M. H. LISTON & A. C. PITMAN.

ROTARY MOTOR.

APPLICATION FILED JAN. 11, 1910.

1,009,759.

Patented Nov. 28, 1911.

2 SHEETS—SHEET 1.

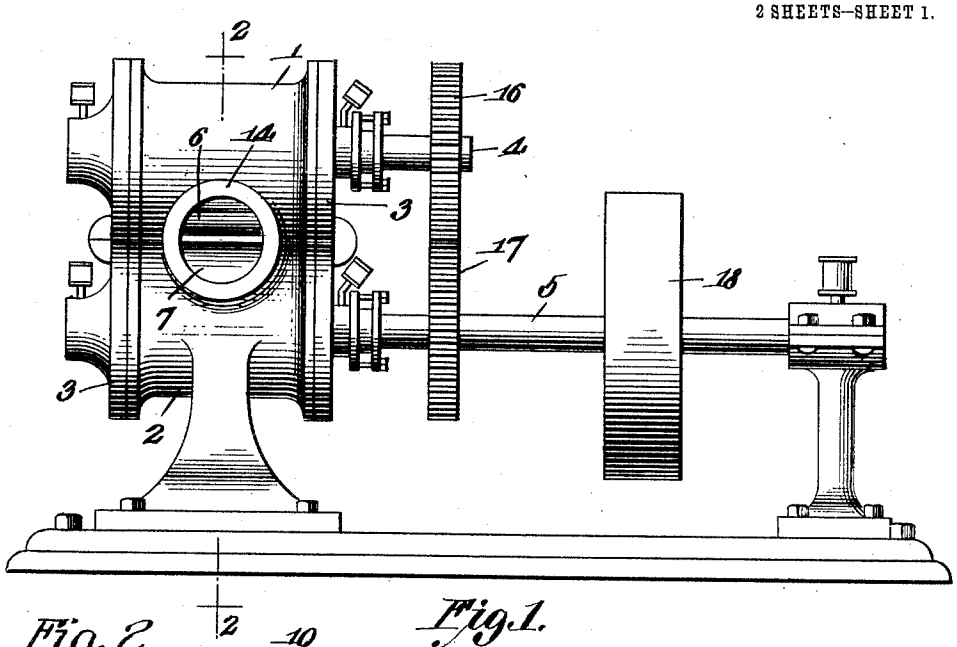


Fig. 1.

Fig. 2

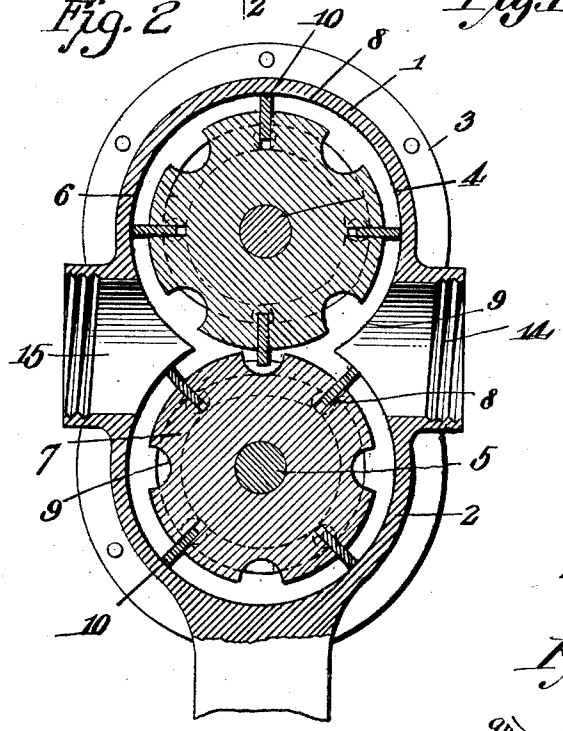
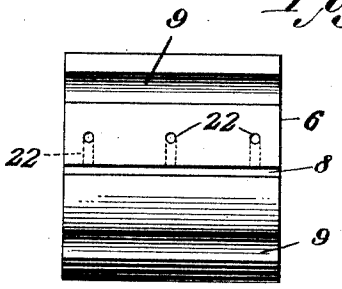


Fig. 7.



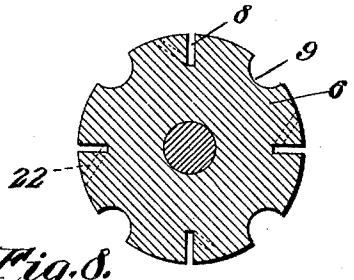


Fig. 8.

Witnesses

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2 SHEETS—SHEET 2.

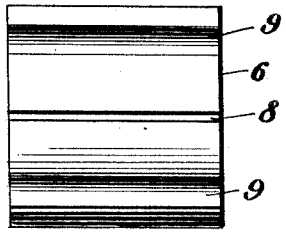


Fig. 3.

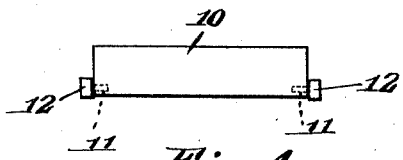


Fig. 4.

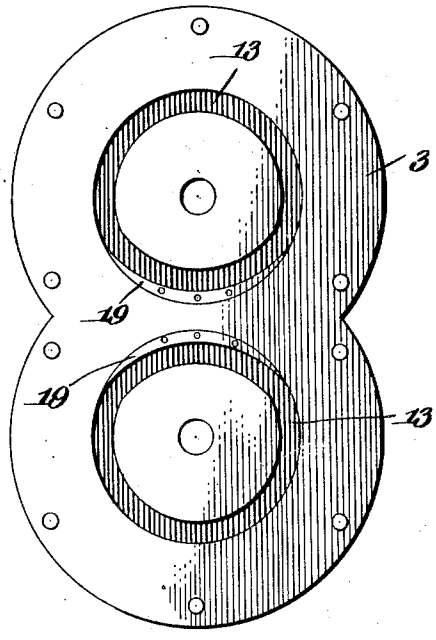


Fig. 5.

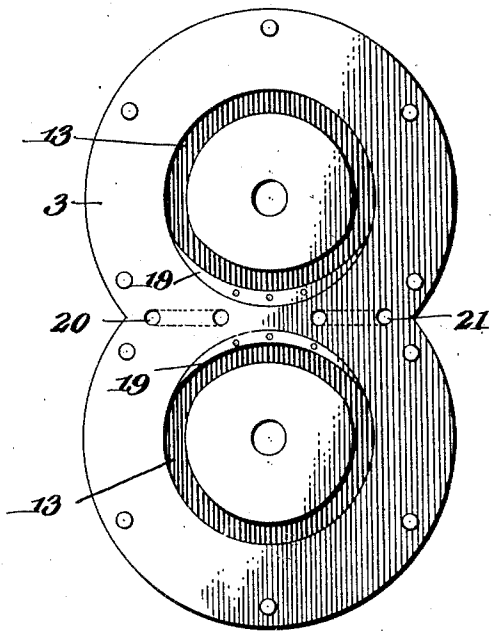


Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

MARCELLUS H. LISTON AND ANDREW C. PITMAN, OF GRAFTON, WEST VIRGINIA.

ROTARY MOTOR.

1,009,759. Specification of Letters Patent. **Patented Nov. 28, 1911.**

Application filed January 11, 1910. Serial No. 537,532.

To all whom it may concern:

Be it known that we, MARCELLUS H. LISTON and ANDREW C. PITMAN, citizens of the United States, residing at Grafton, in the county of Taylor and State of West Virginia, have invented new and useful Improvements in Rotary Motors, of which the following is a specification.

The invention relates to a rotary motor, comprehending specifically a construction which, with slight changes required for admission of the fluid, may be used either as a pump or engine.

The main object of the present invention is the provision of a plurality of cylinders geared for simultaneous opposite rotation, each cylinder being provided with a plurality of pistons designed in the rotation of the cylinders to coöperate with the grooves formed in the opposing cylinder whereby the cylinders for a determined portion of their movement present practically a solid member, utilized in pumping operation to create a vacuum and in engine operation to receive the impact of the motive fluid.

The invention in its preferred details of construction will be described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a side elevation of the device in use as a pump. Fig. 2 is an enlarged, vertical section on line 2—2 of Fig. 1. Fig. 3 is a plan of one of the cylinders. Fig. 4 is an elevation of one of the pistons. Fig. 5 is an inner elevation of one of the head plates. Fig. 6 is a view similar to Fig. 5 showing the ports when the device is in use as an engine. Fig. 7 is a view similar to Fig. 3 showing the cylinder adapted for use as a rotary engine. Fig. 8 is an end elevation of the same.

Referring particularly to the accompanying drawings, our improved motor includes upper and lower casings 1 and 2 preferably formed integral and connected so that the interior of one casing communicates with the interior of the other casing through an opening which is approximately equal to the radius of either cylinder. The ends of the combined casings thus provided are closed by head plates 3, secured in any usual or preferred manner and in which head plates are mounted the upper and lower shafts 4 and 5 for the cylinders. Arranged within the respective chambers of the casing are upper and lower cylinders 6 and 7, of duplicate construction each including a cylinder body preferably of solid type having a diameter materially less than that of the casing chamber in which it is mounted. Each cylinder is formed with a series of longitudinally extending radially arranged grooves 8, and directly intermediate any two adjacent grooves with longitudinal extending channels 9. The grooves and channels are thus alternately and uniformly disposed throughout the circumferential area of a cylinder, the grooves being preferably of a uniform width throughout their height while the channels are of approximately semi-circular form in transverse section.

The respective cylinders are of such size and so arranged in the chambers of the casing that they will just avoid contact at their nearest point, which is in the longitudinal center of the transverse central plane of the casing. In each groove 8 is mounted a piston 10 comprising a rectangular body having a height exceeding the depth of the groove with its remaining dimensions corresponding to that of the groove. The respective ends of the pistons adjacent the relatively inner longitudinal edges thereof are formed to receive pins 11 which project beyond the ends of the pistons and on which are mounted rollers 12. The inner surface of each head plate 3 is formed with a cam groove 13 in which the rollers 12 travel at all times, said grooves being so arranged as to normally maintain the free or upper edges of the pistons in contact with the inner surface of the wall of that chamber in which the particular cylinder is operating. The casing, in using the device as a pump, is formed with a water inlet 14 and a water outlet 15 disposed in alinement with each other and with the horizontal central plane of the casing. Beyond the casing the shafts 4 and 5 are geared for simultaneous opposite movement through intermeshing gears 16 and 17 secured upon the respective shafts, said latter gear being preferably operated by a motor 18. The respective shafts are so geared that at their point of closure the groove 8 of one cylinder, and thereby the piston arranged in said groove will vertically register with the channel 9 of the opposing cylinder, the projection of the piston beyond the peripheral surface of the partic-

ular cylinder being sufficient to allow the full force of the water to be utilized without an appreciable loss through the opening thus formed.

In order to avoid any possibility of interference between the projecting portion of the piston and the peripheral surface of the opposing cylinder in the movement of the parts, we provide each head 3 with a cam plate 19 and shape the groove 13 at this point so that the piston is, by means of the cam plate, withdrawn into the groove to an appreciable extent to avoid such interference. The cam is so shaped as to withdraw the piston just previous and subsequent to its operative engagement with the opposing channel 9, the intermediate portions of the cam preventing the further extension of the piston when in such channel engaging position.

In operation as a pump it will be noted that the rapid rotation of the respective cylinders will tend to create a vacuum within the casing chambers with the effect to draw in the water and project the same through the outlet.

In the use of the device as a rotary engine the inlets and outlets 14 and 15 are omitted, and the steam is admitted through either port 20 or 21, in accordance with the direction in which the engine is to operate, which ports are formed in the heads 3 and open into the interior of the casing so as to direct the steam immediately behind the particular piston just as said piston is in a position to leave the channel in the opposing cylinder. At this time the line of juncture between the peripheral surfaces of the respective cylinders will provide an abutment against which the steam will coöperate.

In the use of the device as a rotary engine the action of the pistons is cushioned by forming in each cylinder a series of ports 22 opening through the peripheral surface of the cylinder adjacent each piston groove and leading down and communicating with each groove adjacent the bottom wall thereof. These ports are influenced by the normal pressure of the steam so that the cushioning is provided behind the relatively inner end of the piston to normally hold the same operative or in projected position.

The motor is of simple construction, is capable of being operated at high speed and the various parts may be readily renewed or repaired with the minimum of labor and experience.

It is of course to be understood that in connection with the ports described we contemplate the use of the usual bearings, lubricating devices and the like forming parts of the ordinary motor structure.

Having thus described the invention, what we claim as new, is:—

1. In a rotary motor, the combination including a casing formed to provide independent chambers, of cylinders mounted for rotation one in each of said chambers, each of said cylinders being formed with alternate grooves and channels extending longitudinally thereof, pistons slidably mounted in said grooves, rollers carried by said pistons, head plates forming side walls for said casing, grooves formed in said head plates, and cam plates arranged to form a continuous wall of each of said grooves, substantially as and for the purpose set forth.

2. A rotary motor including a casing formed to provide independent chambers, cylinders mounted for rotation one in each of said chambers, each of said cylinders being formed with alternate grooves and channels extending longitudinally thereof, pistons slidably mounted in said grooves, rollers carried by said pistons, head plates for the casing, grooves formed in said head plates, the inner walls of said grooves being formed eccentrically with relation to the outer walls thereof, cam plates arranged within said grooves and continuous with said outer walls, and ports formed in one of said head plates.

In testimony whereof we affix our signatures in presence of two witnesses.

MARCELLUS H. LISTON.
ANDREW C. PITMAN.

Witnesses:
W. C. OGDEN,
J. T. FLEMING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."