

(No Model.)

2 Sheets—Sheet 1.

A. KISSAM.
ROTARY MOTOR.

No. 282,001.

Patented July 24, 1883.

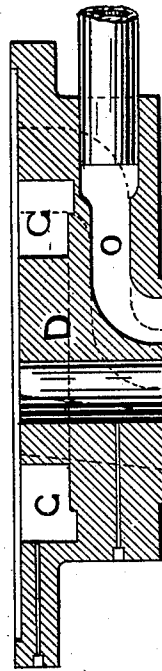
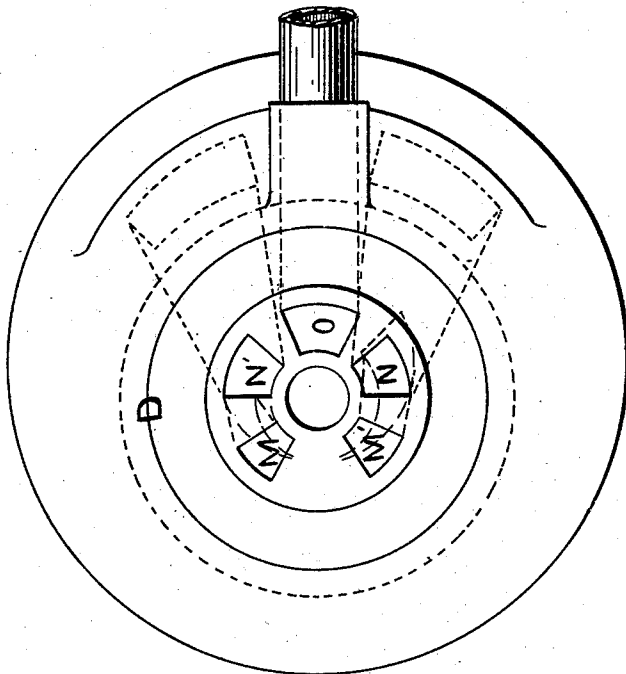


FIG. 3.

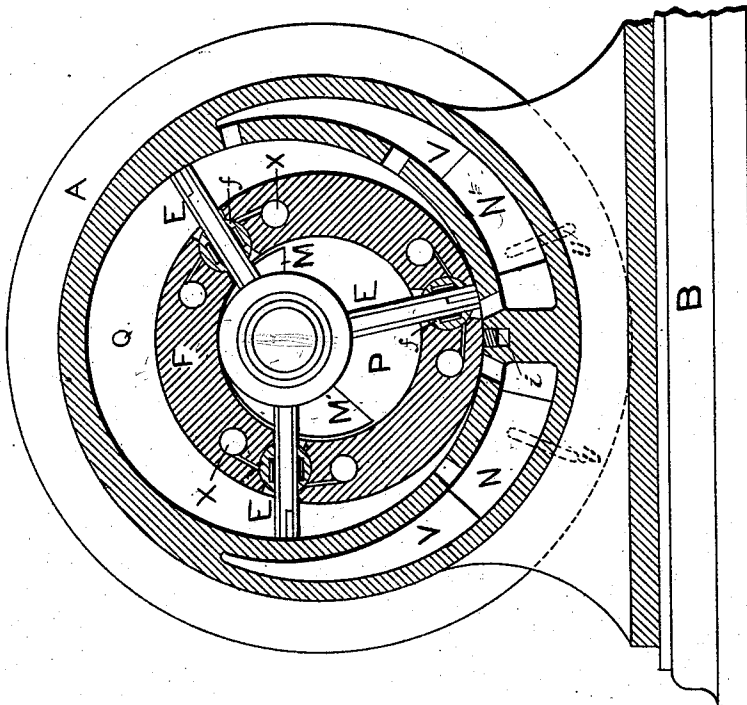


FIG. 1.

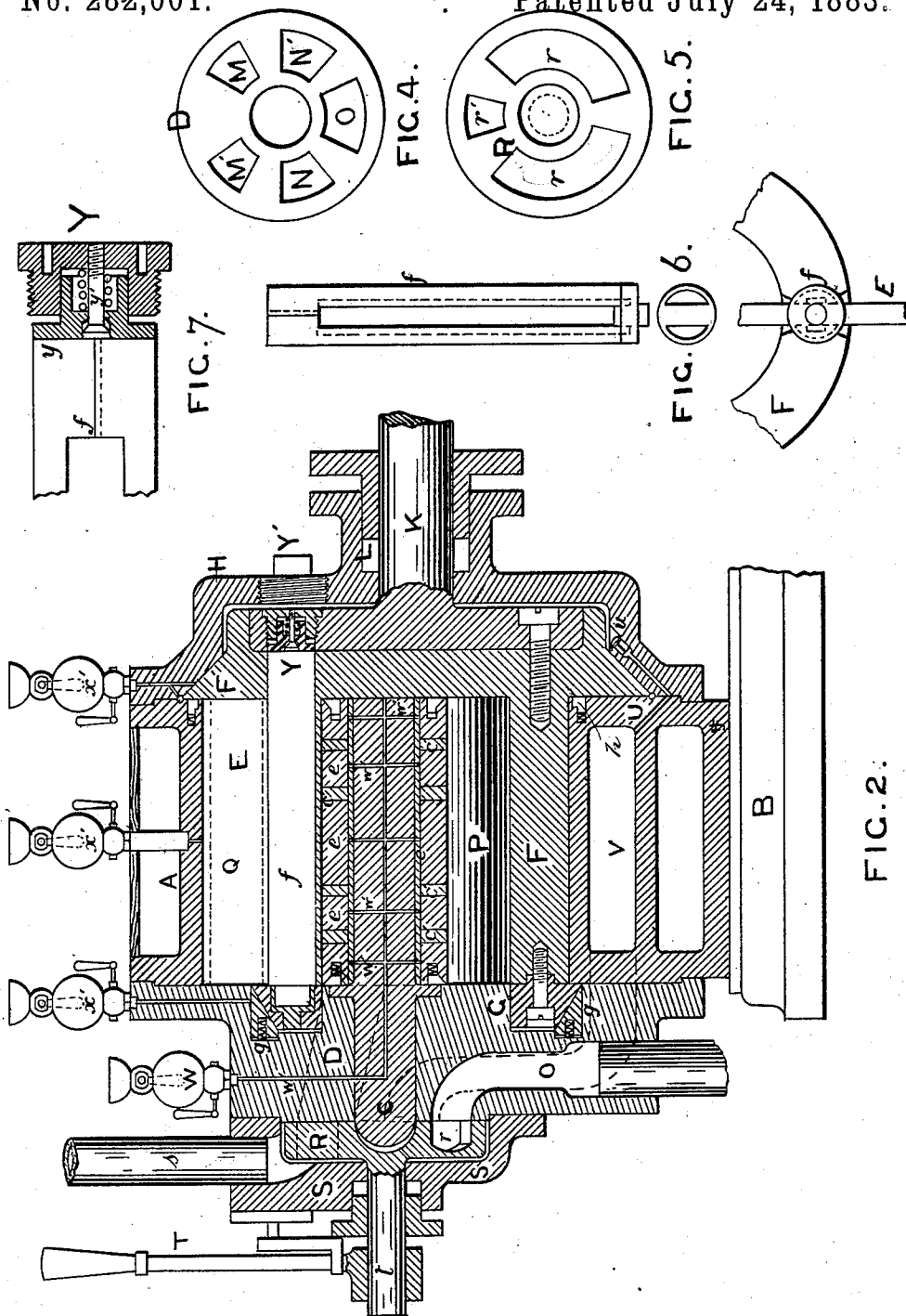
WITNESSES.
Geo. S. Penney
J. W. Hallahan

INVENTOR.
Astor Kissam,
By T. S. Lion, Attorney.

A. KISSAM.
ROTARY MOTOR.

No. 282,001.

Patented July 24, 1883.



WITNESSES.
Geo. S. Penney.
Edw. A. ...

INVENTOR,
Astor Kissam,
By *Wm. ...* Attorney.

UNITED STATES PATENT OFFICE.

ASTOR KISSAM, OF PIMLICO, COUNTY OF MIDDLESEX, ENGLAND.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 282,001, dated July 24, 1883.

Application filed April 13, 1883. (No model.) Patented in England August 9, 1882, No. 3,780.

To all whom it may concern:

Be it known that I, ASTOR KISSAM, a citizen of the United States, at present residing at Pimlico, in the county of Middlesex, England, have invented certain new and useful Improvements in Rotary Motors, (patented in England August 9, 1882, No. 3,780,) of which the following is a specification.

My present invention consists in certain novel combinations of parts, hereinafter set forth and claimed.

The object of the invention is to construct a rotary engine in which steam, or such like aeriform fluid under pressure, may be used expansively, as in compounded engines.

In order that the said invention may be properly understood, I now proceed to describe the same with regard to the drawings hereto attached, reference being had to the figures and letters marked thereon.

Figure 1 of these drawings represents a vertical transverse section of a rotary motor illustrating this invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 comprises a face view and longitudinal section of one of the "covers" of the outer cylinder, containing the inlet and exhaust ports. Fig. 4 represents a face view of the latter, or of that portion of said cover containing said ports. Fig. 5 is a face view of the valve which coacts with said ports. Fig. 6 comprises views in detail of a pair of the plate-piston "packing-pieces," hereinafter described; and Fig. 7 represents a sectional view of one end of the same and a coacting plug on a larger scale.

The engine comprises a non-rotary or fixed cylinder, A, which may conveniently be bolted to a bed-plate, B. In the axis of the cylinder A is a bearing-stud, C, fixed at one end to the cover D of the cylinder A. The opposite end of the fixed bearing-stud C may be supported by a bush or plug-bearing let into the center of the revolving cylinder or rotary piston of the engine, (marked F,) and always retaining its central position with regard thereto, said bush or plug-bearing to be of sufficient size to allow of its connection with said bearing-stud C by any suitable means.

Mounted on the stud C is a loose sleeve or tube, e, and on it are a number of radial arms

or flat plate-pistons, E, by preference three in number, each capable of turning freely on it independently one of the other, with their bearing-hinges *ee* divided over the bearing-stud C, and with collars *e'e'* between each, so as to run steadily and smoothly around the said axis.

The edges of these arms or flat plate-pistons E fit closely against the inner face of the disk F', part of the revolving cylinder F, and at the other end against the cover of the cylinder A, and also against its inner circumference, such edges, together with the inner joints of the pistons, being conveniently fitted with packing-strips set up by springs, steam-pressure, or otherwise, to make a good steam-tight joint. The arms or plate-pistons E pass through slots, according to their number, formed at equal distances apart through the circumference of said revolving cylinder F, which is contained within and placed eccentrically to the larger cylinder, A. One end of this cylinder F is open, through which the central bearing-stud, C, is admitted, and this cylinder fits at this open end into a circular groove, G, in the larger cylinder, and is conveniently strengthened by a ring, and made steam-tight, as to its end, by a suitable three-cornered packing-ring, *g*, set up by springs or other pressure; or the same objects may be accomplished by other means. In small engines the introduction of this connecting and packing ring may not be considered necessary. The other end of the cylinder F is closed solid, fitting against and recessed into the other cover, H, of the outer cylinder, and is provided with a concentric disk, F', cast with it, which overlaps and closes the open end of the cylinder A, so that the projecting edges of the plate-pistons make their steam-joint upon this disk. By preference the edge of this disk F' is made beveled and fits into a corresponding bevel in the cylinder-cover, so as to allow for expansion. A recessed spring-ring, *h*, may be fitted to the edge of the cylinder to make a steam-tight joint. From the center of this closed end of the cylinder F, either cast with it or secured thereto in any convenient way, as shown, projects the shaft K, through a suitable gland and stuffing-box, L, forming the driving-shaft of

the engine. The smaller cylinder, F, situated inside and eccentrically to the larger cylinder, A, fits closely at one portion of its outer circumference against a small arc of the inner circumference of the cylinder A, which, if necessary, may be kept steam-tight by a packing-strip, *i*, in the outer cylinder. On the opposite side the inner circumference of the smaller cylinder fits against and revolves in contact with the exterior surface of the circular rings *e e*, which form the hinges of the plate-pistons E.

The high rate of expansion of the steam is obtained by the increasing volume of the successive spaces from the interior of the inner cylinder to the outer space between the two cylinders, through which the steam is made to pass, and this ratio of expansion can be varied by altering the relative proportion of the inner and outer chambers.

Through the end cover, D, opposite to that from which the driving-shaft projects, ports M M' N N' O (shown in detail in Fig. 3) are made for the admission and escape of steam to and from the engine. Two ports, M M', communicate through the cover D with the crescent-shaped space P between the interior of the smaller cylinder and the central stud, C, which forms the high-pressure chamber in the compounded engine. These ports M M' open one to either side of the stud C, there being no communication between them, except by the revolution of the radial plate-pistons E. Similarly there are two other ports, N N', communicating, through the cover D, with the crescent-shaped space Q between the inner and outer cylinders, one port opening on either side of the point of contact between the said cylinders, there being no communication between them, except by the revolution of the plate-pistons E. At the back or outer face of the cover D these four ports M M' and N N' and an exhaust port or ports, O, to the outer atmosphere or elsewhere, are brought into communication with one another, and opened or closed, as hereinafter more fully described, by a valve or valves, R, inclosed in a casing, S, to which high-pressure steam or other aeriform fluid is admitted by a suitable pipe and passage, *s*, and which thus forms a steam-chest.

For the adjustment of the ports I may preferably use a circular valve, R, (shown in position in Fig. 2 and in detail in Fig. 5,) the ports being then arranged in a circle with a single exhaust-port, O, as shown in detail in Fig. 4.

In the circular valve, Fig. 5, *r r* are pockets recessed in the face of the valve, and *r'* is an orifice right through the valve for the passage of the live steam.

If the face of the circular valve R, Fig. 5, be superposed upon the circular ports, Fig. 4, so that the port *r'* coincides with the port M, then the port M is open to the live steam and communicates with one side of the inner crescent-shaped space, P, of the high-pressure cylinder. Acting upon one or other of the ra-

dial plate-pistons E, which stands across this space, the high-pressure steam rotates the plate-pistons and the inner cylinder, F, with them. As the plate-pistons revolve the imprisoned volume of steam passes through the port M' into a pocket, *r*, in the circular valve, and then returns by the port N to one side of the larger crescent-shaped space, Q, between the cylinders F and A, forming the low-pressure chamber. Here the steam again acts, but still more expansively, upon the radial plate-pistons E crossing this space, and, finally, is allowed to escape, by their revolutions, through the port N' into the other pocket *r* of the circular valve, and thence through the exhaust-port O to the atmosphere, the condenser, or elsewhere, as desired. If the rotary valve R, Fig. 5, be moved through a small circular angle by the lever or other means, T, Fig. 2, attached to the spindle *t*, so that the open port *r'* now coincides with M', the live steam is free to enter to the opposite side of the high-pressure chamber P, and the pockets *r r* of the rotary valve being also correspondingly altered in position, the expanding passage of the steam is reversed in its direction, thus reversing the engine. The circular valve R acts as a stop-valve for shutting off the steam when in an intermediate position between those of forward and back gear. This valve remains stationary while the engine is in motion, except the movement that may be necessary to adjust the supply of steam, by hand or any other known mechanical means, or automatically through a governor. It is evident that other modifications of valve-gear can be arranged to perform similar functions; but I prefer the circular arrangement for simplicity and facility of construction.

In order to make steam-tight the orifices in the cylinder F, through which the radial plate-pistons E pass, different methods may be employed; but I prefer to make the said radial plate-pistons solid and fit the orifices in the revolving cylinder F with segmental packing-pieces *f*, of phosphor-bronze or other metal, as shown in position in Fig. 1, and in detail in Fig. 6. The said packing-pieces may be in two separate parts and fitted with spring packing-strips on the faces, against which the plate-pistons slide. The ends of these packing-pieces may project and fit into circular holes in the disk F and ring G of the inner cylinder, F, so that they have a bearing at each end, to resist the centrifugal force and outward steam-pressure. Said disk may be recessed into the cylinder-cover H, either with square or beveled faces, as most convenient. Said holes in the disk F are closed by suitable plugs, Y, through which and by a suitable plugged opening, Y', in the outer cover said packing-strips may be withdrawn for examination and renewal. The plugs in the end disk, F', (shown in position in Fig. 2,) are shown in sectional detail in Fig. 7.

Y is a screwed plug, inside which slides a piston, *y*, pressed outward by a spiral or other

spring, and prevented from falling out by the check-spindle y^2 . The plug Y may thus be screwed home, while the sliding piston y maintains an elastic pressure upon the end of the packing-pieces f .

In order that the revolving cylinder shall not be pressed with excessive force against the cover, I arrange two ports, U U, running from the low-pressure-steam space to a proportionate space provided between the faces of the revolving cylinder-disk F and the cover H. These ports are fitted with small valves $u u$, so that the steam admitted to balance the cylinder shall not escape through the other port to the exhaust, and vice versa, when the engine is reversed. The like object may be accomplished by the admission of live steam to a reduced recessed space direct from the steam-pipe or pressure-chamber without intervention of valves, as above.

It is found preferable to adjust the engine to do its chief work while running in a single direction, and, with this object in view, to place the ports unsymmetrically to one another, so as to determine an early and free exhaust from the high to the low pressure cylinder, and from the latter to the condenser or elsewhere, as found preferable. The side pockets, V V, in the outer cylinder may be used conveniently to give a large area and a distributed orifice to the said ports, as seen in Fig. 1.

The rotary valve may conveniently be steam-balanced or placed in partial equilibrium by fitting its outer portion steam-tight into a recess in the cover D.

The plate-pistons and hinges are conveniently lubricated by a supply introduced through the lubricator W, which, passing down the channel w into the stud C, is transmitted through the channels $w' w'$ into the joints between the bush and hinges, and between the faces of the latter.

The sliding faces of the plate-pistons E and the packing-pieces may be also conveniently lubricated by the introduction of circular channels or chambers x , Fig. 1, which may be packed with fallow or other suitable lubricant contained in tubes or cartridges sufficient to last a considerable time, and introduced through the plug Y' in the external cover. The like object may be attained by the use of an inspirator attached to the steam-chest to charge the steam with lubricant. The bearing-faces of the revolving cylinder F and the

gland are also lubricated by the special lubricators X' X'.

Having now described and ascertained the nature of my said invention and the manner of its performance, be it known that I do not pretend to claim plate pistons or vanes revolving with a shaft and passing through an inner cylinder revolving on its axis eccentrically to an outer cylinder, inasmuch as this is a known device, and has been applied in less perfect but somewhat similar mechanism; but

What I consider novel, and desire to protect by my Letters Patent, is—

1. In a rotary motor having a non-rotary outer cylinder and an inner "revolving cylinder" or rotary piston, the latter rotating eccentrically within the former and touching the same at one point of its periphery, and having a fixed stud concentric with the outer cylinder, with plate-pistons hinged upon said stud and passing through said revolving cylinder into contact with the interior of said outer cylinder, the combination, with said parts, of inlet and exhaust ports, and a valve or valves coacting therewith, said ports communicating with the crescent-shaped space between said fixed stud and said revolving cylinder, as well as the crescent-shaped space between said revolving cylinder and said outer cylinder, substantially as herein described, for working steam or like fluids, first in the former and then in the latter, in the manner set forth, or an equivalent way, for the purpose specified.

2. The combination, in a rotary motor, of a non-rotary outer cylinder and an inner revolving cylinder or rotary piston, the latter rotating eccentrically within the former and in close contact therewith at one point of its periphery, plate-pistons hinged upon a central fixed stud and projecting outwardly through said revolving cylinder, and a disk, F', closing one end of said revolving cylinder, and affording the means for attaching the driving-shaft thereto, substantially as herein specified, for the purpose set forth.

London, 30th March, 1883.

ASTOR KISSAM.

Witnesses:

JOHN C. FELL,
SAM P. WILDING.