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ROTARY PUMP.

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Fig. 1.

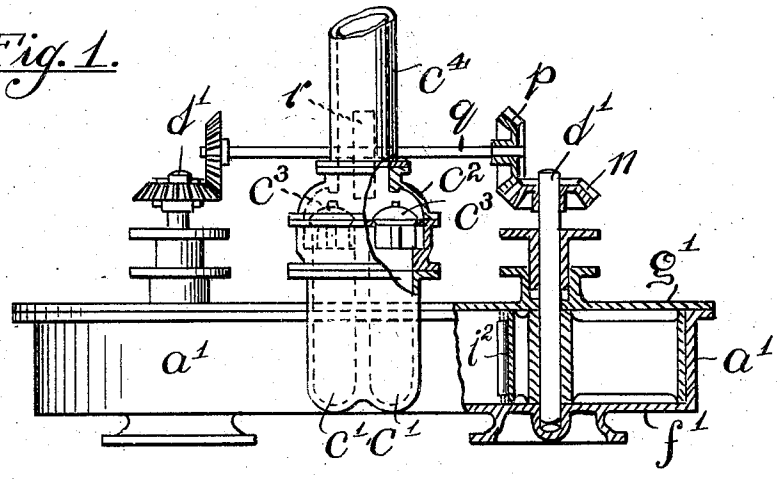
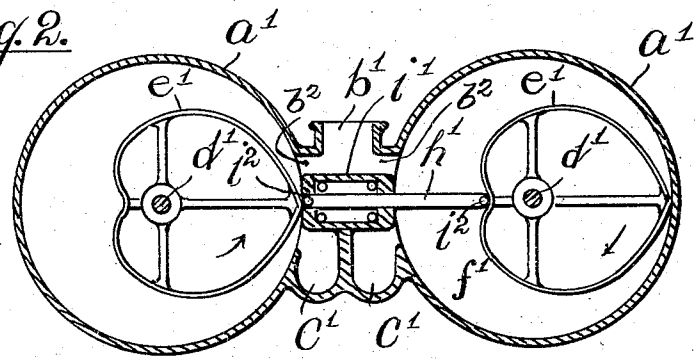



Fig. 2.




Witnesses.

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No. 785,248. Patented March 21, 1905.

# UNITED STATES PATENT OFFICE.

NAMIJIRO YOKOUCHI AND KOSUKE ABE, OF TOKIO, AND AIJI MATSUZAKI, OF NAGANO, JAPAN.

## ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 785,248, dated March 21, 1905.

Application filed April 30, 1904. Serial No. 205,755.

*To all whom it may concern:*

Be it known that we, NAMIJIRO YOKOUCHI and KOSUKE ABE, residents of Tokio, and AIJI MATSUZAKI, a resident of Nagano, Japan, all subjects of the Emperor of Japan, have jointly invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

The object of this invention is to produce pumping apparatus of simple construction, but of great capacity and power; and it consists, generally speaking, in the employment within a cylinder having suction and discharge ports of a cam-shaped rotary piston having but a single line in its periphery in contact with the walls of the cylinder in conjunction with a yielding water-shutter, water-gate, or cut-off between the suction and discharge ports, one end of which travels on the periphery of the piston and follows its movements, while the other end is received and plays in a suitable casing, thereby cutting off all by-paths between the suction and discharge ports.

The invention further consists in coupling two pumps of the above construction together in such manner that the pistons move in unison, with their contacting points always in reverse relation to the ports of the respective cylinders and passing the water-shutter through from one cylinder to the other under such arrangement that while one end travels on the periphery of the right-hand piston the other end travels on the periphery of the left-hand piston, so that it is moved back and forth shuttlewise between them, acting alternately as a cut-off in each and in both.

In the drawings, Figure 1 is a side elevation, partly broken away, of a double-cylinder pump embodying our invention. Fig. 2 is a top plan view with the cylinder cap or cover and driving mechanism removed and certain parts in section.

In the double-cylinder pump shown the cylinders $a'$ are rigidly united and have a common inlet $b'$, with suction-ports $b^2$ leading therefrom to each cylinder. The discharge-ports $c'$ are independent to avoid interference of the discharge of one cylinder with that of the other. For this reason they rise some distance to a common chamber $c^2$, where provision is made, such as the valves $c^3$, for their independent discharge and the ultimate merging of their streams in a stand-pipe $c^4$ or other lead. The actuating-shafts $d'$ $d'$ are stepped centrally in their respective cylinders and have keyed thereto the cam-shaped pistons $e'$ $e'$, filling the space between the common bottom $f'$ and common cap $g'$. The water shutter or gate $h'$, however, extends into both cylinders and into contact with the peripheries of both through guide-casings $i'$, which siameses the two cylinders upon a line passing through the axes of movement of both pistons. Antifriction-rollers $i^2$ may be provided on the ends of the gate $h'$ to lighten the play thereof upon the piston. The vertical shafts are geared in such manner that while one of the pistons turns to the right the other turns to the left, but always with their contacting points in reverse relation to the ports of the respective cylinders, so that when the contacting point of the left-hand piston, as shown in Fig. 2, is between the two ports of that cylinder and its radius corresponds with the siamese line extending from shaft-axis to shaft-axis the contacting point of the other piston is half-way round the right-hand cylinder, but with its radius also coinciding with said line. At this time the right-hand end of the gate will coincide with the shortest radius of the right-hand piston and its left-hand end with the longest radius of the left-hand piston, and it will be in close contact with both pistons, and as the sum of the gate and of the proximate radii of the pistons coinciding with this siamese line always equal the distance between the two shafts the gate will always maintain its contact with both pistons, thus constantly serving as a cut-off between suction-ports and discharge-ports in both cylinders, except at the moment when it coincides with the longest radius of one of the pistons, as shown in Fig. 2, when it will for an instant cut-off in one only, the cut-off in the other being at that moment unneeded. The gate obviously moves with regular velocity relatively to the motion of the pistons and effectually shuts off any escape of water

by its constant contact with the periphery of both pistons. The two piston-shafts should be connected by positive gear to avoid disarrangement of the pistons relatively to each other. The bevel-gear *n p* and horizontal shaft *q*, with its belt-pulley *r*, will serve this purpose, though other arrangements may be adopted.

It will be understood that in the double cylinder-pump the action of one piston is suspended while it is passing between the discharge and suction ports, as shown in Fig. 2, and that it does not attain its maximum action until it reaches the opposite end of the diameter. Meanwhile the other piston is passing its maximum point, and its stream decreases concurrently with the increase of the stream from the first. The amount of water raised, therefore, is practically constant.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A rotary pump comprising a pair of cylinders rigidly united, cam-shaped rotating pistons in each, in contact with the inner periphery of their respective cylinders along one line only, suction and discharge ports for said cylinders, a guide-casing connecting the two cylinders on a line uniting the axes of rotation of the two pistons and between the suction and discharge ports, and a one-piece water-gate extending through said casing from the periphery of one piston to the periphery of the other and traveling back and forth with the rotation of the pistons in constant contact with the periphery of each.

2. A rotary pump comprising a pair of cylinders rigidly united, suction and discharge ports therefor, a heart-shaped piston rotating in each cylinder with its apex in constant contact with the peripheral wall thereof, a guide-casing connecting the two cylinders on a line uniting the axes of rotation of the two pistons and between the suction and discharge ports, and a water-gate extending through said casing from the periphery of one piston to the periphery of the other and traveling back and forth with the rotation of the pistons in constant contact with the periphery of each.

3. A rotary pump comprising a pair of cylinders rigidly united, cam-shaped rotating pistons in each, in contact with the inner periphery of their respective cylinders along one line only, suction-ports for each cylinder, independent discharge-ports, a common chamber to which said latter ports deliver, valves preventing the return of the water from said chamber, a lead opening from said chamber, a guide-casing connecting the two cylinders on a line uniting the axes of rotation of the two pistons and between the suction and discharge ports, and a water-gate extending through said casing from the periphery of one piston to the periphery of the other and traveling back and forth with the revolution of the pistons in constant contact with the periphery of each.

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

NAMIJIRO YOKOUCHI.
KOSUKE ABE.
AIJI MATSUZAKI.

Witnesses:
UHACHI TEHIWARA,
R. S. MILLER.