H. ROUX.

ROTARY ENGINE.

APPLICATION FILED JULY 20, 1908.

942,413.

Patented Dec. 7, 1909.

3 SHEETS—SHEET 1.

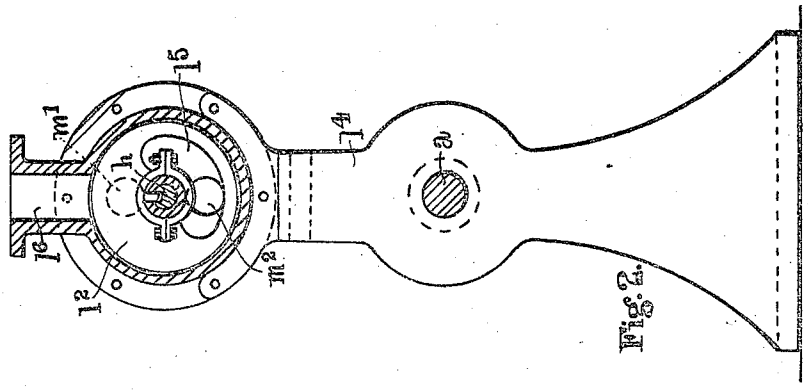


Fig. 2.

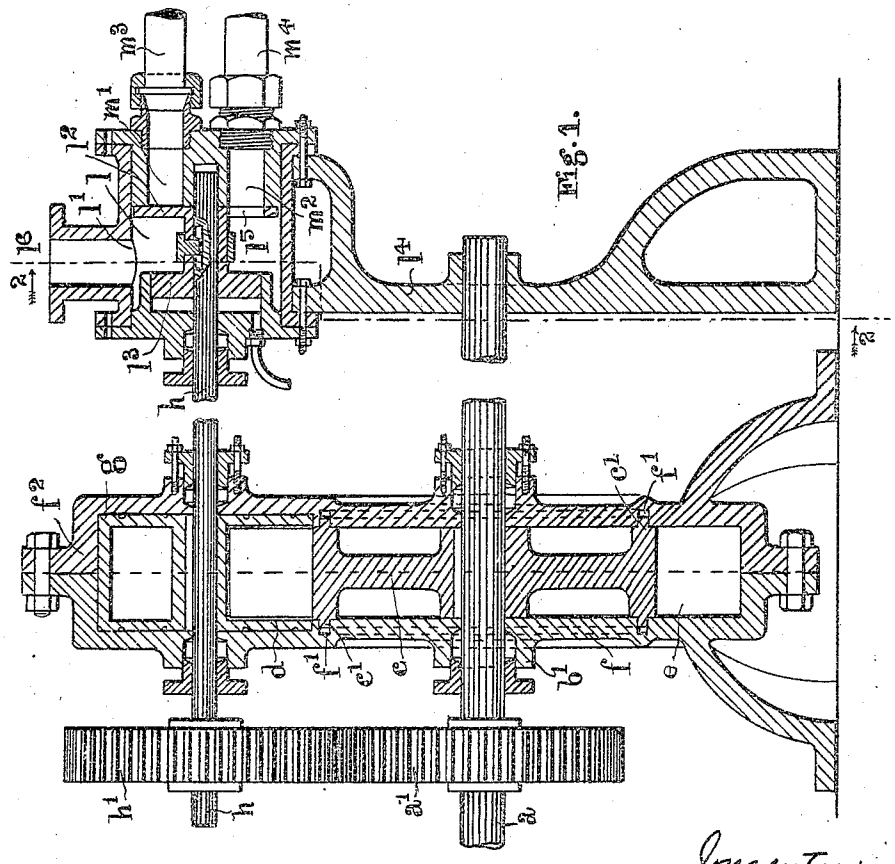


Fig. 1.

Witnesses:
L. E. Barkley.
L. A. Sands.

Inventor:
Henri Roux,
by Frank A. Allumbaugh
atty.

H. ROUX.

ROTARY ENGINE.

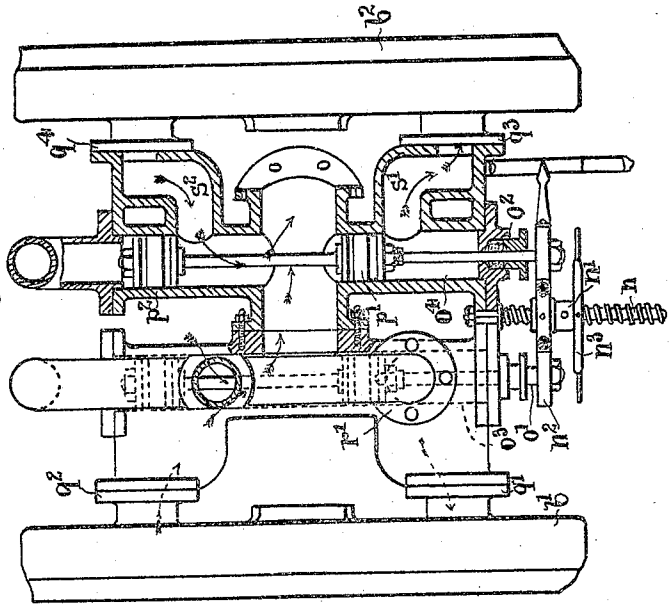
APPLICATION FILED JULY 20, 1908.

942,413.

Patented Dec. 7, 1909.

3 SHEETS—SHEET 2.

Fig. 4.



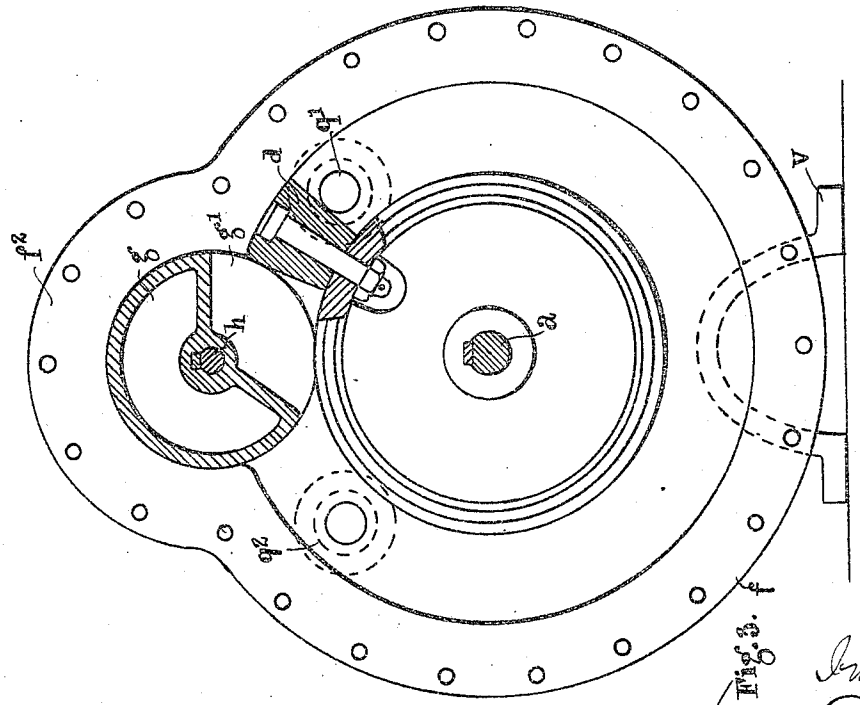


Fig. 3.

Witnesses:
R. E. Barkley.
L. A. Sands.

Inventor:
Henri Roux,
by James A. Williamson
atty.

H. ROUX.

ROTARY ENGINE.

APPLICATION FILED JULY 20, 1908.

942,413.

Patented Dec. 7, 1909.

3 SHEETS—SHEET 3.

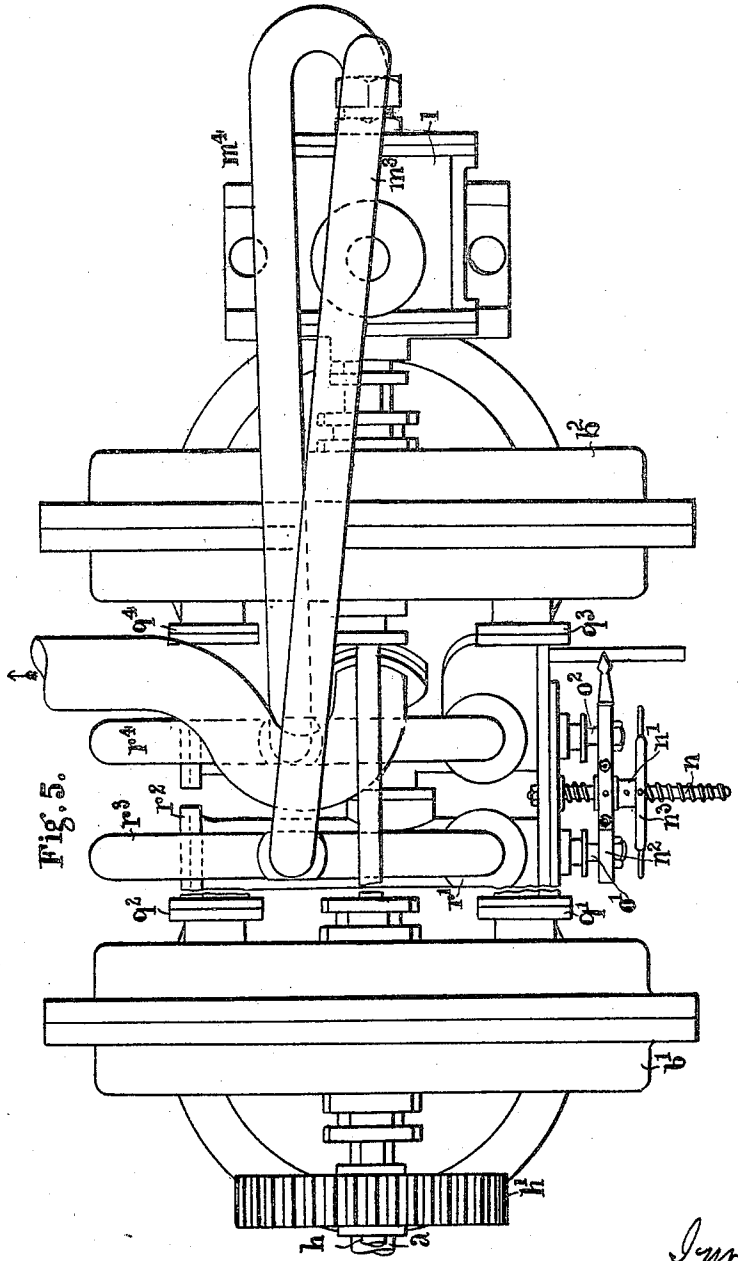


Fig. 5.

Witnesses:
L. C. Barkley.
L. A. Sands.

Inventor:
Henri Roux,
by Frank S. Ackerman
atty.

UNITED STATES PATENT OFFICE.

HENRI ROUX, OF MARSEILLE, FRANCE.

ROTARY ENGINE.

942,413. Specification of Letters Patent. Patented Dec. 7, 1909.

Application filed July 20, 1908. Serial No. 444,455.

To all whom it may concern:

Be it known that I, HENRI ROUX, a citizen of the French Republic, and resident of 13 Rue Albrand, Marseille, France, engineer, have invented certain new and useful Improvements in and Relating to Rotary Engines, of which the following is a specification, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention consists of a rotary engine which is driven by steam or other fluid under pressure, and which comprises essentially two or more rotors mounted on the same shaft, each rotor consisting of a piston revolving in an annular case, and of a rotating shutter, arranged on a shaft, which is in gear connection with the main shaft of the engine and which is common to the shutters of both, or if more than two, to all the rotors. The machine comprises also an automatically acting distribution valve, which allows the steam to alternately flow to the different rotors.

The arrangement of the pistons and of the distribution valve with its connections is such that each turn of a piston will consist of three phases; in the first phase the piston will receive an impulse and will drive, all the steam being admitted to its chamber, in the second phase the shutting off of the supply of steam from one rotor and the opening up of same to another rotor will be effected in such a manner, that the flow of steam will be split and steam will be admitted to two rotors, this arrangement will prevent a dead-lock of the machine; in the third phase the supply of steam will be completely shut off from the first mentioned rotor, and the piston of same will complete its revolution by drive from the shaft, the shaft receiving its momentum from another rotor, and the section being assisted by the piston's own momentum and also partly by the expansive power of the steam introduced which in this phase is allowed to exhaust.

I will now describe my invention with reference to the accompanying drawings in which a machine with two rotors is shown by way of example and in which—

Figure 1. shows a cross sectional elevation of one of the rotors and also of the distribution valve. Fig. 2. shows a section of the distribution valve on its support, made on line 2—2 of Fig. 1. Fig. 3. shows one of the rotors in section made through its center plane. Fig. 4. shows part of the rotors with their connections and the arrangement for regulating the supply of steam to the rotor partly in plan and partly in horizontal sections. Fig. 5. shows the whole compound machine in plan.

On the shaft a, which is preferably composed of two parts engaging with each other, so as to allow for lateral expansion, two rotors b' and b^2 are mounted. Each of these rotors consists of a disk c which is keyed or otherwise fixed to the shaft a and which is provided on its circumference with a piston d which is arranged in one rotor diametrically opposite to that of the other rotor. This piston d revolves in an annular chamber e formed by the casing f of the rotor and terminated at its center side by the periphery of the disk c, the side-walls of which for the purpose of superior tightness are preferably provided with annular flanges c' sliding in annular grooves f' of the casing f. This casing is of annular shape except at one place, preferably its top, where it has a projection f^2 the outline of which corresponds to part of a circle of smaller diameter. The projection f^2 has a hollow interior, which forms an extension of the chamber e and when closed a shutter g of cylindrical shape, which shutter g is provided with a sector shaped cut out or recess g' and turns on a shaft h. The dimensions are such that the shutter when passing with its full part through the adjacent part of the annular chamber e will be in contact with the periphery of the disk q provision being made to decrease friction between shutter and disk to a minimum. The shaft h carries a gear wheel h' at one of the extremities, which gear wheel h' engages with a gear wheel a' of equal size mounted on shaft a, in such a manner that the shaft h will be driven from shaft a and that consequently the positions of the piston d will always correspond to certain positions of the shutter.

On the same shaft h a distribution valve l consisting of a sleeve l' keyed or otherwise fixed to the shaft, and carrying two disks 12, 13 the whole being inclosed in a box is arranged. Of these disks 13 assists to make the box steam tight and 12 is provided with a concentric semi-circular slot 15, which, when the disk 12 revolves, passes over two orifices m', m^2 of the valve box always uncovering one of same, in such a manner that

the steam entering the valve box at 16 is allowed to alternately, and at certain intervals enter the two orifices mentioned. The extremity of shaft h is mounted on suitable bearings provided in the walls of the valve-box which is carried by a suitable support or stand 14 in which bearings for the free end of the shaft a are arranged.

Between the two rotors an arrangement for regulating the supply and exhaust of steam is provided, which arrangement consists essentially of a screwed spindle n fixed in the frame of the machine, on which spindle a nut n' with handle n^3 travels, a bar n^2 being loosely mounted on said nut. This bar is firmly connected to two rods o', o^2 each of which carries two plungers working in cylinders o^3, o^4 respectively. Of these cylinders o^3 is connected with the steam chamber e of the rotor b' by passages and orifices q' q^2 and by means of orifices r' r^2 to a tube r^3 which is connected with the orifices m' of the valve l by a tube m^3. The cylinder o^4 is connected with the steam chamber of rotor b^2 by means of orifices q^3, q^4 and passes s', s^2 and is also connected in a manner similar to that of cylinder o^3, to a tube r^4 communicating with pipe m^4 which leads to orifice m^2 of the valve l.

The rod o^2 carries two plungers p' p^2 which can be brought into such position as to disconnect passage s^2 from tube r^4 and allow communication between passage a' and tube r^4 (Fig. 4) in which position the steam coming from the orifice m^2 of the valve-box will enter the rotor b^2 by orifice q^3 and will escape by orifice q^4 and pass through passage s^2 to exhaust conduit t, or the plungers will be in front of the mouths of passages s' and s^2 in which case inlet and outlet of the rotor will be shut and the machine will stop, or the plungers will be in such a position, that plunger p' will disconnect the passage s' from the tube r^4 and connect the latter with passage s^2, passage s' being allowed to communicate with exhaust t in which case the movement of the rotor b^2 will be reversed. A scale is provided, the sections of which correspond to the three positions of the plunger, a finger provided on bar n^3 sliding on said scale and enabling the operation to adjust the nut n' for either of the three phases.

The cylinder o^3 incloses an arrangement similar in construction and action to that described with regard to cylinder o^4. The castings f are mounted on suitable supports or stands v.

The working of the machine is as follows:—See the position shown in the accompanying drawings. Steam will flow from the interior of the valve box 14 through slot 15 and orifice m^2 and will enter the tube m^3 through which it passes to tube r^4 and from there through cylinder o^4 passage s' and orifice q^3 into the steam chamber e of the rotor b^2 (Figs. 4 and 5). The piston d in same will at the commencement of this action occupy a position on the other side of orifice q^3 to that where the shutter g is arranged, which at this stage of the action will display its full portion in the chamber e so as to prevent the steam from escaping backward. The piston d will then be blown around, steam entering orifice q^3 for the time of more than half a turn of the piston d from the place of commencement of its action, at the expiration of which time the disk l^2 rotated by shaft h, which turns with the same velocity as the shaft a (the gear wheels a' and h' being of equal size) has performed half a turn and will be in a position to cover orifice m^2 and to uncover orifice m' the semi-circular slot l^5 leaving orifice m^2 and passing now over orifice m'. Steam will now pass through orifice m' tubes m^3 r^4 orifice r^2, cylinder c^3, to orifice q' of rotor b' the piston d of which being arranged diametrically opposite to the piston d of rotor b^2, will occupy the same position as the latter piston did at the commencement of its action, and will be forced around in the same direction as the piston of rotor b^2. This latter piston will during this stage of the action complete its revolution the shaft a which in this phase is driven by rotor b' taking it with it. The momentum of the piston and the expansion of the steam introduced into the chamber e will assist the shaft a in the performance of this function. When the piston has passed the orifice q^4 the steam will be exhausted. The shutter g will then occupy such a position as to display its recess g' to the chamber e thus allowing the piston d to pass by and assume its position behind inlet q^3 for another turn. The same action is performed by the piston d of the rotor b' during a drive of rotor b^2. Fig. 3. shows the piston of rotor b' completing its rotation.

The machine may comprise more than two rotors in which case the proportions of the valve and the arrangement of the pistons of the different rotors will have to be altered accordingly.

The machine may be made to exhaust into other engines of the same or other type, arranged separately or mounted on the same shaft so as to further use the expansive power of the same shaft.

The machine shown and described herein is an example only of how my invention may be carried out and modifications of same may be made without thereby deviating from the principle of the invention. It is evident that if the machine is constructed for a particular purpose economies can be made in its construction and making.

The arrangement for actuating the distribution valve may be altered so as to avoid

the use of toothed gears, which may for instance be replaced by connecting rods and eccentrics.

The method of assembling the casings may be simplified by making them of one annular casing, which is on one side closed by a plate, instead of constructing them of two equal halves, as shown in the drawings.

The advantages of my machine are chiefly:—The dimensions are reduced. A minimum consumption, the expansive power of the steam being used under the same conditions as in reciprocating engines. The machine works at low speed with unvariable economy of power. It can be easily reversed. It can be used with the highest pressures, while always working with great economy the principle of cascade expansion of the steam being employed.

What I claim and desire to secure by Letters Patent is:—

1. In a rotary engine, a plurality of cylinders having enlarged heads, rotary pistons movable within the cylinders, each of the pistons being provided with a single abutment, rotary valves located in the enlarged heads of the cylinders having recesses for the radial movement of the abutments of the pistons, a valve casing having spaced ports therein, a rotary valve disk having a slot therein for separately closing either of the ports and jointly both of them, and means connected with the cylinders and the valve casing for supplying fluid under pressure thereto.

2. In a rotary engine, a plurality of cylinders, a plurality of pistons rotatable in the cylinders, said cylinders having enlarged heads, and said pistons being provided with single abutments, valves having recesses therein for the reception of the abutments of the pistons rotatable in the enlarged heads of the cylinders and coacting with the pistons thereof, a valve casing having spaced ports, fluid conducting means connected with the spaced ports of the valve casing and with the cylinders, and a rotary valve disk having a slot therein for separately closing either of the ports of the valve casing and jointly opening both of said ports.

3. In a rotary engine, a plurality of cylinders, a plurality of pistons, said cylinders being formed with enlarged heads and said pistons being provided with single abutments, rotary valves having recesses for the reception of the abutments of the pistons secured in the enlarged heads of the cylinders, a valve casing having spaced ports therein connected with the cylinder, a rotary valve disk having a slot therein for separately closing either of the ports of the valve casing and jointly opening both of said ports, and a plurality of reciprocating plungers for reversing the direction of rotation of the pistons connected therewith.

4. In a rotary engine, a plurality of cylinders, a plurality of pistons, said cylinders being formed with enlarged heads and said pistons being provided with single abutments, rotary valves having recesses for the reception of the abutments mounted in the enlarged heads of the cylinders, means for supplying fluid under pressure to the cylinders, valves connected with said cylinders for directing the flow of the pressure fluid to either cylinder, and plunger valves movable in the supply means for reversing the direction of flow of the fluid.

5. In a rotary engine, a plurality of pistons, means for supplying fluid under pressure to the pistons, cylinders for the pistons, means for controlling the flow of the fluid to either of the pistons, reciprocating plunger valves located in the supply means for reversing the flow of the fluid, and a screw operated indicator head for operating the plunger valves.

6. In a rotary engine, a plurality of rotary pistons, means for supplying fluid to either of the pistons and to both of them, plunger valves for reversing the direction of flow of the fluid and indicating means for regulating the valves.

7. In a rotary engine, a plurality of rotary pistons, means for supplying fluid to either of the pistons and to both of them, plunger valves working in the supply means for reversing the direction of flow of the fluid and indicating means having a screw adjustment for regulating the valves.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRI ROUX.

Witnesses:

ALPHONSE LE FAVRE,

MARIUS MARGUIER.