C. MENDIZABAL.

ROTARY PUMP.

APPLICATION FILED DEC. 21, 1908.

953,539. Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

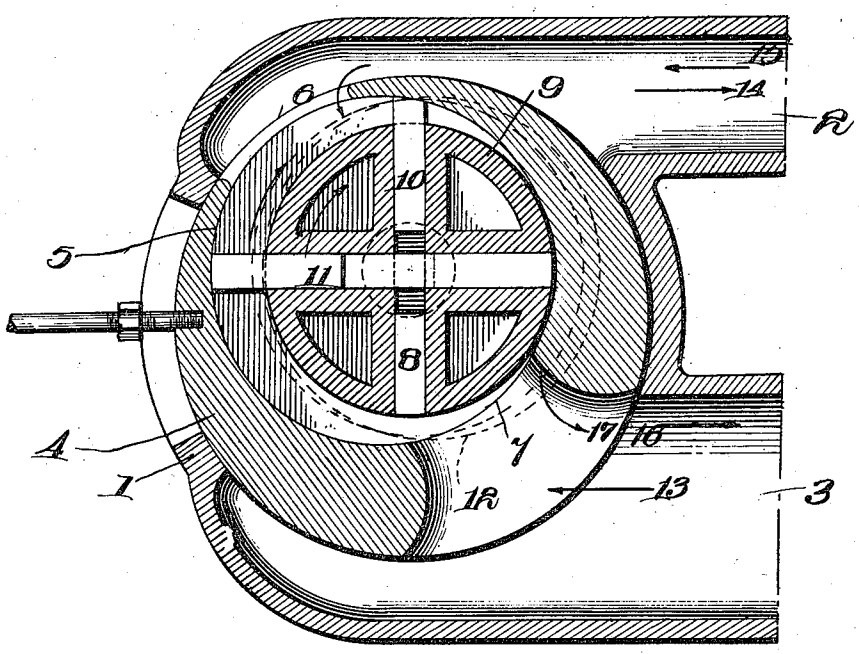
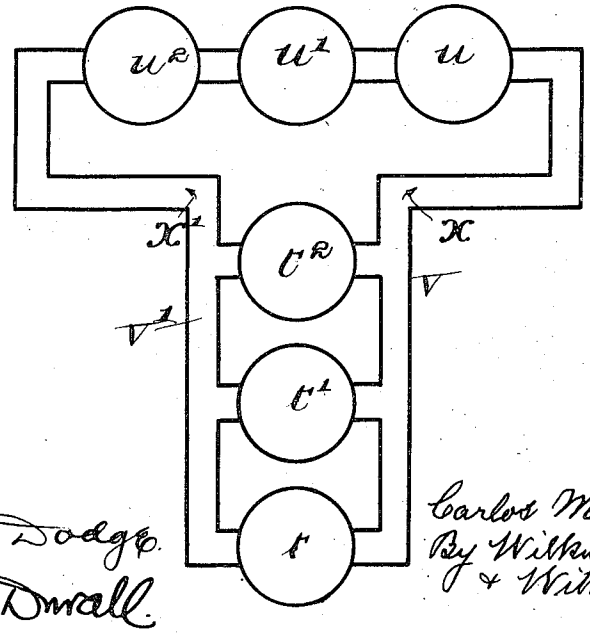


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

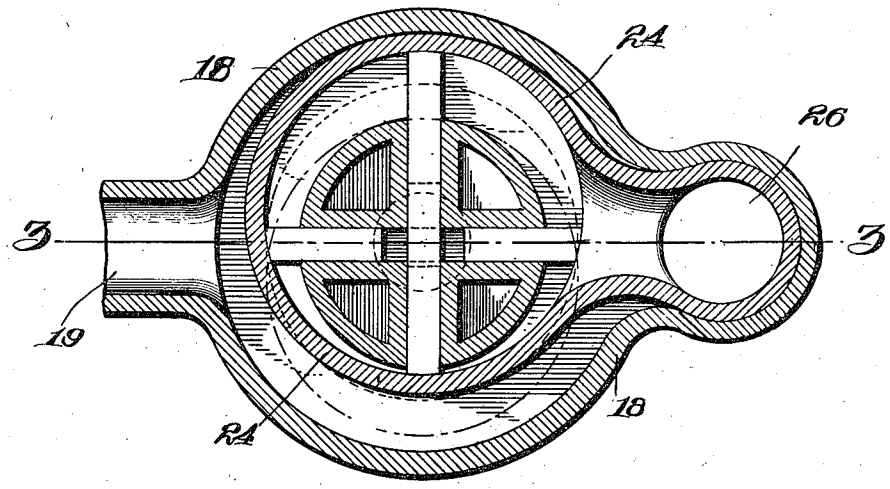
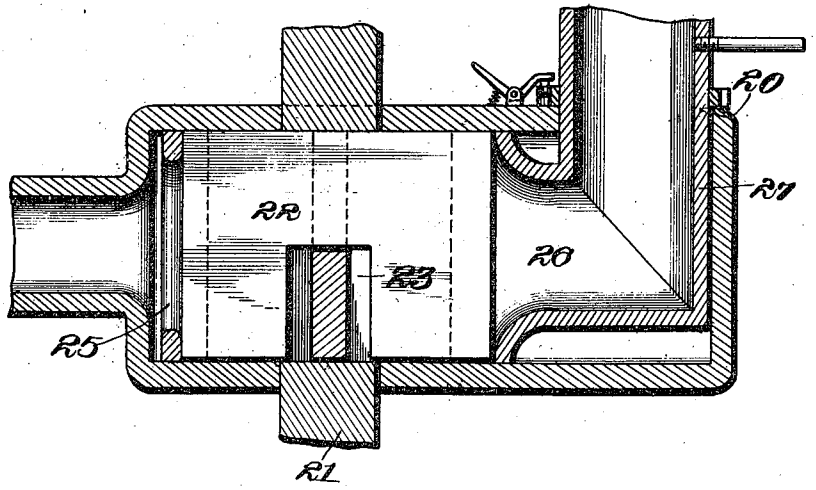


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ROTARY PUMP.

953,539. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed December 21, 1908. Serial No. 468,683.

To all whom it may concern:

Be it known that I, CARLOS MENDIZÁBAL, a subject of the King of Spain, residing at Saragossa, in the Province of Saragossa and Kingdom of Spain, have invented certain new and useful Improvements in Rotary Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The outflow given by a rotary pump, having paddles run by a shaft placed eccentrically inside a cylinder, depends upon the available or working area that these paddles present at every movement and upon the length of that path in every revolution. In most rotary pumps these quantities are constant, as well as the volume of fluid delivered at each revolution.

The present invention relates to rotary eccentric pumps provided with means for changing at will the working area of the paddles. This result is accomplished by changing the distance between the center of the drum in which the paddles are mounted and the center of the cylinder in which the paddles work. According to my invention, this cylinder can be adjusted so that its center will coincide with the center of the drum, or it may be adjusted in either direction therefrom. When the eccentricity is between maximum and zero on what may be called the positive side, the fluid will be propelled in a given direction, which we will call the positive flow, and the volume of fluid delivered in the given time will be between the maximum capacity of the pump and zero. Where the centers of the drum and cylinder coincide, or where there is no eccentricity, there will be no flow. If the cylinder is still further adjusted so as to make the eccentricity on the opposite side, which may be called the negative side, the outflowing fluid will also have its direction changed. At every moment the inside capacity of the cylinder and the rate of rotation of the paddles are constant, but the sliding movement of the paddles changes in proportion to the change in eccentricity. When this eccentricity is zero, the paddles will not slide in the drum at all. As the eccentricity diminishes from its maximum, whether positive or negative, the fluid will form around the drum a fluid ring or coil which participates in the rotation but which does not leave the cylinder. The thickness of this coil is dependent upon the degree of the eccentricity. In order to change this eccentricity, the cylinder is placed inside a box and means are provided whereby the cylinder may be caused to move its center along a straight or curved line which passes through the center of the shaft. With a pump constructed in this way, it is possible to change at will the quantity of fluid delivered until it becomes nothing, or reverse the direction of flow of the fluid without changing the rotary movement of the shaft. The pump is adapted to receive a flow of fluid under pressure, and according to their size and the relative adjustment of the drum and cylinder, this apparatus may be utilized as a rotary generator of power, transmitting it at different speeds and, when desired, in opposite directions.

In the accompanying drawings—Figure 1 is a cross section of a pump constructed according to my invention. Fig. 2 is a cross section of a modification of the same. Fig. 3 is a section on the line 3—3 of Fig. 2, and Fig. 4 is a diagrammatic view showing the combination of three rotary variable pumps intended to transmit fluid to three other pumps disposed in series.

Referring to Fig. 1, 1 represents a circular casing having attached thereto inlet and outlet pipes 2 and 3. 4 represents a cylinder mounted so that it may be revolved in said casing, said cylinder being provided with a cylindrical cut away portion 5, located eccentrically in relation to the cylinder 4. This cylinder is provided with inlet and outlet ports 6 and 7. On a shaft 8, shown in dotted lines in Fig. 1, which is journaled in bearings carried by the casing 1, is firmly mounted a drum 9, provided with longitudinal passages arranged at right angles to each other, in which the paddles 10 and 11 are adapted to slide, these paddles and drum being of the ordinary construction. The cylinder 4 is revolubly mounted in the casing 1, and it may be revolved from the position shown in full lines to the position shown in the dotted line 12, the arrows 13 and 14, respectively, showing the direction of the fluid when the apparatus is in the position indicated in full lines in Fig. 1, and the arrows 15, 16, and 17 indicating the direction of flow of the fluid when the cyl-

inder 4 has been adjusted to the position indicated by the dotted lines in Fig. 1.

In the modified form shown in Fig. 2, 18 represents a casing provided with inlet and outlet ports 19 and 20. Centrally mounted in this casing is a shaft 21, on which is mounted a drum having slots at right angles to each other, in which the paddles work. These paddles are made as shown in Fig. 3, consisting of a flat portion 22 with a slot 23, the slots in the vertical and horizontal paddles being arranged so that these paddles can slide freely without interfering with each other. The construction of the paddles is the same in all the forms. Within the casing 18 is mounted a cylinder 24, having inlet and outlet openings 25 and 26. To one end of the cylinder is fastened the right angled pipe 27, projecting outwardly through the opening 20. By revolving the pipe 27, the cylinder 24 may, of course, be revolved about the axis of the pipe 27. The full and dotted lines in Fig. 2 show some of the various positions the cylinder 24 may be made to assume.

Fig. 4 diagrammatically shows three rotary variable pumps, t, t^1 and t^2, all delivering either into the pipes v or v^1 connected to either side of the pumps. The flow of fluid may be caused to move a set of motors u, u^1, and u^2, which may be disposed in series, and the flow may be either in the direction represented by the arrow x or by the arrow x'.

I claim:—

1. In a rotary eccentric pump, the combination of a casing provided with inlet and outlet passages, a cylinder movably mounted in said casing, said cylinder being provided with a cylindrical bore arranged eccentrically to the axis of oscillation of the cylinder, a shaft mounted in said casing, a drum mounted on said shaft and provided with paddles adapted to slide therein, said cylinder encircling said drum, and means for oscillating said cylinder to shift the bore thereof relatively to said shaft, substantially as described.

2. In a rotary eccentric pump, the combination of a cylindrical casing provided with an inlet and outlet, a shaft passing centrally through said casing, a drum mounted on said shaft and provided with slots passing therethrough at right angles to each other, paddles adapted to slide in said slots, a cylinder within which said drum is mounted, said cylinder being provided with a cylindrical bore arranged eccentrically in relation to the axis of oscillation of said cylinder, an inlet pipe connected to one side of said cylinder, and means for revolving said inlet pipe about its axis and thereby moving said cylinder in a curved circular arc on which said shaft is located, substantially as described.

3. In a rotary eccentric pump, the combination of a cylindrical casing having an inlet port and an outlet port, a shaft centrally journaled in said casing, a drum fixed to said shaft and provided with slots arranged at right angles to each other and extending through said drum, paddles adapted to slide in said slots and being cut away at the center so that they may slide without interfering with each other, a cylinder surrounding said drum, said cylinder being provided with a cylindrical bore located eccentrically in relation to the axis of oscillation of said cylinder, said cylinder being provided with an outlet port and with an inlet pipe attached thereto and bent at right angles, said pipe passing through the inlet port of said casing, whereby said cylinder may be revolved in a circular arc about the axis of said pipe, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

CARLOS MENDIZÁBAL.

Witnesses:
CONSTANTINO LOPER CID,
STANLEY C. HARRIG.