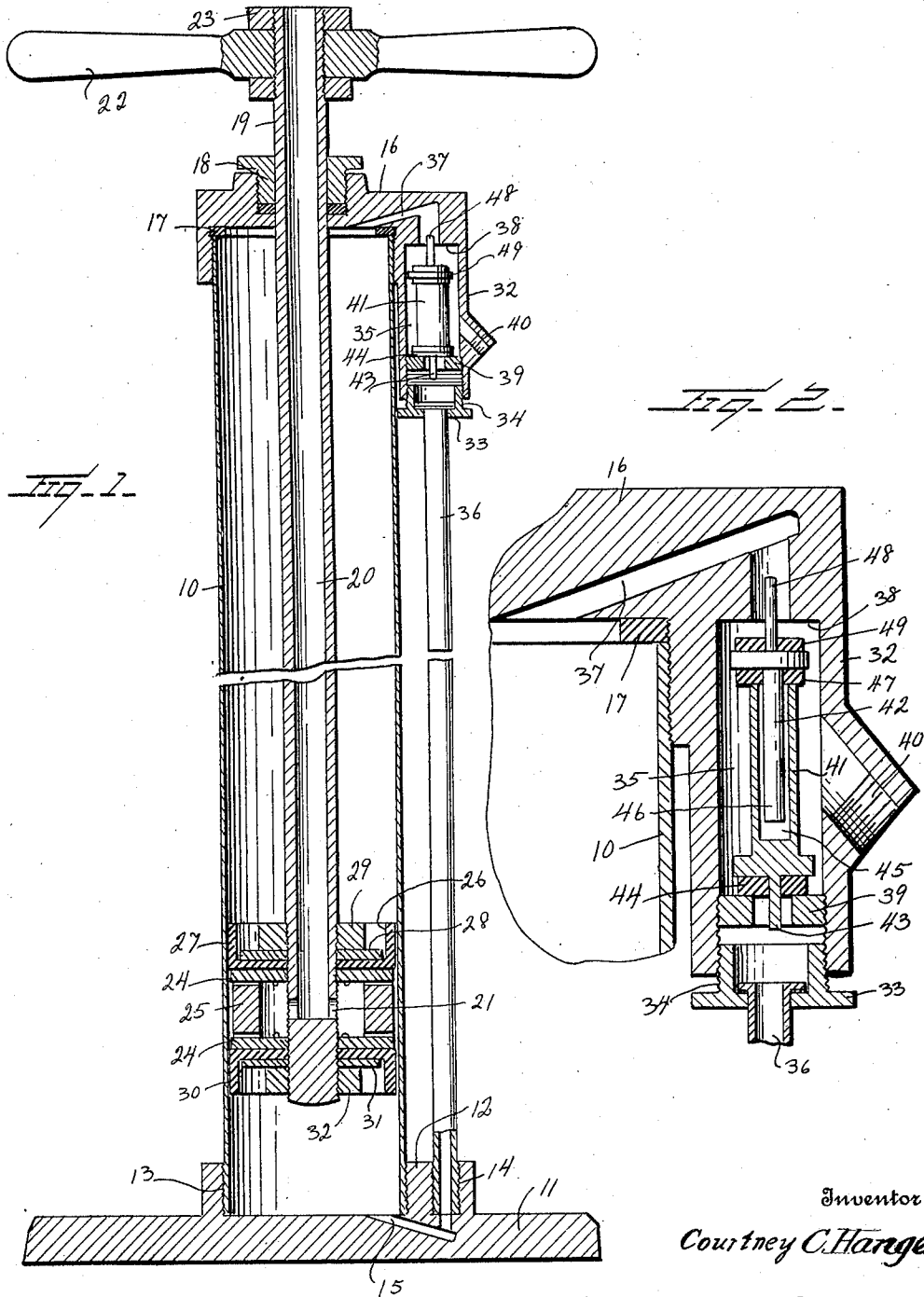


C. C. HANGER.
AIR PUMP.
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Inventor

Courtney C. Hanger

By

Watson E. Coleman
Attorney

UNITED STATES PATENT OFFICE.

COURTNEY C. HANGER, OF MADISONVILLE, KENTUCKY, ASSIGNOR OF ONE-FOURTH TO
W. D. COIL, OF MADISONVILLE, KENTUCKY.

AIR-PUMP.

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To all whom it may concern:

Be it known that I, COURTNEY C. HANGER, a citizen of the United States, residing at Madisonville, in the county of Hopkins and State of Kentucky, have invented certain new and useful Improvements in Air-Pumps, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to double acting pumps, and particularly to a double acting air pump.

The general object of this invention is to provide a very simple and effective pump having a very simple controlling valve controlling the passage of air from the pump and being so constructed that there is no valve necessary in order to control the inlet of air to the pump.

A further object is to provide a construction of this character including a plunger and plunger rod, so constructed that the air is admitted through the plunger or piston rod and through the piston into the barrel of the pump, and particularly so constructed that upon a movement of the piston in one direction, air is admitted through the piston to the space behind the piston, while the air in front of the piston is forced out through the outlet port.

A further object is to provide a pump of this character having few parts, and these are of a very simple construction to thus render the pump less liable to accidental breakage or derangement of the parts and permit a relatively cheap construction of the pump and permit the parts to be readily assembled or disassembled.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal vertical section of an air pump constructed in accordance with my invention; and

Fig. 2 is an enlarged view of the valve shown in Fig. 1.

Referring to these drawings, 10 designates the barrel or cylinder of the pump which is, of course, of metal and which is exteriorly screw-threaded at its ends. This barrel or cylinder is mounted upon a base 11

having a centrally disposed hub 12 interiorly screw-threaded, at 13, for the reception of the lower end of the barrel 10 and also having a screw-threaded bore 14 and a port or duct 15 extending downward from the interior of the annular hub 12 and extending upward into the bore 14.

The upper end of the barrel 10 is closed by a metal cap 16 which is interiorly threaded to engage the upper end of the cylinder and which is adapted to bear upon a gasket 17 on the upper end of the cylinder to thereby form an air-tight engagement between the cap and the cylinder. The cap is recessed to receive a packing nut 18. The cap extends beyond the cylinder and is formed to provide a valve casing, as will be later described.

Extending through the packing nut 18 is a piston rod or plunger rod 19, which is tubular for nearly its entire length. The bore 20 of this plunger rod extends downward from the outer end of the plunger nearly to the inner end and communicates with a transversely extending bore 21 which opens upon the outer face of the plunger rod. The plunger rod at its upper end is provided with an operating handle 22, held in place by nuts 23 or other suitable means.

Mounted upon the lower end of the plunger rod is a piston or plunger comprising spaced disks 24 within which is disposed a radially grooved packing ring 25 which is arranged between the disks 24 and is spaced from the outer surface of this portion of the plunger rod. The transverse duct or port 21 opens into the space between the disks 24 and the packing ring 25. Disposed upon the upper face of the upper disk 24 is a cup 26 of leather, rubber, or other suitable material, the outer edge of which extends upward, as at 27, and bears yieldingly against the inner face of the cylinder 10. This cup is held in place by a metallic disk 28 which is screw-threaded on the plunger rod and above this disk there is disposed the nut 29. Below the lower disk 24 there is disposed a cup of leather, rubber or other suitable flexible material, designated 30, which corresponds in form to the cup 26. This is held in place by a lower disk 31 and a nut 32, as previously described. The disks 24, 28 and

30 are screw-threaded on the screw-threaded portion of the rod 19.

This construction is such that when the plunger is forced downward, the pressure of air below the lower cup 30 will cause this cup to expand and fit against the cylinder walls tightly, while the upper cup is free to contract and permit air from the duct 21 to pass into the upper portion of the cylinder. Upon the upward stroke of the piston, the upper cup 26 is expanded against the wall of the cylinder, while the lower cup yields to permit the passage of air from the duct 21 into the lower portion of the cylinder. As before remarked, the cap 16 is formed to provide a valve casing, designated 32. This valve casing is closed at its lower end by means of a cap 33 having an annular, exteriorly screw-threaded flange 34 engaging the interior screw-threads on the wall of the chamber 35 of the valve casing, this cap 33 having a central aperture. A tube 36 which has its upper end flanged, is inserted through this aperture in this cap nut 33. The lower end of this tube 36 has screw-threaded engagement with the base 12. When the cap nut 33 is engaged within the lower end of the valve casing, it is obvious that it will draw the tube 36 up tightly so that the upper end of the tube 36 will have air-tight engagement with the valve casing.

Extending from the upper end of the cylinder 10 through the interior of the cap 16 is an air duct 37 which, at its outer end, opens into the upper end of the chamber 35. The shoulder 38 at this point forms a valve seat. The lower end of the valve casing is also formed with a valve seat 39 which is preferably formed by a screw-threaded annulus. The side of the valve casing has an outlet port 40 extending through an interiorly screw-threaded nipple whereby an outlet pipe as, for instance, an outlet pipe of rubber, may be engaged with the pump. Disposed within the chamber 35 are two valves 41 and 42. The valve 41 coacts with the seat 39, and the body of this valve has a downwardly extending stud 43 surrounded by a gasket 44 adapted to coact with the seat 39. The body of the valve is longitudinally bored, as at 45. The valve 42 has a centrally disposed, downwardly extending stem 46 adapted to be received in and moved freely in the bore 45, and this is surrounded by a gasket 47 coacting with the upper end of the wall of the bore 45. The valve 42 is also provided with an upwardly extending stem 48 surrounded by a gasket 49 which coacts with the seat 39. It will thus be seen that these valves 41 and 42 have independent movement.

In the operation of this device, assuming that the plunger is at the lower end of the barrel or cylinder 10, then upon an upward movement of the plunger, the cup 26 will

hug the cylinder 10 tightly so that the air above the piston will be forced out through the outlet port 37 into the chamber 35, while the air above the piston is being forced out through the outlet port 37. The air passing downward through the tubular plunger rod and out through the port 21 is forced around the cup 30 into the lower portion of the cylinder or barrel. When the air is forced out through the duct 37 and exhausted, the valve 42 will be forced open and the valve 41 will be closed, thus permitting the outward passage of air from the duct 37 through the outlet opening 40. When the piston or plunger has reached the end of its stroke, the motion is reversed so that the air below the plunger is now compressed and as a consequence, the cup 30 is expanded and air is admitted through the cup 26 into the space above the downwardly moving plunger. The pressure of the air below the piston forced out through the duct 15 and tube 36, will now cause the valve 41 to open and the suction in the space above the piston will cause the valve 42 to close. Thus, by reciprocating the plunger air will be caused to pass out continuously through the port 40.

It will be seen that this construction is very simple, that no springs are used for urging the valves to their seats, that the valve mechanism cannot readily get out of order, and that it is an easy matter to disengage the cap 33 and the seat 39 to thereby remove, replace, and repair the valves 41 and 42, and that it is an easy matter to remove the cap 16 in order to rearrange or replace the members constituting the plunger. The device has very few parts and these are not liable to get out of order. It will be noted that both the valves 41 and 42 will close upon back pressure in the outlet tube.

While I have illustrated a form of my invention which I have found to be particularly effective in practice, yet it is obvious that many changes might be made in the details of construction and arrangement of parts without departing from the spirit of the invention.

I claim:—

1. A pump of the character described comprising a barrel and a valve chamber having ducts extending from its opposite ends into opposite ends of the barrel, a double acting piston operating within the barrel and constructed to cause the entrance of air to one end of the barrel and the expulsion of air through the duct at the other end of the barrel, said valve chamber having an outlet port and oppositely disposed valve seats, and valves both disposed in said chamber and each controlling the passage of air through one of said ports, said valves being independently movable and being shifted

to their respective closed and open positions by suction and pressure of air.

2. A pump of the character described comprising a barrel, a tubular piston rod extending into the barrel and having a lateral port at its inner end, a piston including flexible cups disposed above and below said port, the cups extending in reverse directions into the barrel and coacting with the same whereby upon a movement of the piston in opposite directions the cups will alternately be forced against the barrel and forced away from the barrel by the inlet of air, the ends of the barrel being formed with outlet ducts, a valve chamber, said valve chamber having an outlet port being formed to provide seats at opposite ends of the valve chamber, a longitudinally shiftable valve coacting with one of said seats and having a central bore, and a longitudinally shiftable valve coacting with the other seat and having a stem extending into said bore, said valves being independently and freely movable within the valve chamber toward or from the seats.

3. A pump of the character described including a pump barrel and a single valve chamber having ducts extending from its opposite ends into opposite ends of the pump barrel, a piston operating within the pump barrel and constructed to cause air to be forced out through one of said ducts as the piston moves in one direction and draw air into the barrel behind the piston, the valve chamber having oppositely disposed valve seats and an outlet port, and independently shiftable valves disposed within said chamber and each controlling passage through one of said ducts, one of said valves having a stem extending loosely into the other of said valves whereby said valves will telescopically engage with each other.

4. A pump of the character described including a barrel having a base at one end upon which the barrel is mounted, a cap closing the opposite end of the barrel and formed to provide a valve chamber exteriorly of the barrel, a tubular plunger rod passing through said cap and open at its outer end, the inner end of the piston rod having laterally disposed ports communicating with the interior of the cylinder, a piston mounted upon the inner end of the piston rod and including two flexible cups disposed on opposite sides of said ducts and having their margins extending in opposite directions and loosely bearing against the interior face of the cylinder, the base being formed to provide a duct leading from the lower end of the cylinder, a tube connecting this last named duct to one end of the valve chamber, the cap at the opposite end of the cylinder being provided with a duct leading into the adjacent end of the valve chamber, and two independently mov-

able valves disposed within the valve chamber, one controlling the passage of air from the first named duct and the other controlling the passage of air from the second named duct, one of said valves having a central bore and the other valve having a stem having sliding engagement with the bore, the valve chamber being provided with an outlet port.

5. A pump of the character described including a barrel having a base at one end upon which the barrel is mounted, a cap closing the opposite end of the barrel and formed to provide a valve chamber exteriorly of the barrel, a tubular plunger rod passing through said cap and open at its outer end, the inner end of the piston rod having laterally disposed ports communicating with the interior of the cylinder, a piston mounted upon the inner end of the piston rod and including two flexible cups disposed on opposite sides of said ducts and having their margins extending in opposite directions and loosely bearing against the interior face of the cylinder, a tube connecting this last named duct to one end of the valve chamber the cap being formed to provide a duct leading into the upper end of the valve chamber, and the valve chamber being formed to provide a seat at the termination of this duct, the opposite end of the valve chamber being formed to provide a seat, and the valve chamber between these seats having an outlet port, and independently movable valves disposed within the chamber, one of said valves having a stem extending through the last named seat and having a longitudinally extending bore, the other valve having a stem extending into said bore and a stem extending into the duct in the cap.

6. A pump of the character described including a barrel having a base at one end upon which the barrel is mounted, a cap closing the opposite end of the barrel and formed to provide a valve chamber exteriorly of the barrel, a tubular plunger rod passing through said cap and open at its outer end, the inner end of the piston rod having laterally disposed ports communicating with the interior of the cylinder, a piston mounted upon the inner end of the piston rod and including two flexible cups disposed on opposite sides of said ducts and having their margins extending in opposite directions and loosely bearing against the interior face of the cylinder, a tube connecting this last named duct to one end of the valve chamber, the cap having screw-threaded engagement with this end of the valve chamber and having a central opening through which the tube passes, the extremity of the tube being flanged to engage the cap, the cap at the opposite end of the cylinder being provided with a duct leading

into the adjacent end of the valve chamber, and two independently movable valves disposed within the valve chamber, one controlling the passage of air from the first
5 named duct and the other controlling the passage of air from the second named duct, one of said valves having a central bore and the other valve having a stem having slid-

ing engagement with the bore, the valve chamber being provided with an outlet port. 10

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

COURTNEY C. HANGER.

Witnesses:

H. L. MASON,
R. S. HUNTER.