P. B. MARTIN.
ROTARY ENGINES.

No. 195,032. Patented Sept. 11, 1877.

Fig. 1.

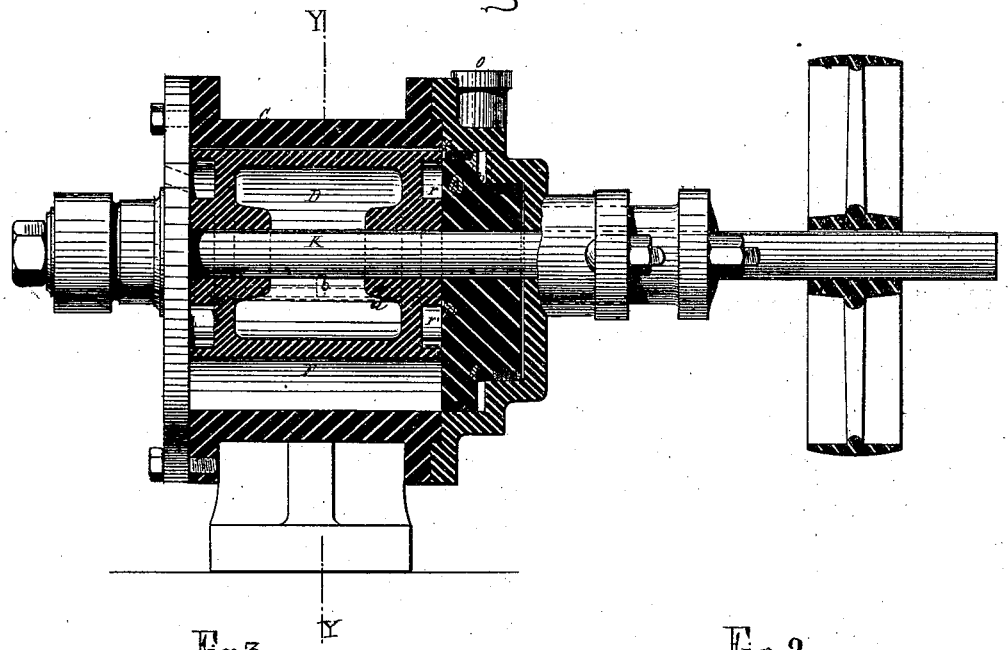


Fig. 3.

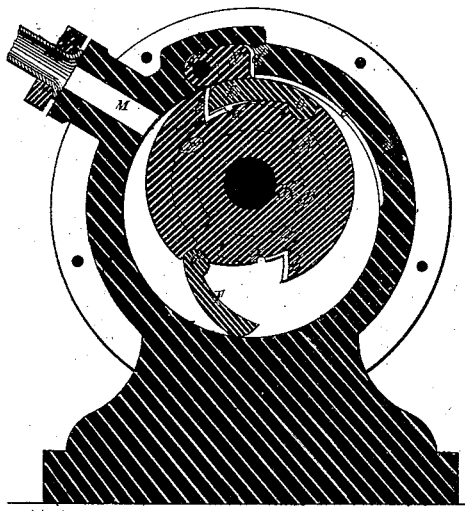
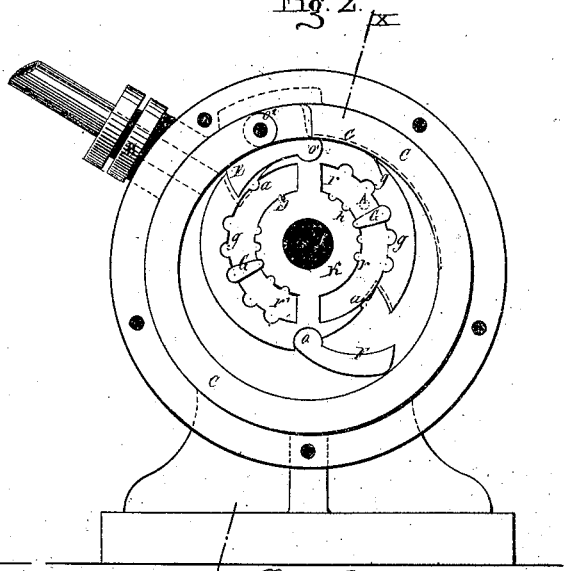


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

PIERRE B. MARTIN, OF BORDEAUX, FRANCE.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **195,032**, dated September 11, 1877; application filed May 28, 1877.

To all whom it may concern:

Be it known that I, PIERRE BERNARD MARTIN, of Bordeaux, France, have invented an Improved Rotary Engine, of which the following is a specification:

My invention consists in a novel construction of rotary motor engine to be worked by steam or other fluid under pressure.

Within an exterior fixed-cylinder casing I mount, on a shaft which passes through packings at the ends of the cylinder-casing, an inner rotating cylinder of smaller diameter than the former, and eccentric to it, so that it touches its interior at one side. To the rotating cylinder are jointed, at opposite points of its circumference, two folding wings, which, when folded inward, lie in such a position as to form part of the circumference of the rotating cylinder, and can therefore pass its point of contact with the fixed-cylinder casing, and, when folded outward, bear by their edges on the inner surface of the fixed-cylinder casing. At the end of the fixed-cylinder casing is fitted a packing-piece, in the form of an annular piston, behind which the working-fluid is admitted, pressing it against the end of the rotating cylinder, and thereby keeping the latter tight endwise. Through a hole in this packing-piece the fluid passes into either of two grooves formed in the end of the rotating cylinder, each of these grooves being of nearly semicircular form, extending nearly half around the end of the rotating cylinder, and communicating with a longitudinal groove extending lengthwise under each of the two folding wings. The fluid, entering by the hole in the packing-piece into one of the grooves, presses outward one of the folding wings, and causes the inner cylinder, to which it is jointed, to revolve, the one wing which is being pressed out by the fluid opening out to accommodate itself to the eccentricity of the cylindrical surface on which its edge bears, while the other wing is being folded inward as it approaches the line of contact of the two cylinders. The supply of working-fluid continues as long as any part of the semicircular groove in the end of the rotating cylinder faces the supply-hole in the packing-piece. By inserting a stop in any desired part of this semicircular groove, the supply of fluid can be cut off at any desired period of a revolution, permitting the fluid already admitted to work expansively during the remainder of the revolution. The fluid, after having done its work by pressing one of the wings around a great part of a revolution, escapes by a discharge-orifice in the side of the fixed-cylinder casing near the point of its contact with the rotating cylinder. Before, however, the one folding wing reaches the point of discharge, the other has begun to be acted on by the working-fluid, and thus continued rotation of the inner cylinder is secured.

In order to render the line of contact of the inner and outer cylinders tight against the leakage of the working-fluid past it, notwithstanding wear, I mount in a cavity provided in the outer-cylinder casing, at the line of contact, a folding wing, jointed so as to fold in the opposite direction to those on the rotating cylinder, and I make a communication by a small groove to the space under this wing against the surface of the rotating cylinder.

Although I have described the admission of working-fluid as taking place only at one end of the cylinder-casing, by the like arrangement of admission-hole and semicircular grooves at the other end of the cylinder-casing the fluid may be admitted also there.

Figure 1 of the drawings shows a longitudinal section of the engine on line *x x*, Fig. 2. Fig. 2 shows an end view of the engine with the cover removed. Fig. 3 shows a cross-section on line *y y*.

The steam is supplied through the pipe O to the cavity Q, between the cover of the cylinder casing and the loose piston-packing P, which is thereby pressed against the end of the rotating cylinder D, thus insuring the steam-tight contact of the end surfaces thereof with the outer-cylinder casing. From the space Q the steam enters the annular space *r r'* of the rotating cylinder D through the passage A. The cylinder D is fixed on the shaft K eccentrically within the cylinder-casing C, so that at one point of its circumference it is in contact with the latter. It has hinged to it at *o o*^{1} two folding wings, E F, at opposite points, which, when folded back, as at E, fit into corresponding recesses in the cylinder D,

and, when folded outward, as at F, bear with their edges on the inner surface of the cylinder-casing C.

Behind these wings small channels *a a* are formed in the cylinder D, which communicate with the annular spaces *r r'*, so that the steam entering these will pass through such channels to the back of the wings, and tend to press these outward against the cylinder-casing C, and the steam, in filling the space between the two cylinders behind the wing, will effect the rotation of the cylinder.

The annular space at the end of the cylinder D being divided by radial partitions into two separate semicircular compartments, it will be seen that when the one partition passes the inlet-passage A the steam-supply will be cut off from the one compartment, say *r*, and will enter the other, say *r'*. The steam is thus cut off from the space between the cylinders behind the wing F, and when the cylinder D has rotated so far that the point of contact between F and the cylinder-casing C has passed beyond the exhaust-passage M, the steam will escape from the space behind F while it is entering the space behind E. The wing F will at the same time, by the rotation of the cylinder, be gradually pressed back into its recess, as shown at E.

In order always to insure a steam-tight contact between the two cylinders, notwithstanding any wear, a flap, N, hinged to the cylinder-casing C at o^2, and fitted in a cavity therein, is pressed against the cylinder D by steam-pressure, which has access to the space behind it through a small channel, *c*, formed in the cylinder-casing C. The flap N is hinged in the contrary direction to E and F, so that it offers no obstacle to these in revolving.

It will be seen that, when the cylinder D has revolved so far that the partition at *r*, in passing the steam-port A, cuts off the supply of steam to the space behind the wing F, the steam will thus act expansively in such space until it is made to communicate with the exhaust-port, as described. When it is required that the engine shall work with variable expansion, the cylinder D is constructed as shown at Figs. 1 and 2.

The annular channels *r r'* have semicircular grooves *g g* formed in them for the reception of movable partitions G G, so that in fitting these partitions in one or other of these grooves, as shown, the supply of steam is limited to that portion of the channels *r r'* between the partitions G and the wings E F.

In order not to have to remove the cover of the engine and packing-piece A every time the partitions G require to be shifted for varying the expansion, holes corresponding with the form of the partitions, and closed by covers, are made in the cover and the packing, so that by turning the piston until the required grooves in the channels *r r'* are brought opposite the holes the partitions can be inserted through them.

The hinge-joints of the wings E and F and of the flap N may either be formed by a pin passing through eyes in the wings or flaps, as shown at o^2, or they may be more conveniently formed, as at o^1, without any pin, the rounded parts being merely forked, so as to fit in between each other.

The admission of steam behind the piston-packing P being limited to the annular space Q, the pressure exerted thereby is only sufficient to maintain a steam-tight joint without producing any such friction as would act as a brake on the cylinder D. The steam might, however, be made to act upon the entire back surface of the packing if of low pressure.

The steam may either be introduced only at one end of the cylinder D or at both ends thereof, in which case both ends would be formed with the channels *r r'*, as indicated on the drawing.

A small notch is formed at *f*, Fig. 1, in the packing P, in order that the edge thereof may form no impediment to the motion of the flap N.

Owing to the great speed at which the above-described engine is capable of running, the steam might not be capable of expanding to the desired extent. In this case two such engines might advantageously be arranged closely side by side, the two revolving cylinders being fixed on one and the same shaft, and the exhaust steam from the one engine be made to pass into the other engine, to do duty therein by expansion, as in ordinary compound engines.

Having thus described the nature of my invention, and in what manner the same is to performed, I claim—

The arrangement of the semicircular channels *r r'* with fixed partitions, whereby the supply of steam is cut off, and with movable partitions, whereby the expansive action of the steam may be varied.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

P. B. MARTIN.

Witnesses:
P. O. SAU,
LUCIEN MEISSUER.