

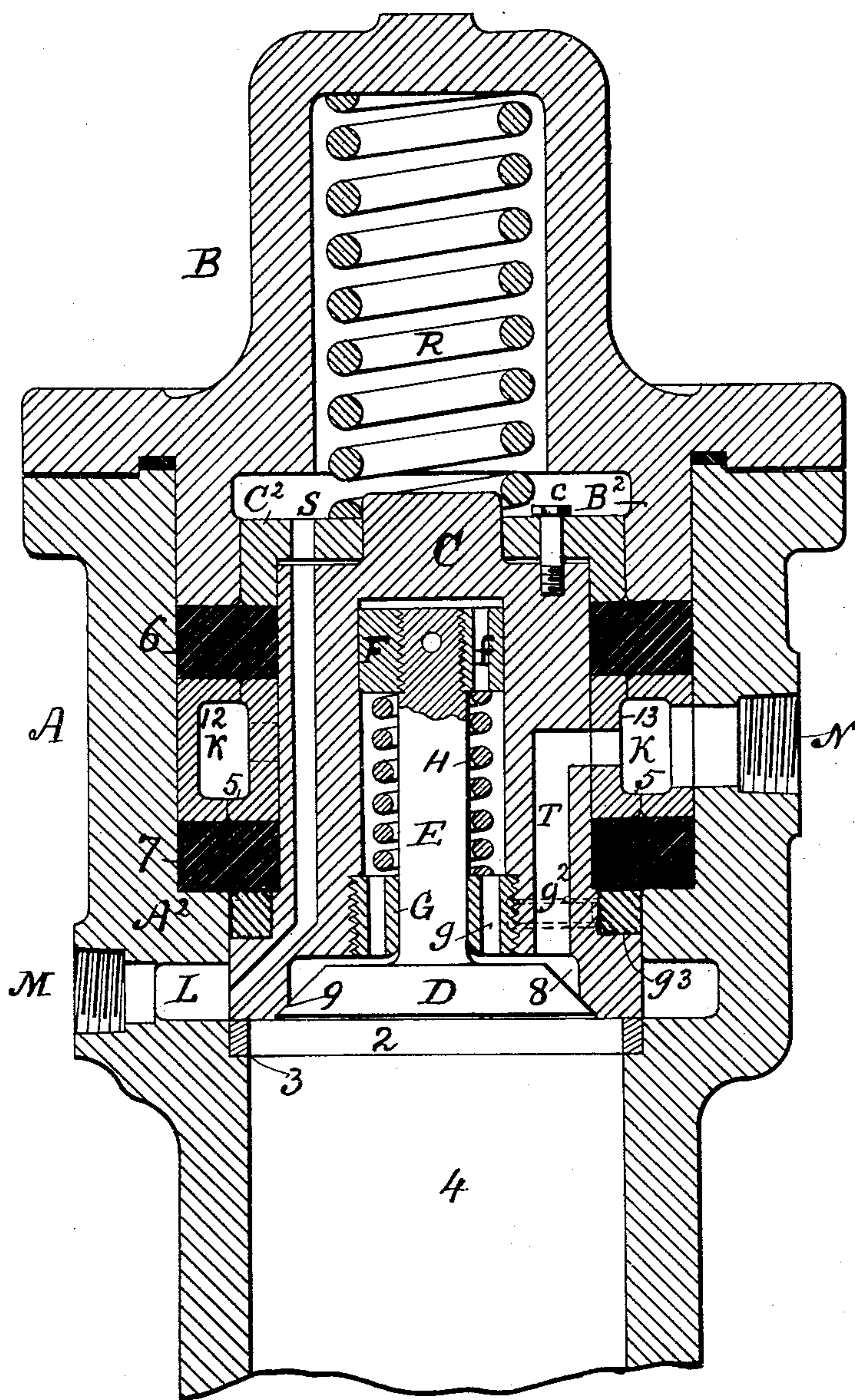
No. 735,009.

PATENTED JULY 28, 1903.

R. WHITAKER.  
PUMP.

APPLICATION FILED JAN. 2, 1903.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## PUMP.

SPECIFICATION forming part of Letters Patent No. 735,009, dated July 28, 1903.

Application filed January 2, 1903. Serial No. 137,383. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD WHITAKER, a citizen of the United States, residing at New Brunswick, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pumps and valves thereof operating on a suitable fluid, the essential features being the packing-rings and means for reducing the area on the back of the discharge-valve which is acted upon by the discharge-pressure; and it consists in details of construction which will be fully described in connection with the accompanying drawing, which represents a vertical central section through the valves of a portion of a pump constructed in accordance with my invention.

In said drawing, A represents the valve-cylinder, which has in its interior a valve-seat which consists, preferably, of a steel ring 2 to obtain a smooth and hard surface. Said ring rests upon an annular shoulder 3, formed in the interior of the cylinder above the piston-chamber 4. The valve-cylinder is bored above its ring 2 to fit the periphery of the lower portion of the discharge-valve C; but the upper portion of the interior of the cylinder is formed by the pendent cylindrical flange B<sup>2</sup> of the cover B, which flange is internally of smaller diameter to fit the periphery of the upper portion of the valve C, there being an annular shoulder 5 around said valve between the upper and lower portions. This annular shoulder represents the difference of area between the upper and lower portions of the valve C exposed to discharge-pressure. The head B of the cylinder is suitably attached to the body of the pump-cylinder and has a pendent cylindrical flange B<sup>2</sup>, that fits the periphery of the upper portion of the valve C or, more properly, the periphery of its cap C<sup>2</sup>, which is suitably secured by screws c to the top and around the upper end of the valve C.

Under the lower edge of the pendent flange of the cover B there is a packing-ring 6, of rubber of comparatively great thickness,

which rests upon a metal ring 12, which has its inner periphery hollowed to constitute a passage K for the fluid operated upon, and its upper edge is broader than its lower edge. Said ring 12 rests upon another packing-ring 7, of rubber, which rests upon an annular shoulder A<sup>2</sup>, projecting inwardly from the interior of the cylinder A. The ring 12 and the outer portions of the packing-rings 6 and 7 remain stationary. The inner portion of the rubber packing-ring 6 extends under the lower edge of the cap C<sup>2</sup> of the valve C and bears upon a metal ring 13, the upper portion of which has the same diameter as the cap C<sup>2</sup>; but its lower portion is of greater diameter to obtain the differential annular shoulder 5, said diameter being the same as that of the lower end of the valve C. The lower end of the ring 13 rests upon the inner portion of the rubber packing-ring 7. Said inner portion is capable of moving up and down with the valve C about one-sixteenth of an inch, which is sufficient for the proper function of the valve. The inner portion of the packing-ring 6 also moves a corresponding distance and is found to work properly in practice.

Within the metal rings 12 and 13 is the annular suction chamber or passage K, which is protected from the discharge-pressure on both its top and bottom by the packing-rings 6 and 7. The discharge-pressure is admitted on top of the valve C through the passage S, formed in the body of the valve C, from the bottom discharge-chamber L of the pump-cylinder.

Within the hollow head B of the cylinder is placed a coiled spring R of predetermined strength according to the pressure intended to be exerted. One end of said spring bearing upon the top of the discharge-valve C acts to seat said valve against the discharge-pressure acting on the under side of said valve.

The sucked-in fluid (which may be air, gas, or liquid) is admitted into the annular chamber K through the opening N in the side of the cylinder A. From the chamber K the fluid is admitted into the lower suction-cham-



ber 8 through the passages T, of which there may be a series arranged in a circle within the body of the valve C. From the chamber 8 the fluid enters the piston-chamber 4 through the passage, shown closed by a conical valve D, which is a suction-valve having a stem E vertically slidable in the center of the valve C. Said stem is guided at its upper end by the nut F, mounted upon said stem, and by the interior of a nut G, secured to the valve C. A coiled spring H between the nuts F and G assists in closing the valve D and the lower suction-chamber 8. In the body of the nuts F and G are small vertical passages *f* and *g* for the passage of fluid and to prevent a vacuum on top of the nut F. To prevent the nut G from getting accidentally unscrewed, it is retained by a binding set-screw *g*<sup>2</sup>, and the displacement of the latter is prevented by a ring *g*<sup>3</sup>, of steel, bearing against the head of said set-screw. By this arrangement of valves when the limit-pressure is reached the machine does not stop working them, but continues to run and requires only enough power to overcome the friction of the parts. In using a single-cylinder machine the gas is alternately compressed and reexpanded; but if a two-cylinder machine is used with cranks at one-hundred and eighty degrees the gas or fluid is seesawed between the two cylinders, both discharge-valves remaining open so long as the pressure in the receiver exceeds the pressure for which the spring R is designed and provided. This spring R is assisted in closing the discharge-valve C by the discharge-pressure of the fluid acting on the top of the valve C and the suction-pressure acting upon the annular shoulder 5 of said valve C. The pressure against which the valve C will close is regulated by the predetermined strength of the spring R or by the amount of width or area of the annular shoulder 5, or by both of said means together, thus limiting the pressure to which the pump can force a fluid into a receiver.

The discharge gas or fluid taken from the annular discharge-chamber L passes out

through the discharge-opening M. On the bottom face of the discharge-valve C is formed a beveled seat 9, against which bears the conical periphery of the suction-valve D.

Having now fully described my invention, I claim—

1. The combination of a valve-cylinder and its hollow cover having a pendent annular flange, a rubber packing-ring under the edge of said flange, a metal ring having its upper edge wider than its lower edge, a rubber packing-ring supporting said metal ring, a cylindrical discharge-valve having a cap the pendent bottom edge of which rests upon the upper rubber packing-ring, and a metal ring having its upper edge narrower than its bottom edge, said bottom edge clamping the lower packing-ring to the body of the discharge-valve, substantially as described.

2. In a pump the combination of a valve-cylinder and its cover having a pendent annular flange, two rubber packing-rings having their outer portions clamped to the valve-cylinder, with a hollow metal ring between them, and a discharge-valve having the inner portions of the two rubber packing-rings clamped thereto, with a metal ring between said packing-rings, substantially as described.

3. In a pump the combination of a valve-cylinder and its hollow cover having a pendent annular flange, two rubber packing-rings having their outer portions clamped to the valve-cylinder with a metal ring between them having its inner periphery recessed, a discharge-valve having the inner portions of the two rubber packing-rings clamped thereto with a metal ring between them having its periphery recessed, and a coiled spring pressing upon the discharge-valve, substantially as described.

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

RICHARD WHITAKER.

Witnesses:

EDWARD MORRIS,  
LOUIS H. LEITHEISER.