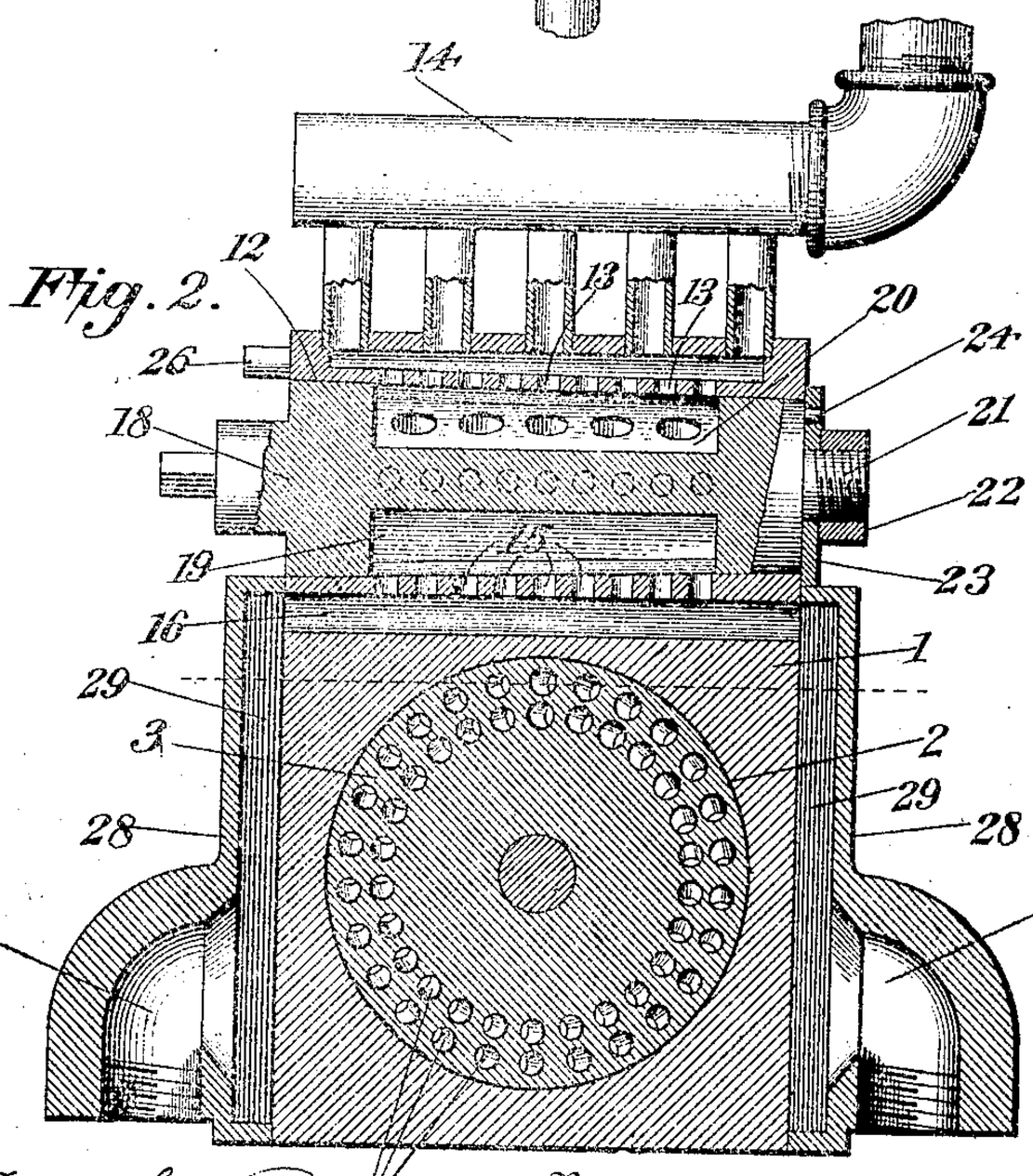


Fig. 5.

Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

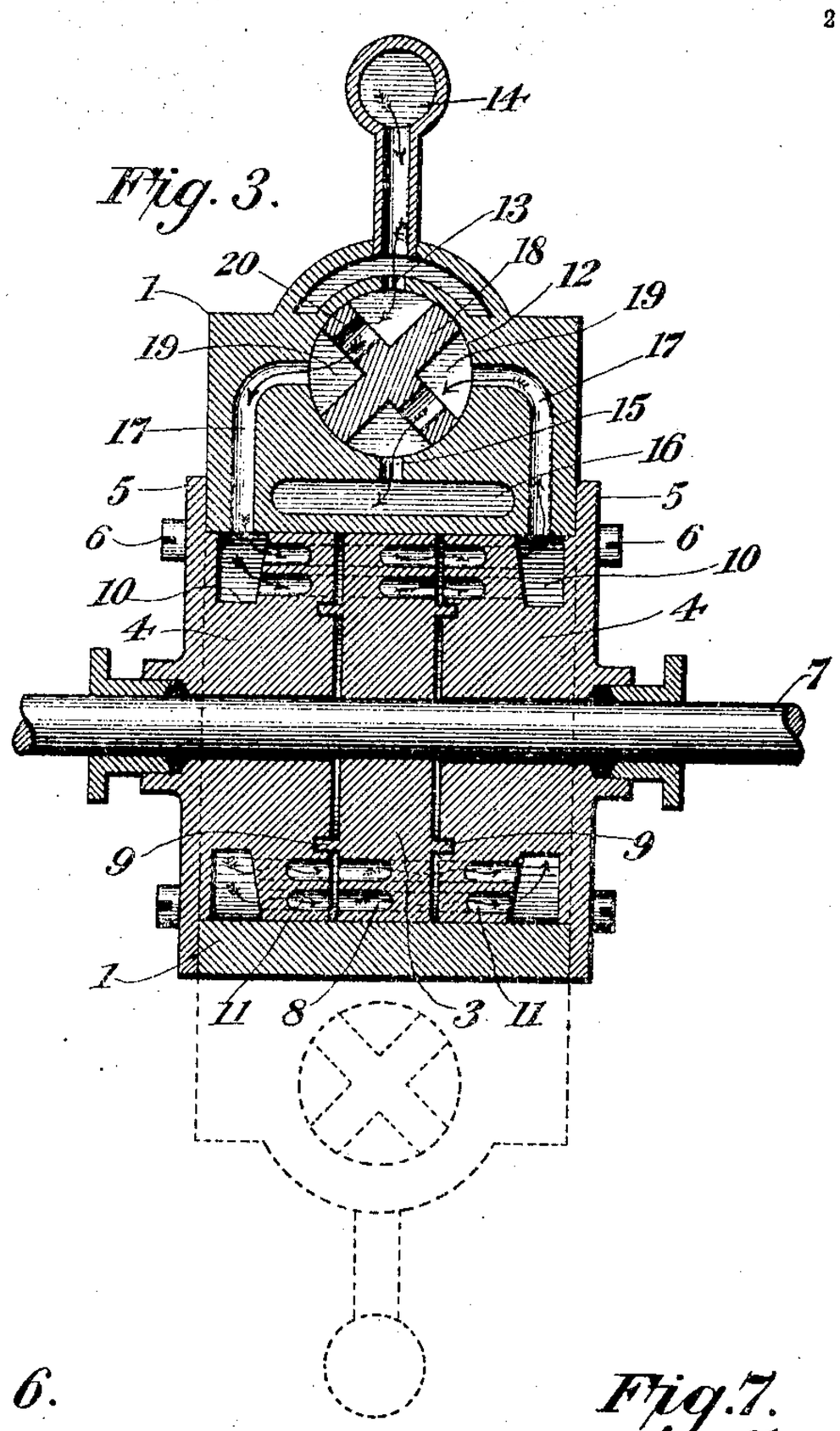


Fig. 6.

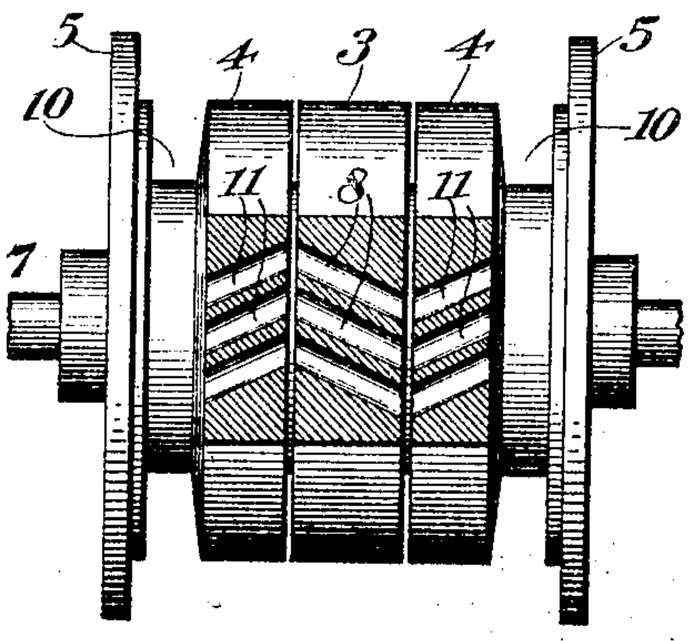
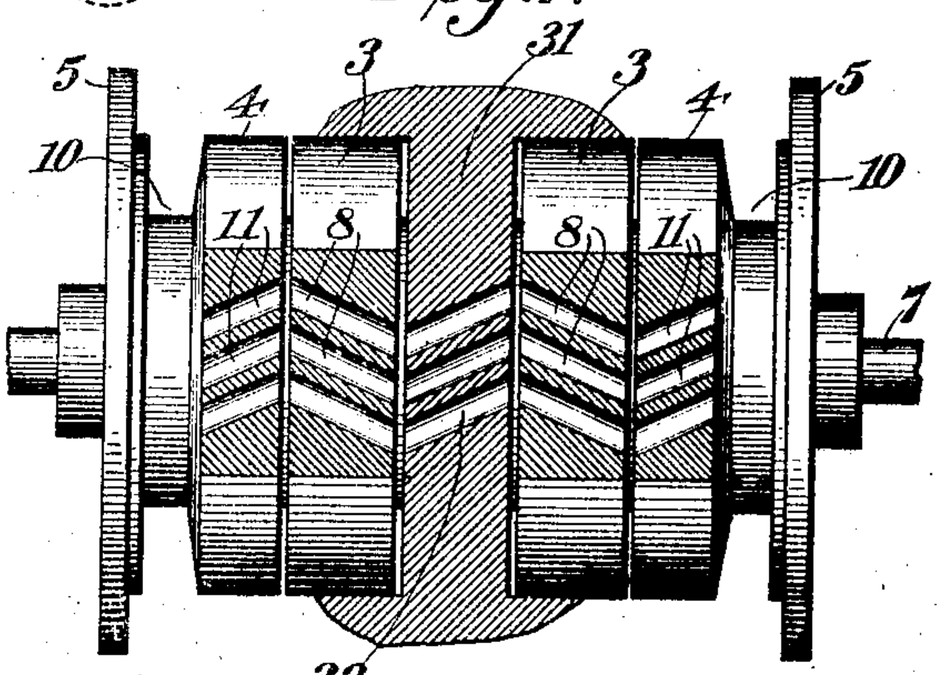


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

ALFONZO MERCER, OF NORFOLK, VIRGINIA, ASSIGNOR OF ONE-HALF TO TERRY B. GORDON, OF NORFOLK, VIRGINIA.

ROTARY ENGINE.

No. 877,854. Specification of Letters Patent. Patented Jan. 28, 1908.

Application filed June 8, 1907. Serial No. 377,928.

To all whom it may concern:

Be it known that I, ALFONZO MERCER, of Norfolk, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Rotary Engines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

The present invention relates to improvements in rotary engines and has for its primary object to provide a novel construction whereby the pressure of the fluid medium is utilized to the fullest possible extent.

The invention further contemplates the provision of novel means for feeding live fluid to the rotor upon one side of the engine and exhausting it therefrom upon the opposite side of the engine.

The engine also embodies a peculiar valve mechanism whereby the direction of the flow of the fluid medium through the rotor can be reversed when required.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result, reference is to be had to the following description and accompanying drawings, in which—

Figure 1 is a perspective view of the engine; Fig. 2 is a longitudinal sectional view partly in elevation; Fig. 3 is a transverse sectional view showing in dotted lines the double arrangement of valves; Fig. 4 is a detail perspective view of the rotary plug valve; Fig. 5 is a cross section of same; Fig. 6 is a detail plan view partly in section of the rotor and the co-acting end pieces removed from the casing; and Fig. 7 is a similar view showing a plurality of rotors.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Specifically describing the invention, the numeral 1 designates the casing which is provided with a cylindrical opening 2 within which the rotor 3 is mounted. The opening 2 is closed by the end pieces 4 which extend within the opening and are provided with annular flanges 5 fitting against the exterior of the casing and secured thereto by any suitable means such as the screws 6. The shaft 7 is journaled within suitable bearings formed in the end pieces 4 and is rigid with the rotor 3. This rotor 3 is in the nature of a disk and is provided towards its periphery with a plurality of transversely disposed ports 8 which are inclined with respect to the axis of the rotor and constitute the buckets of the engine. In the preferred form of the invention, as in the present instance, these ports 8 are arranged in a plurality of concentric circles. With this construction, it will be readily apparent that the reaction of the fluid medium in passing through the ports will operate to revolve the rotor. In order to prevent undue leakage of the steam or fluid medium, the rotor 3 is provided upon its opposite sides with the laterally extending flanges 9 which are received within corresponding grooves in the end pieces 4. Each of the said end pieces 4 is formed with an annular groove 10 constituting a chamber to receive the steam or fluid just before acting upon the rotor and after leaving the same. Communication between the annular chambers 10 and the ports 8 in the rotor is brought about by means of a plurality of ports 11 formed in the end pieces and communicating with the chambers 10, the said ports corresponding in number and location to those in the rotor so as to utilize the force of the fluid medium to the fullest possible extent.

A valve chamber 12 is formed in the upper portion of the casing 1 and preferably has a tapered formation. The upper portion of the valve chamber communicates with a plurality of inlet openings 13 leading from a common supply pipe 14, while the lower portion of the valve chamber communicates with a series of exhaust ports 15 leading to an exhaust chamber 16 extending entirely through the casing and disposed approximately parallel to the valve chamber. The passages 17 communicate with opposite sides of the valve chamber 12 at points between the inlets 13 and the exhaust ports 15, and lead to the annular chambers 10 in the end pieces 4 applied to opposite sides of the casing. Operating within the valve chamber 12 is a rotary plug valve 18 which has a corresponding taper to that of the valve chamber and is provided upon diametrically opposite sides with the recesses 19, each of which is sub-divided into two portions by a

perforated longitudinal flange 20. It may be mentioned that these perforated flanges 20 do not in any manner alter the flow of the steam or fluid medium and merely serve to enable the plug valve to obtain a firm bearing within the chamber. The smaller end of the valve plug 18 terminates in a threaded stud 21 capped by a nut 22 and receiving a washer-member 23 which is somewhat larger than the end of the valve plug and fits against the exterior of the casing. It may be observed that this washer 23 is provided with a perforation receiving a corresponding lug 24 projecting from the valve member. This construction aids in producing a steam-tight joint. The opposite end of the plug valve has the operating lever 25 applied thereto, the movements of the said lever being limited by the stops 26 and 27 projecting from the casing. When the lever is moved into contact with the lug 26, the valve member 18 assumes the position shown in Fig. 3, in which the inlets 13 communicate through one of the recesses 19 on the valve member with one set of the passages 17, while the opposite set of passages 17 communicate with the exhaust ports 15. By swinging the lever into contact with the stop 27 this condition is reversed and the fluid medium is caused to pass through the rotor in an opposite direction, thereby reversing the direction of the same. Should the operating lever be moved to an intermediate point between the two stops 26 and 27, it will be readily apparent that the flow of the fluid will be entirely shut off and the engine will come to a stop.

Applied to opposite ends of the casing 1 are the removable plates 28 formed upon their inner faces with the depressions or recesses 29 communicating with opposite ends of the exhaust chamber 16. Each of these plates 28 is provided with an exhaust port 30 through which the dead steam may be drawn into the condenser.

In the operation of the engine, it will be readily apparent that the live steam will flow through one set of the passages 17 and enter the annular steam chamber 10 upon one side of the rotor and after passing through the ports 8 of the said rotor will enter the opposite chamber 10 and be exhausted through the opposite set of passages 17 and the exhaust chamber 16. By reversing the position of the lever, the steam can be caused to flow through the rotor in an opposite direction and the engine thereby reversed. In this connection, it is desired to direct particular attention to the fact that the ports 8 in the rotor and the ports 11 in the end pieces 4 are inclined axially in opposite directions whereby the jets of steam are caused to act in a most effective manner.

A slight modification of the invention is shown in dotted lines in Fig. 3, in which one of the valve chambers 12 is provided upon each side of the opening 2 in the casing, the two valves being identical in construction with that previously described, and the various sets of the passages 17 leading from the valve chambers, communicating, respectively, with the two annular chambers 10.

A still further modification is shown in Fig. 7, in which a plurality of the rotors 3 are employed, the said rotors being separated by an intermediate wall 31 formed with ports 32 which are inclined in an opposite direction to the ports 8 in the rotor. The operation of an engine constructed in this manner is idential with that of the preferred form previously described, with the exception that the steam passes through a plurality of the rotors instead of only through a single rotor. In a similar manner it will be readily apparent that the number of rotors utilized may be increased indefinitely in order to obtain additional power.

It is to be understood that minor structural changes may be made from the foregoing structure without departing from the spirit of the invention as set forth in the following claims.

Having thus described the invention, what is claimed as new is:

1. In a rotary engine, the combination of a casing, a rotor mounted within the casing, end pieces applied to the casing and formed with annular grooves constituting chambers, the said rotor being formed with axially inclined ports and the end pieces with a second set of ports communicating with the before mentioned chambers and inclined in an opposite direction to those of the rotor.

2. In a rotary engine, the combination of a casing, a rotor mounted within the casing, end pieces applied to the casing and provided with flanges fitting against the exterior thereof, the said end pieces being formed with annular grooves, the rotor being provided with axially inclined ports and the end pieces with a second set of ports communicating with the grooves and inclined in an opposite direction to those of the rotor, and means for supplying live fluid to one of the grooves and exhausting dead fluid from the opposite groove.

3. In a rotary engine, the combination of a casing provided with an exhaust chamber, a rotor mounted within the casing, means for supplying live fluid to the rotor and delivering dead fluid to the exhaust chamber, and a plate applied to the casing formed with a recess communicating with the exhaust chamber.

4. In a rotary engine, the combination of a casing formed with an exhaust port extending completely through the same, a rotor mounted within the casing, means for supplying live steam to the rotor and leading dead fluid to the exhaust chamber, and plates

applied to opposite sides of the casing formed with recesses communicating with opposite ends of the exhaust chamber.

5. In a rotary engine, the combination of a casing, a rotor mounted therein and provided with a plurality of concentric circles, of transversely disposed ports inclined relatively to the axis of the rotor, fixed end pieces extending within the casing and each having a corresponding number of ports to those of the rotor and a grooved chamber to receive the actuating fluid prior to its admission to the ports, all substantially as described.

6. In a rotary engine, the combination with a rotor mounted upon a shaft within a suitable casing, and having a plurality of concentric circles, of transversely disposed ports, said ports being inclined with respect to the axis of the rotor; of fixed end pieces extending within the casing, each having ports corresponding in number with those in the rotor, and provided with a receiving fluid or steam chamber, and an annular flange secured against the exterior of the casing, all substantially as and for the purpose described.

7. In a rotary engine, the combination with a rotor provided on its opposite sides with laterally extended flanges and mounted on a shaft within a suitable casing, said rotor having a plurality of transversely disposed ports inclined with relation to its axis, fixed end pieces extending within the casing and having a corresponding number of inclined ports with those in the rotor, and grooves for the reception of the flanges on the rotor whereby undue leakage of the actuating fluid is obviated, all substantially as described.

8. In combination, a rotary engine casing having a valve chamber at its upper part, with inlet openings leading to a common supply pipe, a valve fitting in said chamber, a series of exhaust ports leading to an exhaust chamber extending entirely through the casing and disposed approximately parallel to the valve chamber, passages leading from opposite sides of said chamber and communicating with the chambers in the end pieces, a rotor fixedly mounted upon a shaft and provided with a plurality of inclined ports adapted to receive the actuating medium from ports in end pieces.

9. In combination, a rotary engine casing having a tapered valve chamber at its upper portion and inlet opening leading to a common supply pipe, a valve fitting in said chamber and provided with recesses upon opposite sides each of which being subdivided into two portions by perforated longitudinal flanges, a series of exhaust ports leading to an exhaust chamber extending through the casing, passages leading from opposite sides of said chamber and communicating with chambers in the end pieces, a rotor provided with a plurality of ports adapted to receive the actuating medium through ports in the end pieces, all substantially as and for the purpose described.

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

ALFONZO MERCER.

Witnesses:
JOHN L. FLETCHER,
T. H. ALEXANDER.