No. 746,344. PATENTED DEC. 8, 1903.

G. A. KROHN.

INTERCHANGEABLE CYLINDER PUMP.

APPLICATION FILED MAR. 6, 1903.

NO MODEL.

Fig. 1.

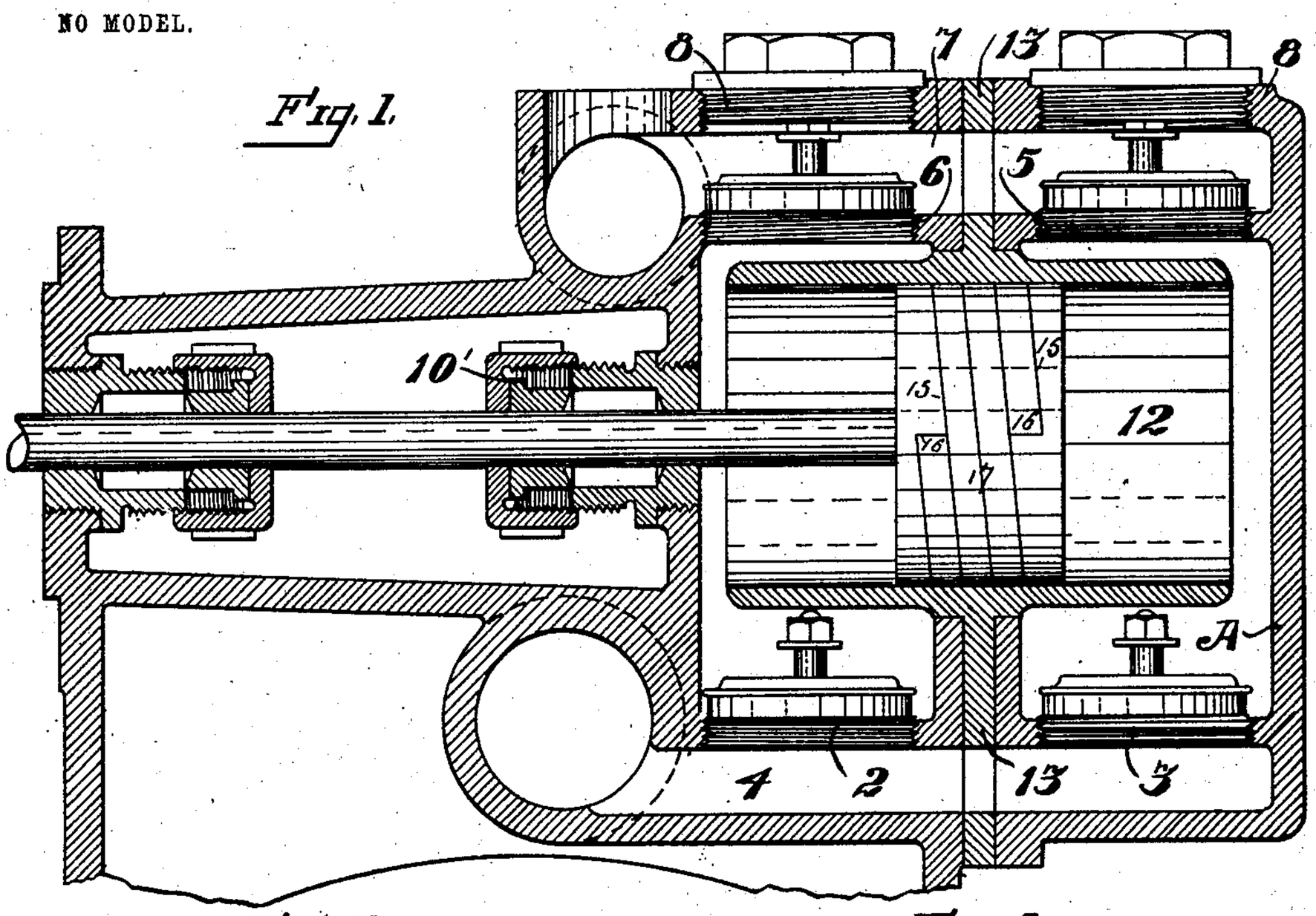


Fig. 2.

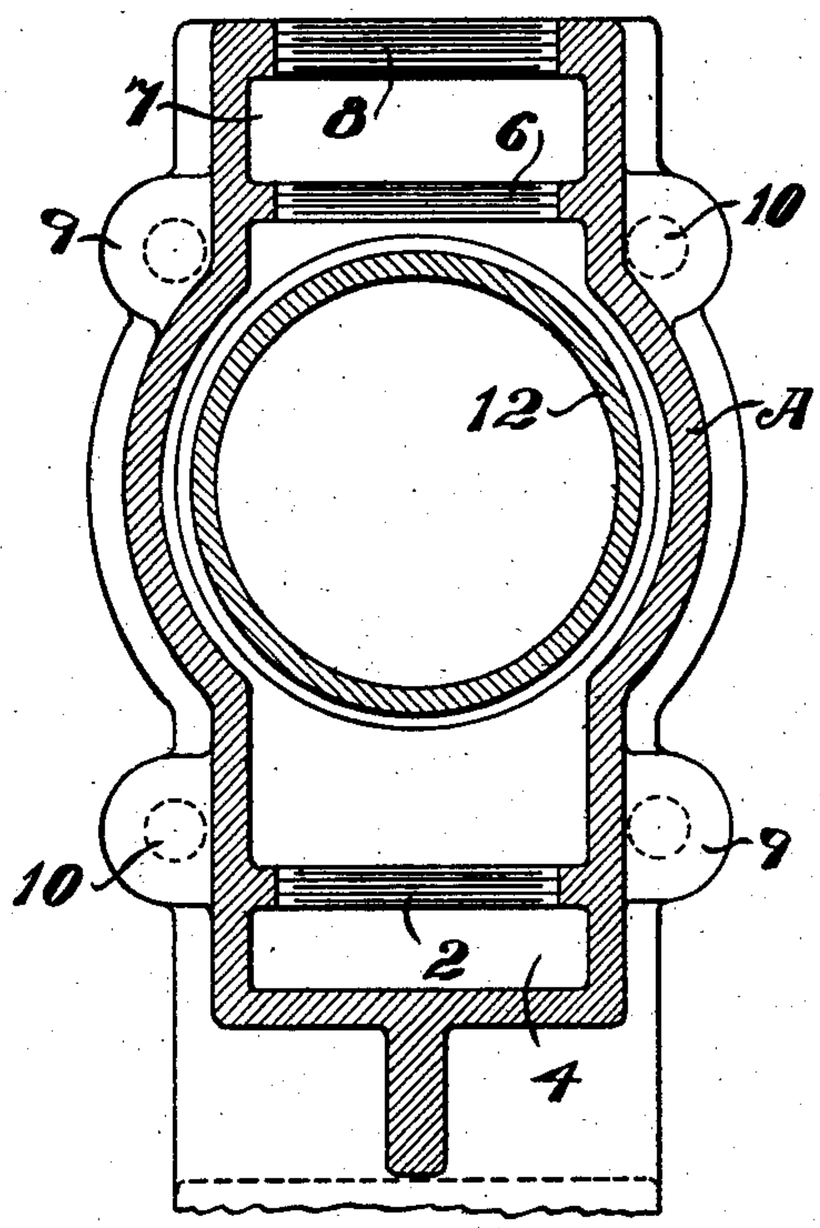
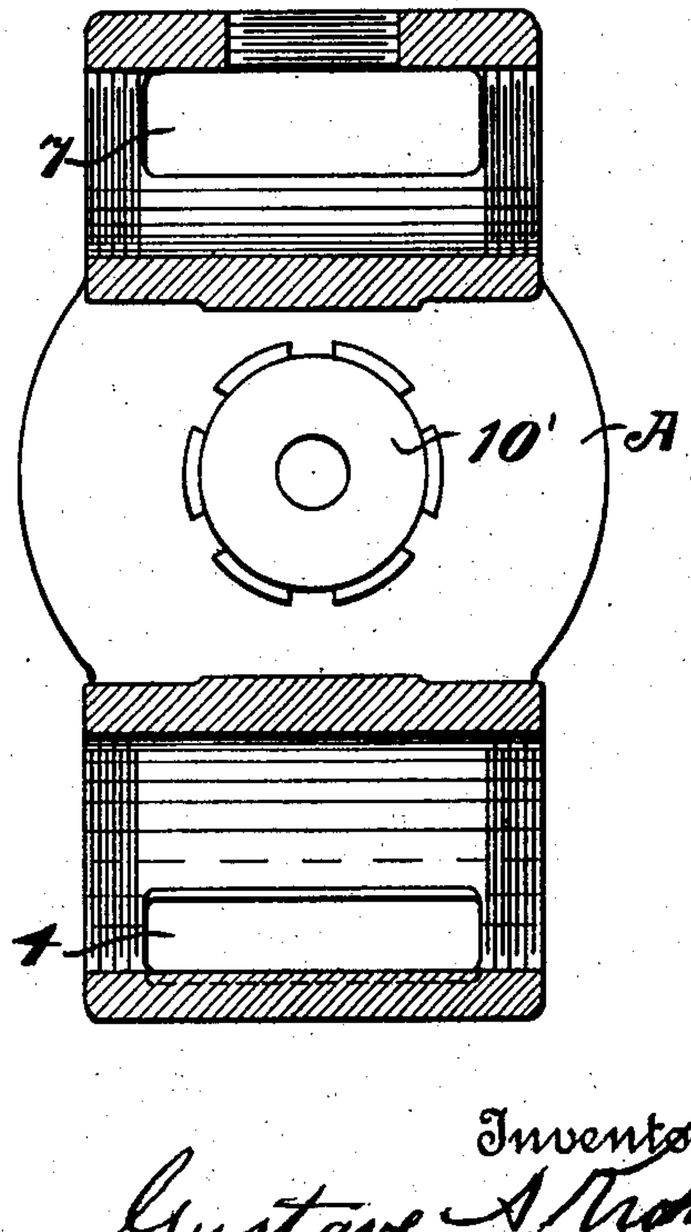


Fig. 3.



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No. 746,344. Patented December 8, 1903.

UNITED STATES PATENT OFFICE.

GUSTAVE A. KROHN, OF COARSEGOLD, CALIFORNIA.

INTERCHANGEABLE-CYLINDER PUMP.

SPECIFICATION forming part of Letters Patent No. 746,344, dated December 8, 1903.

Application filed March 6, 1903. Serial No. 146,505. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVE A. KROHN, a citizen of the United States, residing at Coarsegold, county of Madera, State of California, have invented an Improvement in Interchangeable-Cylinder Pumps; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in pumps.

It consists in a construction by which the interior portion within which the plunger reciprocates is made removable and interchangeable.

It also consists in a novel construction of the exterior cylinder with waterways and valve-chambers arranged with relation to the interchangeable plunger-cylinder and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal central section of my pump. Fig. 2 is a transverse section through valve-openings. Fig. 3 is a transverse section through inlet and outlet openings.

It is the object of my invention to so construct the pump that the interior cylinder within which the pump-plunger reciprocates may be easily changed and different sizes of cylinders substituted to suit variations in pressure or capacity.

The cylinder when in place is held rigidly as an integral part of the apparatus.

As shown in the accompanying drawings, A is an outer cylinder having inlet-passages 2 and 3, connecting with an exterior inlet-channel 4, and outlet-passages 5 and 6, connecting with an outlet-channel 7. These inlet and outlet passages are here shown as screw-threaded and adapted to receive the independent valve-seats, with relation to which the inlet and outlet valves are designed to operate. These valves may be of any suitable or well-known construction, such as puppet-valves; but I do not claim either the valves or seats as being any part of my present invention. In line axially with these inlet and outlet valves are openings 8, which are closable by suitable screw-caps, and these openings serve for the purpose of introducing or removing the valves and their seats, as they are all in line with each other.

The cylinder A is made in two parts, as shown, these parts being separable substantially at or near the center and in a plane transverse to the axis of the cylinder. They are provided with lugs 9, and screw-studs, as at 10, serve to unite the two parts together. When the studs are removed, the outer end is in the form of a cylindrical cap, which may be removed. The opposite end is connected with the steam-cylinder or other motor and has a stuffing-box, as at 10′, through which a piston-rod passes and connects with a plunger adapted to reciprocate in the interior portion of the pump-cylinder, as will be hereinafter described. The opposite end of the rod, extending through a similar stuffing-box into the pressure-cylinder, connects with the piston, which is reciprocable in that cylinder and through which motion is transmitted to the pump-plunger.

The interior cylinder 12 is shorter than the two-part exterior cylinder and has flanges or extensions, as at 13, which extend outwardly from the cylinder 12 and register with the outer portion of the cylinder A and the parts containing the inlet and outlet passages, as shown. These extensions where they coincide with the inlet and outlet passages have openings formed through them, so that the water may freely pass through the inlet-passage to both the inlet-valves and in the same manner may freely pass through the outlet-valves to the outlet-passage.

The inner cylinder 12 has a length sufficiently less than the interior length of the outer cylinder to allow liquid when being pumped to pass freely into either of its ends after entering the inlet-valves. The diaphragm or flange 13 of the inner cylinder is approximately central between the ends of the cylinder and forms a closure or diaphragm between the outside of the inner cylinder and the interior of the outer cylinder. When the parts are secured together, a tight joint is made between this flange or diaphragm and the contiguous contact parts of the outer cylinder by means of suitable sheet-packing, and when the parts are bolted together the whole forms a rigid structure. The dia-

phragm intermediate between the two ends of the outer cylinder and projecting from the inner cylinder prevents any passage of liquid being pumped from one end to the other of the outer cylinder.

The operation will then be as follows: The plunger being reciprocated within the inner cylinder will first draw through the inlet-passage and the inlet-valve at one end of the main cylinder, and this liquid will freely enter the open end of the cylinder 12, from which end the plunger is at that instant receding. Upon the reversal of the movement of the plunger the liquid in the cylinder 12 will be forced out, and as the inlet-valve closes the outlet-valve opens into the discharge-passage. At the same time the opposite inlet-valve will be opened by the vacuum produced by the receding piston, and that end of the cylinder will be filled during the time that the water is being expelled from the opposite end of the cylinder, thus producing a double-acting pump in the usual manner. If it be found desirable to change the size of the inner cylinder to suit different requirements of capacity or of pressure as compared with the power-cylinder, it is only necessary to remove the connecting bolts or studs and the outer end of the cylinder A, when the inner cylinder 12, with its flanges, can be removed and another one of different size, but having similar flanges, can be inserted into its place. When this cylinder is thus removed, the valves, valve-seats, and all parts connected with the outer cylinder are easily accessible, and the plunger is also in full view and may be repacked or changed to suit the different capacity of the cylinder 12 without in any way disturbing any other part of the apparatus.

I preferably form the plunger with a continuous wind of packing, so that it can be packed without the use of a packing-hook and with ease and despatch by reason of its being fully exposed.

The plunger is provided with a spiral groove or channel, as at 15, said groove or channel terminating in abutting ends 16 equal in thickness to one turn of the spiral. The packing 17 is of any flexible class and has a transverse form and area corresponding with the ends 16. A sufficient length of this packing is used to complete the required turns of the spiral between the ends 16, against which the packing ends abut, thus obviating all joints lengthwise of the piston.

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

1. The combination in a pump of an exterior cylinder formed in two parts separable transversely to the axis, each of said parts provided with inlet and outlet valves and water-passages; an interior cylinder of less length and diameter than the outer cylinder and having a radial diaphragm or flange approximately central between its ends and lying between the two parts of the outer cylinder at a point between each pair of inlet and outlet valves; and studs for securing the two parts of the outer cylinder and the inner cylinder together.

2. The combination in a pump of an outer and inner cylinder said inner cylinder of less diameter and length than the outer cylinder and having a radial diaphragm or flange approximately central between its ends, and said outer cylinder formed of two parts each including an inlet-valve, an outlet-valve and a water-passage said valves removable with said sections and said sections provided with lugs and capped openings affording access to the valves, and studs engaging the lugs and securing the parts together.

In witness whereof I have hereunto set my hand.

GUSTAVE A. KROHN.

Witnesses:
S. H. NOURSE,
JESSIE C. BRODIE.