No. 664,765. Patented Dec. 25, 1900.

L. LEGENDRE.

ROTARY ENGINE.

(Application filed May 7, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig 1

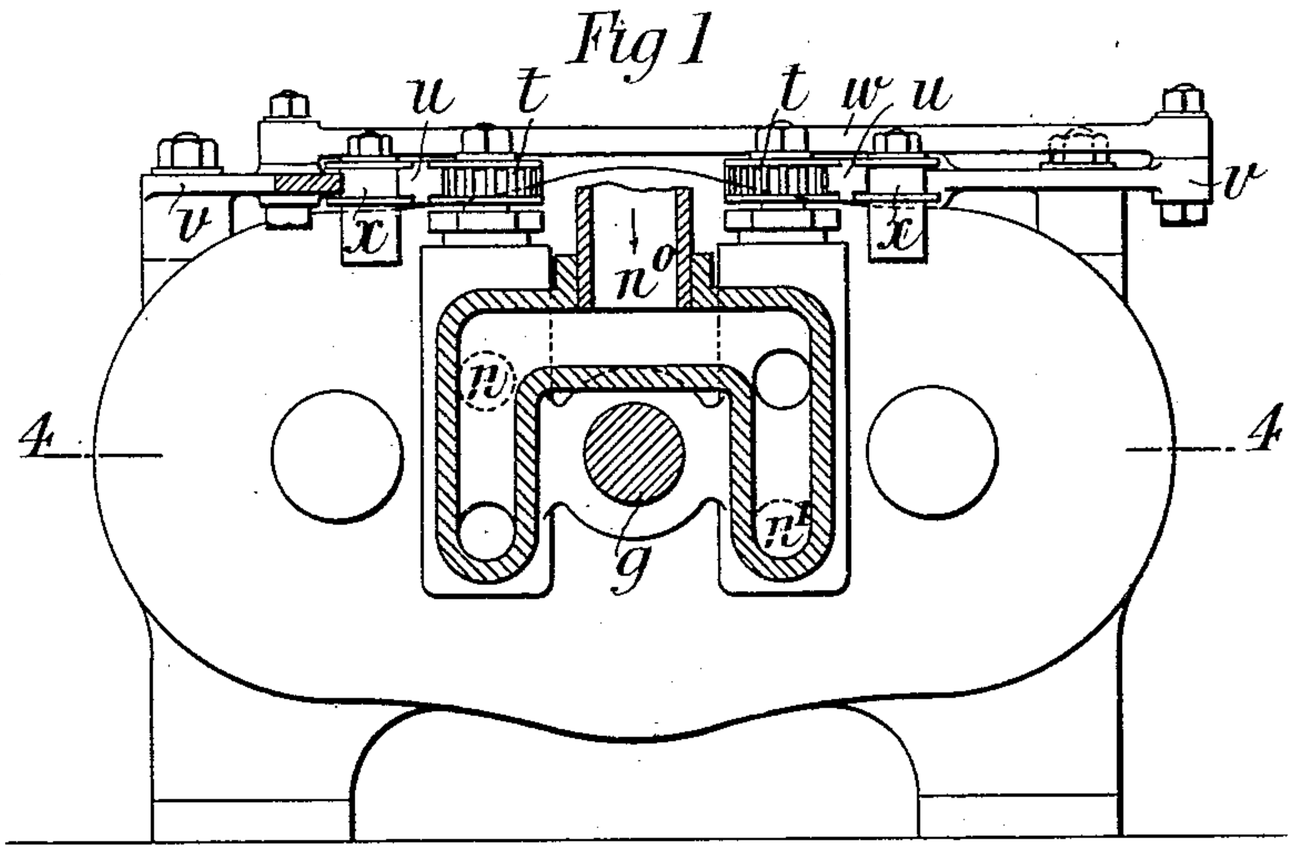

Fig 2

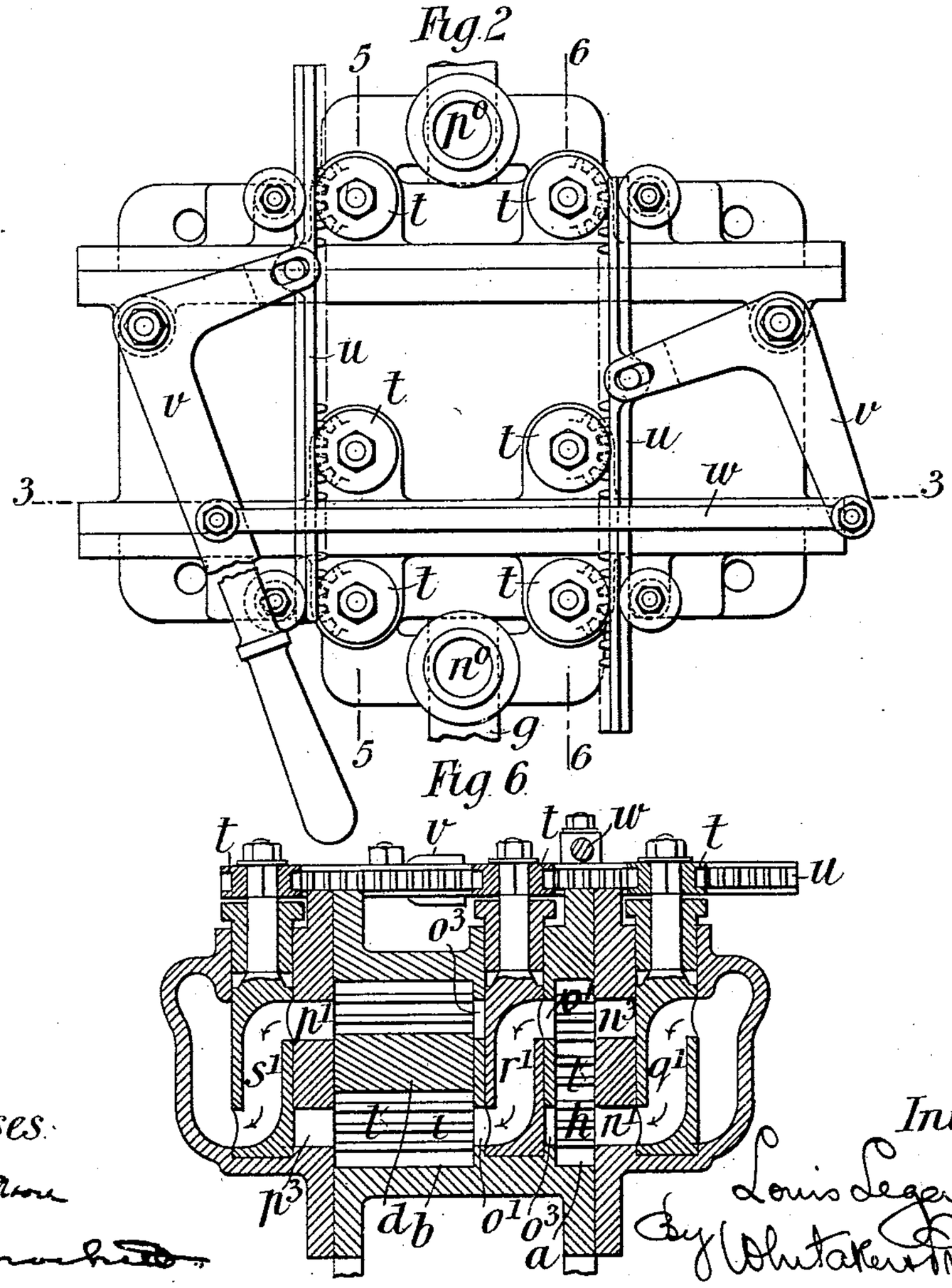

Fig 6

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Fig. 3.

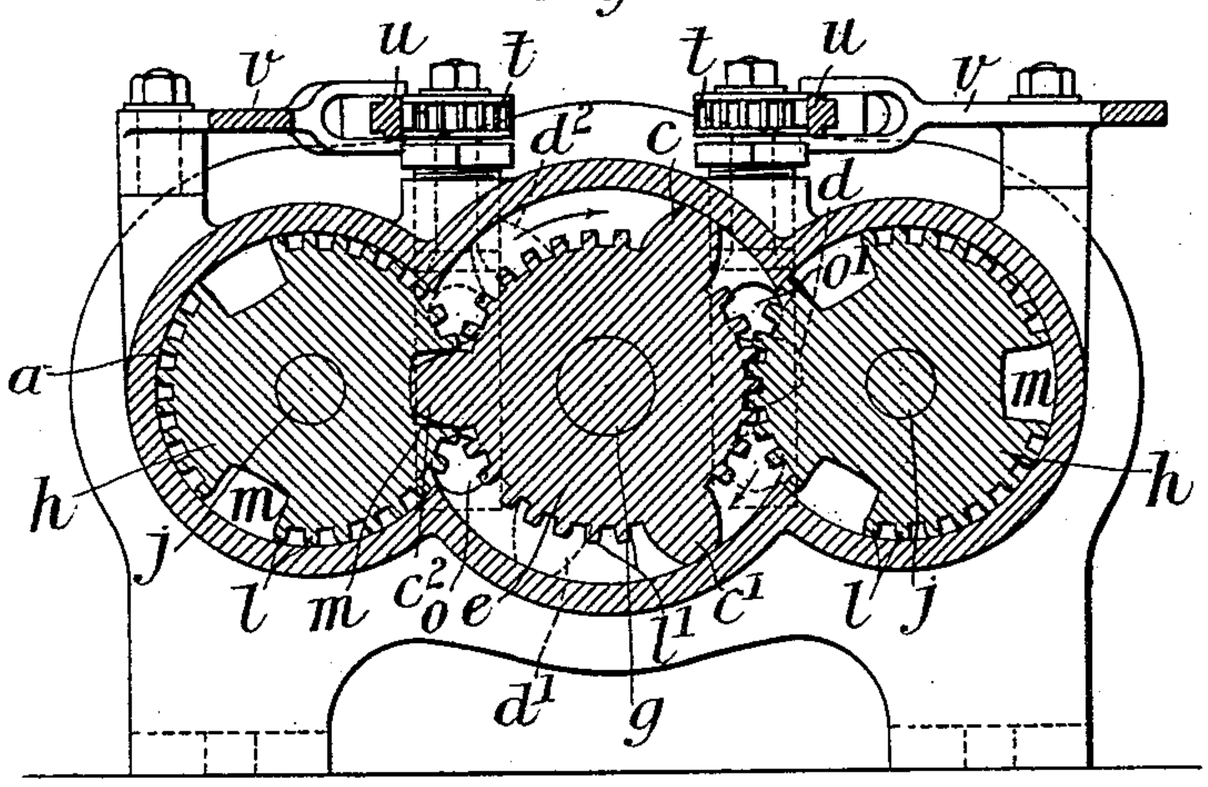


Fig. 4.

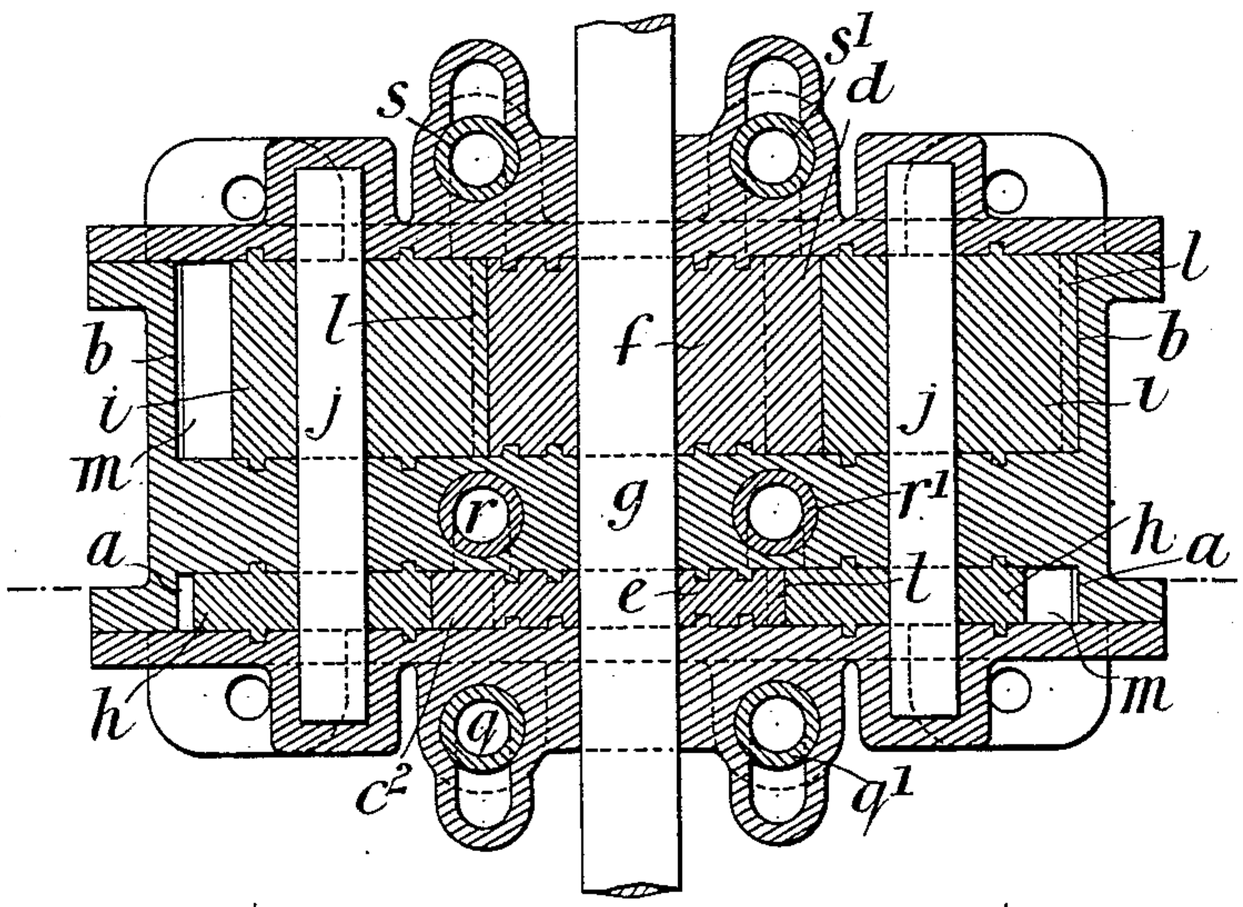
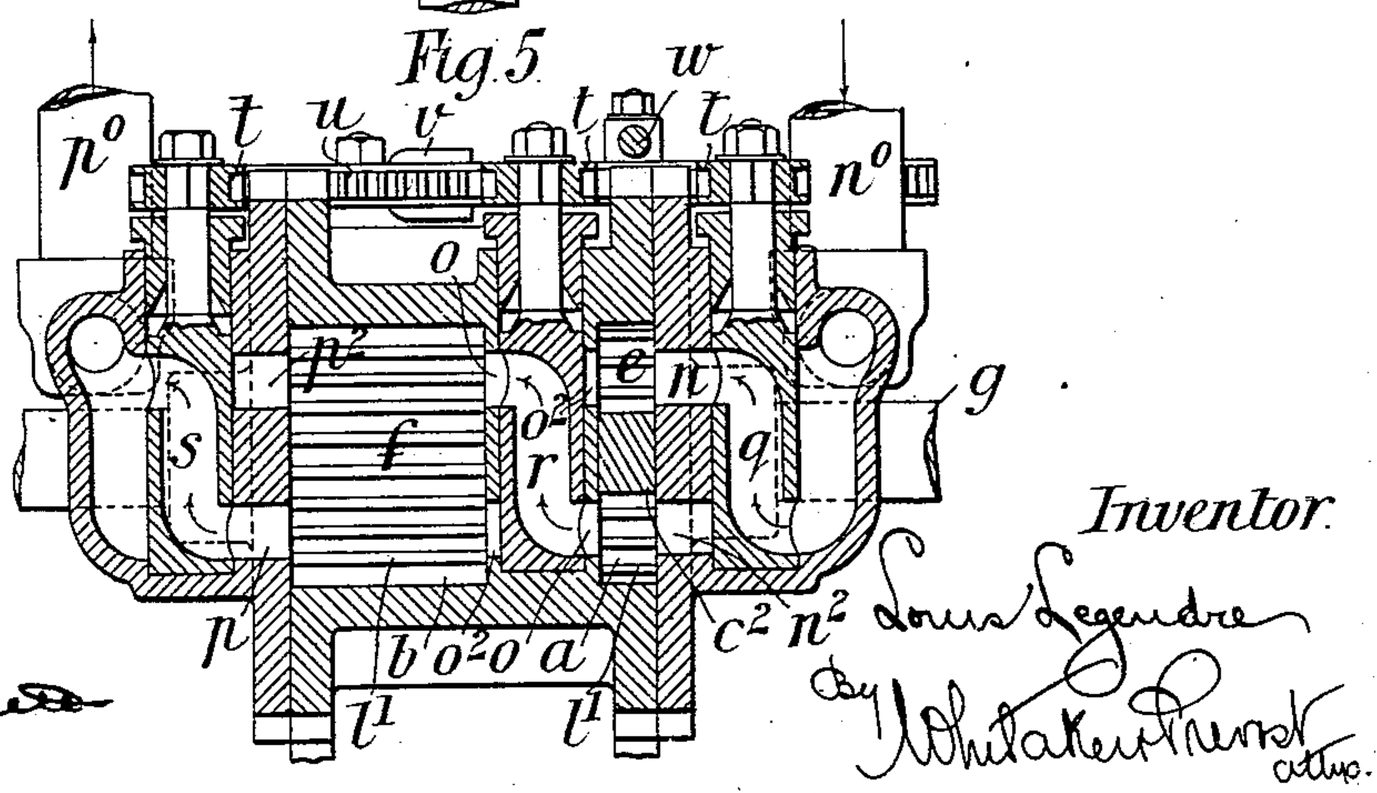


Fig. 5.



Witnesses.
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Inventor.
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UNITED STATES PATENT OFFICE.

LOUIS LEGENDRE, OF LONDON, ENGLAND.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 664,765, dated December 25, 1900.

Application filed May 7, 1900. Serial No. 15,771. (No model.)

To all whom it may concern:

Be it known that I, LOUIS LEGENDRE, a citizen of the Republic of France, residing at 46 Walcot Square, London, England, have invented new and useful Improvements in Rotary Engines or Motors, of which the following is a specification.

This invention relates to rotary engines or motors.

In carrying out my invention I provide power-chambers of different areas having a common driving-shaft passing therethrough provided with radial pistons. These pistons are formed on disks fixed on the driving-shaft, and in order that the steam or other expansive fluid may have an abutment in one direction while operating upon a piston in the opposite direction I provide other disks designed to rotate in the same chambers upon shafts parallel with the main driving-shaft, the said disks being provided with gear-teeth engaging similar teeth on the piston-disks and with recesses with which the pistons engage as they rotate. Suitable ports and valves may be provided whereby the direction of motion of the pistons, and consequently that of the driving-shaft, can be reversed.

To enable my invention to be fully understood, I will describe it by reference to the accompanying drawings, in which—

Figure 1 is a sectional front elevation of a compound rotary engine constructed according to my invention and provided with two power chambers or cylinders. Fig. 2 is a plan thereof. Fig. 3 is a transverse vertical section on the line 3 3, Fig. 2. Fig. 4 is a horizontal section on the line 4 4, Fig. 1. Fig. 5 is a longitudinal vertical section on the line 5 5, Fig. 2. Fig. 6 is a longitudinal vertical section on the line 6 6, Fig. 2.

a b are the power-chambers, and c c' c^2 and d d' d^2 are the respective pistons therein on disks e f on the common driving-shaft g, supported in bearings g' g' at the outer ends of the said chambers and in a bearing g^2 in a partition g^3 between the chambers. The steam or other expansive fluid is first used in the chamber a and then exhausted into and expanded within the chamber b, the working space and the pistons of which are of greater area than those of the said chamber a. The pistons on each disk are advantageously three in number, for the purpose hereinafter described.

h i are disks forming the abutments for the pistons c d, respectively, the said disks being upon shafts j j, parallel with the driving-shaft g and on opposite sides of the said shaft.

l l are gear-teeth on the disks h i, engaging similar teeth l' l' on the disks e f, and m m are recesses in the said disks h i for the reception of the pistons c d.

In the drawings each abutment-disk is represented as being provided with three recesses m m. It will be obvious, however, that a greater number may be employed, the diameter of the said disks being correspondingly increased.

n n' are ports for the admission of the motive fluid from an inlet-pipe n^0 to the chamber a, and o o' and p p', respectively, ports for exhausting the motive fluid from the said chamber to the chamber b and from the latter to the open air through a pipe p^0. By the described construction, assuming the pistons to be in the position indicated in Fig. 3, it will be seen that if the motive fluid—say steam—be admitted through the ports n n' into the chamber a it will exert pressure on the pistons c and c', so as to rotate the shaft g in the direction of the arrows, Fig. 3, the piston c^2, which is in engagement with a recess m in one of the disks h, being inoperative for the time being. The piston c in its movement will then pass over the port o' and allow the steam which has been impelling it to pass through the said port into the low-pressure chamber b behind the piston d, which it actuates in the manner above described. At the same time the piston c^2 will move out of engagement with the recess m and over the port n, the steam passing through, which exerts its pressure on the said piston, and the piston c' will still be under the pressure of the steam passing through the port n'. The piston c' will then move past the port o and allow the steam which has been impelling it to pass through the said port into the chamber b behind the piston d' in a manner similar to that described with reference to the pistons c and d. The piston c^2 will then pass over the port o' and admit steam behind the piston d^2, each piston c c' c^2 in turn being impelled by the steam and exhausting behind the corresponding pis-

ton in the chamber *b*. A similar action to that described with reference to the exhausting of the steam takes place in the chamber *b*—that is to say, each piston *d*, *d'*, and d^2 in turn passes over one of the ports *p p'* and allows the steam to pass into the open air. By the arrangement of three pistons in each chamber and of two inlet and two exhaust ports in connection with each piston-disk it will be seen that there is always a pressure of steam on opposite sides of the driving-shaft.

Although I have described an engine or motor provided with but two power-chambers, I can employ more than two, so as to more fully expand the motive fluid than would otherwise be the case, and thus more efficiently utilize its energy.

In order that my improved engine or motor may be rendered reversible, I provide valves *q q' r r' s s'*, in connection, respectively, with the ports *n n' o o' p p'*, and I also provide additional ports n^2 n^3 for the admission of the motive fluid to the chamber *a*, ports o^2 o^3 for exhausting the motive fluid from the said chamber to the chamber *b*, and ports p^2 p^3 for exhausting the motive fluid from the said chamber *b* into the open air. The valves *q q' r r' s s'* are advantageously cylindrical, with an S-shaped port formed in them, so that by rotating them through one hundred and eighty degrees they will admit the motive fluid to act upon the opposite sides of the pistons to those previously acted upon and so drive the shaft *g* in the opposite direction. For instance, assume the valves to be in the position shown in Figs. 5 and 6, so as to admit the motive fluid to move the pistons in the direction of the arrows, Fig. 3, as hereinbefore described. If now the valves be turned through one hundred and eighty degrees, the motive fluid instead of passing through the ports *n n' o o' p p'* will pass through the ports n^2 n^3 o^2 o^3 p^2 p^3 and so act upon the sides of the pistons opposite to those acted upon by the motive fluid when passing through the ports *n n' o o' p p'*.

For simultaneously operating the valves I may provide the valves with stems carrying gear-wheels *t t*, engaged by racks *u u*, designed to be actuated by hand to rotate the valves by means of the bell-crank levers *v v*, connected together by the rod *w*. *x x* are antifriction-rollers for supporting, guiding, and keeping the racks in gear with the wheels *t t*.

It is to be understood that in practice the shaft to be driven is coupled to the driving-shaft. Also, if desired, the engine may be supported upon the shaft to be driven in such a manner that the engine is free to partake of any movements of the shaft due to wear, means of course being provided to prevent the casing of the engine from rotating.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a rotary engine, the combination with a chamber, of a rotary piston-disk in said chamber, abutments for said disk, two pairs of ports on each side of the piston-disk, a valve for each pair of said ports, and means for rotating said valves simultaneously to reverse the engine, substantially as described.

2. In a rotary engine, the combination with a chamber, of a rotary piston-disk in said chamber, abutments for said disk, two pairs of ports on each side of the piston-disk, a valve for each pair of said ports, each valve having an aperture adapted to register with each port of its pair, and a passage connecting said apertures and means for rotating said valves simultaneously to reverse the engine, substantially as described.

3. In a rotary engine, the combination with a chamber, of a rotary piston-disk in said chamber, abutments for said disk, two pairs of ports on each side of the piston-disk, a valve for each pair of said ports, each valve being provided with two apertures on opposite sides of the valve and in different transverse planes and an internal passage connecting said apertures, each of said apertures being adapted to register with one of the adjacent ports and means for simultaneously rotating said valves to reverse the engine, substantially as described.

4. In a rotary engine, the combination with a chamber, of a rotary piston-disk in said chamber, abutments for said disk, two pairs of ports on each side of the piston-disk, a valve for each pair of said ports, a pinion operatively connected with each of said valves, a pair of racks each engaging two of said pinions, an operating-lever and connections between said lever and said racks for imparting a simultaneous partial rotation to said valves, substantially as described.

5. In a rotary engine, the combination with a chamber, of a rotary piston-disk in said chamber, abutments for said disk, two pairs of ports on each side of the piston-disk, a valve for each pair of said ports, a pinion operatively connected with each of said valves, a pair of racks each engaging two of said pinions, a bell-crank lever connected to each of said racks, a link connecting said bell-crank levers and means for operating one of said levers to simultaneously partially rotate all of said valves to reverse the engine, substantially as described.

6. In a rotary engine, the combination with a plurality of chambers of different areas located side by side, a rotary piston-disk in each chamber, abutments for said disks, said chambers being each provided with two pairs of ports on each side of its piston-disk, a valve for each pair of ports on the outer sides of said chambers, valves located between said chambers, each controlling a pair of ports for each adjacent chamber, and means for operating said valves simultaneously to reverse the engine, substantially as described.

7. A rotary engine provided with two chambers of different areas located side by side

and having two valve-casings on the outer side of each chamber, and two intermediate valve-casings located between said chambers, each of said outer valve-casings having two ports communicating with its adjacent chamber, and said intermediate valve-casings having each two ports communicating with each chamber, of a revoluble valve in each of said valve-casings, provided with two apertures on opposite sides and in different transverse planes, and an internal passage connecting said apertures, and means for simultaneously rotating said valves to reverse the engine, substantially as described.

LOUIS LEGENDRE.

Witnesses:
JOHN E. BOUSFIELD,
C. G. REDFERN.