No. 835,030.

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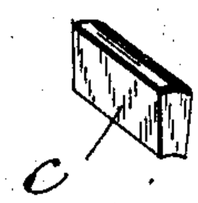
E. D. & E. A. E. MOUSSEAU.

ROTARY ENGINE.

APPLICATION FILED FEB. 8, 1906.

FIG. 5.



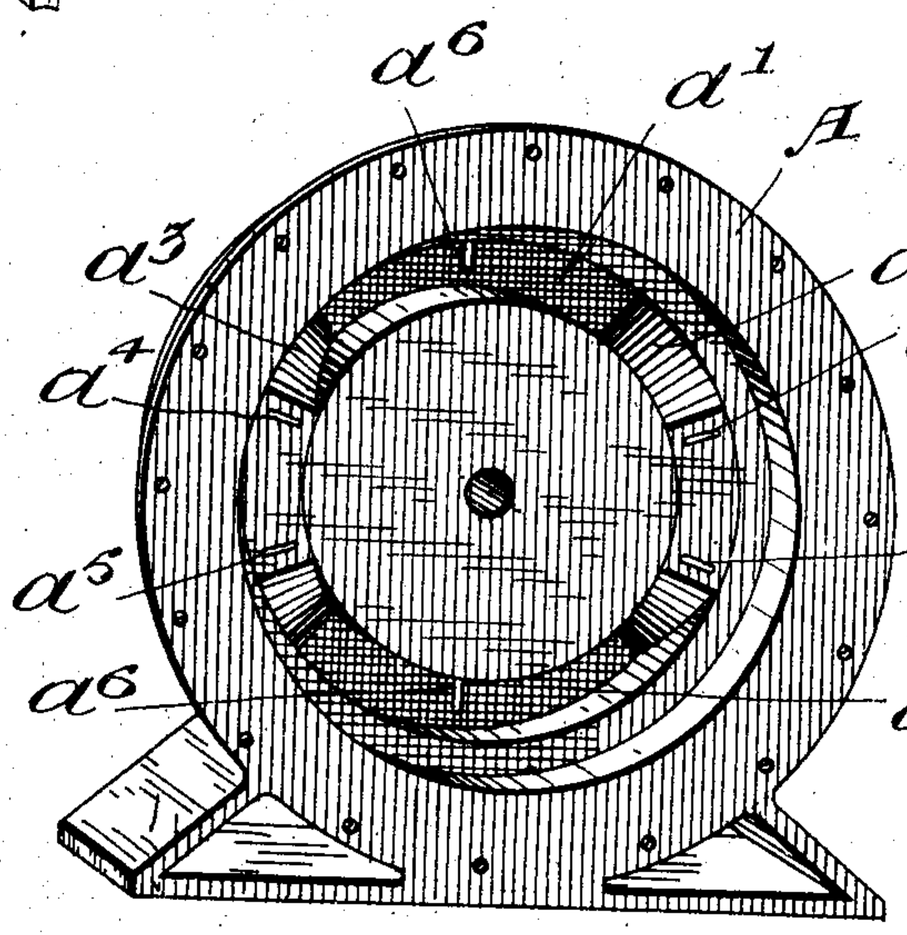


FIG. 2.

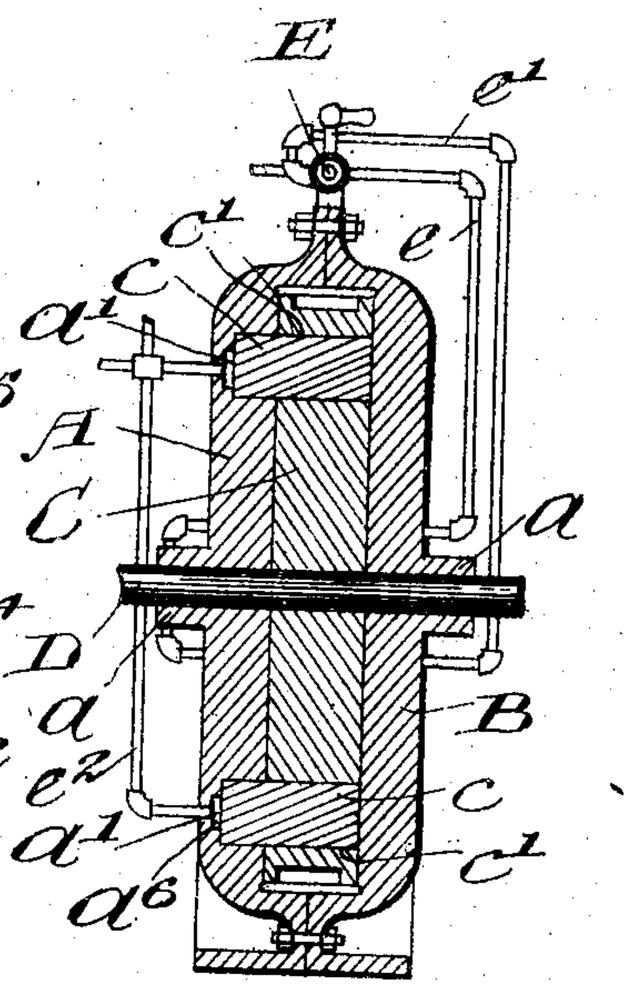


FIG. 1.

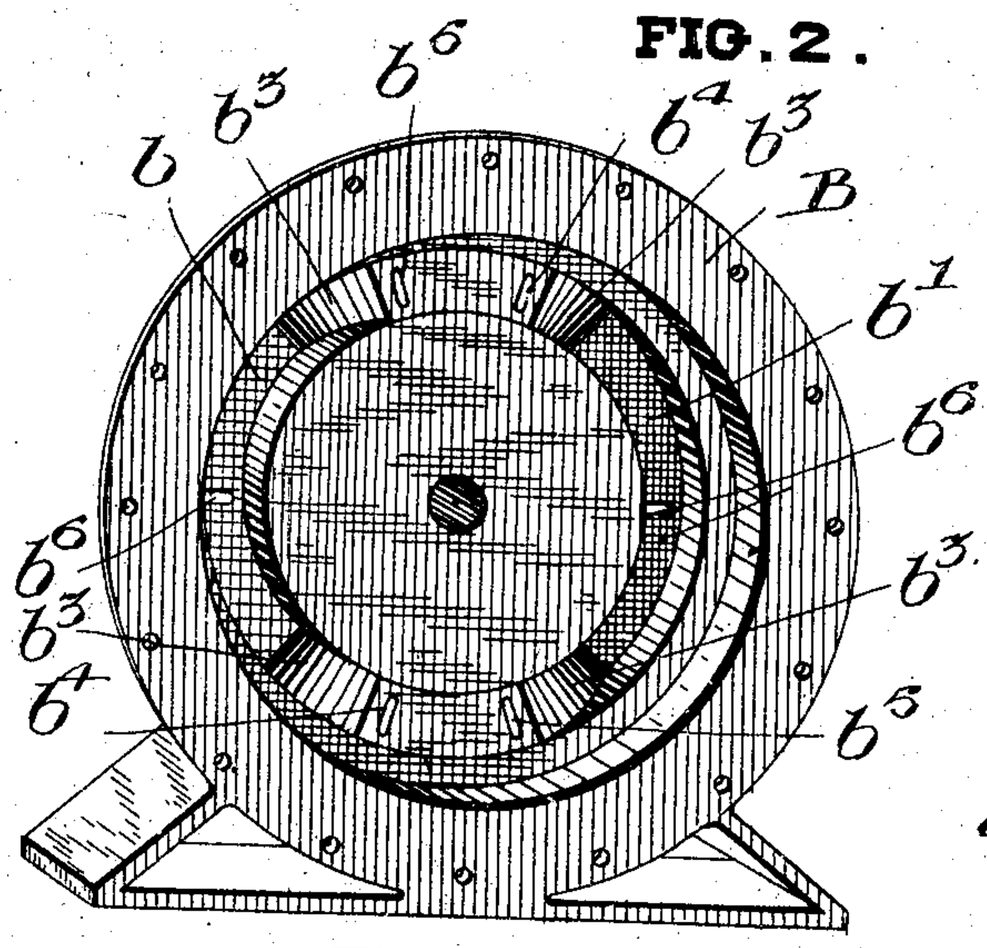


FIG. 3.

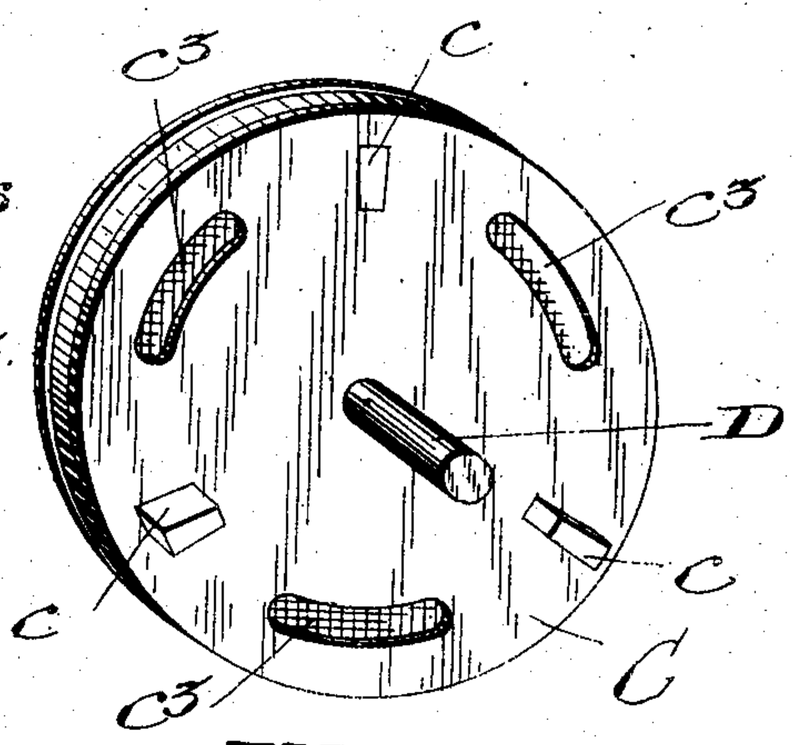


FIG. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD DAVID MOUSSEAU AND EDWARD ANTHONY EZRA MOUSSEAU, OF HULL, QUEBEC, CANADA; SAID EDWARD A. E. MOUSSEAU ASSIGNOR TO SAID EDWARD D. MOUSSEAU.

ROTARY ENGINE.

No. 835,030. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed February 8, 1906. Serial No. 300,155.

To all whom it may concern:

Be it known that we, EDWARD DAVID MOUSSEAU and EDWARD ANTHONY EZRA MOUSSEAU, of the city of Hull, in the county of Ottawa, Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

Our invention relates to improvements in rotary engines; and the objects of our invention are to devise an exceedingly simple but efficient form of rotary engine in which the fluid-pressure on the rotor will be continuous and evenly balanced on both sides thereof, enabling a very steady revolution to be made, further objects being to provide simple means for reversing the engine, doing away with the various forms of complicated valve mechanisms generally employed in devices of this class; and it consists, essentially, of a casing, a rotor located therein having a plurality of transversely-slidable plugs therein adapted to protrude from the side thereof into cam-grooves provided in the casing and to be moved by said cam-grooves from one side of the rotor to the other, means for intermittently admitting the motive fluid into said cam-grooves to produce a pressure against the plugs of the rotor, and means for exhausting the motive fluid at predetermined portions of the revolution, the various parts of the device being constructed and arranged in detail as hereinafter more particularly described.

Figure 1 shows a sectional view through our engine. Fig. 2 is a perspective view of the left-hand portion of the casing shown in Fig. 1. Fig. 3 is a perspective view of the right-hand portion of the casing. Fig. 4 is a transverse view of the rotor. Fig. 5 is a perspective view of one of the transversely-slidable plugs of the rotor.

In the drawings like letters of reference indicate corresponding parts in each figure.

A and B are the two sections of the casing, suitably secured together by steam-tight joining means and within which is located the rotor C, supported on a shaft D, journaled in any suitable form of bearing *a* on the casing. In accordance with our invention the rotor is of the form shown in Fig. 4, having provided therein a plurality of plugs *c*, which are slidably held in grooves *c'*, which extend transversely of the rotor. The form of these plugs is shown in Fig. 5, and their length is greater than the width of the rotor, whereby they will always protrude from one side or the other to form abutments for the motive fluid.

On the interior side of each part of the casing grooves a', a^2, b, and b' are provided, within which the plugs are adapted to fit and rotate during a portion of the rotation of the rotor. The grooves are diametrically placed in each side of the casing, and those on one side are placed at the top and bottom and those on the other on each side. At each end of each of these grooves cam-surfaces a^3 and b^3 are provided, which are adapted to raise and lower the plugs in and out of the grooves. These cam-surfaces are preferably such as would be generated by radial lines passing through the center of the axle, whereby the plugs will always fit tightly on them and no leakage of motive fluid can take place from one side of the plug to the other. It will thus be seen that a plug is by means of these grooves alternately moved from one side of the rotor to the other, and it rotates for a portion of the revolution of the rotor in a groove on one side of the rotor and for another portion of the revolution in a groove on the opposite side.

A motive fluid, such as steam, is intermittently admitted to the grooves in which the plugs operate by means of conducting-channels c^3, formed around the surface of the rotor between the plugs on each side thereof and which conduct the fluid from the steam-ports a^4 and b^4 to the grooves during certain portions of the revolution. A second set of steam-ports a^5 and b^5 is provided at the opposite end of the groove whereby the engine may be reversed, as hereinafter described. Exhaust-ports a^6 and b^6 are provided in each of the grooves.

For convenience in reversing the engine we connect the ports a^4 and b^4 by means of suitable conducting-pipes *e* to one side of a three-way cock E and the ports a^5 and b^5 by conducting-pipes *e'* to another side of the three-way cock, the supply of fluid being led in through the pipe e^3. The exhaust-openings may also be connected together by an exhaust-pipe e^2.

Having fully described the various parts

of our engine, we will briefly point out the method of operation of the same.

Assuming that the three-way cock is so turned that a motive fluid, in this case steam, is admitted through the ports a^4 and b^4, we find that the steam will be conducted from these ports to the grooves a', a^2, b, and b' by means of the conducting-channels c^3 as the rotor rotates. It will thus be seen that the length of the conducting-channel c^3 limits the time during which steam will be admitted to the groove. By the time the steam is admitted to the groove one of the plugs c will be already located in position therein, and the steam will produce a pressure against this, producing a torque which will rotate the rotor. The distance between the plug and the conducting-channel is so arranged that the plug will have been moved off the cam-surface a^3 or b^3 by the time the steam is admitted, and hence there will be nothing to prevent it freely moving down the said cam-surface.

After the plug is rotated a certain distance in the groove it passes the exhaust-opening a^6 or b^6, which allows the steam to exhaust. After this the plug is free to move up the cam-sufrace at the other end of the groove and then go into the succeeding groove on the opposite side of the rotor. By the arrangement of the plurality of plugs around the rotor we always insure that there is a steam-pressure at least on one of the plugs on each side, and hence a constant torque will be exerted on the rotor.

The steam is preferably cut off from each of the grooves a short time before the exhaust-port is opened, whereby it will have an opportunity to do work on the rotor by its expansion in the confined space formed by the groove and the plug operating in the same.

All that it is necessary to do to reverse the engine is to move the three-way cock, so that the motive fluid will be introduced through the ports a^5 and b^5. This will introduce the steam into the opposite ends of the grooves and cause the plugs to move in them in the opposite direction.

It will be observed that no form of valve mechanism is required to control the admission of the motive fluid to the engine, for the reason that the motive fluid is controlled absolutely by the channel-grooves formed in the sides of the rotor, and these may be so arranged that motive fluid will be admitted during any predetermined part of the revolution.

The amount of flat surface in contact between the rotor and the sides of the casing entirely prevents the escape of fluid between the two, and as the plugs move alternately from one side to the other the pressure is always equalized on both sides of the rotor.

While we have described our rotary engine with steam as the motive fluid, yet it will be readily understood that any other form of motive fluid, such as hot air or gas, might be employed in place thereof.

The complete and easy reversibilty of the engine by the operation of the three-way cock is an important feature in the construction of the engine, as the lack of reversibility has been one of the points which has mitigated considerably against the universal introduction of rotary engines as at present devised.

While we have described with great particularity of detail one specific embodiment of our invention, yet it is not to be understood that it is limited to the specific construction shown, as various changes in the details of construction might be made to accommodate different circumstances in which the engine is used.

What we claim as our invention is—

1. In a rotary engine the combination with the rotor, a casing inclosing the same of a transversely-slidable plug in the rotor adapted to protrude from either side thereof, a cam-groove in the casing alternately moving the plug from one side of the rotor to the other, a fluid-port extending through the casing, and a fluid-conducting channel formed on the side of the rotor for conducting the motive fluid from the port to the groove as and for the purpose specified.

2. In a rotary engine the combination with the rotor and casing inclosing the same, of a plurality of transversely-slidable plugs in said rotor adapted to protrude from either side thereof, cam-grooves in said casing, alternately moving the plugs from one side of the rotor to the other, fluid-ports extending through said casing, fluid-conducting channels formed on the sides of the rotor for conducting the motive fluid from the ports to the grooves and a plurality of exhaust-ports automatically opened by the rotation of the plugs as and for the purpose specified.

3. In a rotary engine the combination with the rotor and casing inclosing the same, of a plurality of transversely-slidable plugs symmetrically arranged around the rotor and adapted to protrude from either side of the same, a plurality of cam-grooves in the casing alternately moving the plugs from one side of the rotor to the other, fluid-ports extending through the casing, a plurality of fluid-conducting channels formed on the sides of the rotor between the plugs and adapted to conduct the motive fluid from the ports to the grooves and exhaust-ports in the bottom of the said grooves opened by the rotation of the plug as and for the purpose specified.

4. In a rotary engine the combination with the rotor and casing inclosing the same of a plurality of transversely-slidable plugs located in said rotor and adapted to protrude from either side thereof, cam-grooves for alternately moving the plugs to protrude from

one side or the other thereof, steam-ports extending through the casing at the beginning of said cam-grooves, means for connecting the same to a suitable supply of motive fluid, fluid-ports at the opposite ends of said cam-grooves, means for connecting the same to a supply of motive fluid, and a plurality of conducting-channels on the rotor adapted to conduct the motive fluid from said ports to said grooves as and for the purpose specified.

5. An improved rotary engine comprising a rotor, a two-part casing inclosing the same, a plurality of symmetrically-arranged transversely-slidable plugs located in slots provided in the rotor, a plurality of grooves in each side of the casing in which the plugs are adapted to rotate, cam-surfaces at each end of said grooves for moving the plugs in and out of the same, steam-ports extending through each side of the casing, conducting-channels formed on each side of the rotor between the plugs for conducting the steam from said ports to said grooves and exhaust-ports located in the bottom of said grooves and adapted to be opened by the passage thereover of the plugs substantially as described.

Signed at Ottawa, in the county of Carleton and Province of Ontario, this 15th day of March, 1906.

EDWARD DAVID MOUSSEAU.
EDWARD ANTHONY EZRA MOUSSEAU.

Witnesses:
J. E. DRÜMET,
L. H. DE PUPPALON.