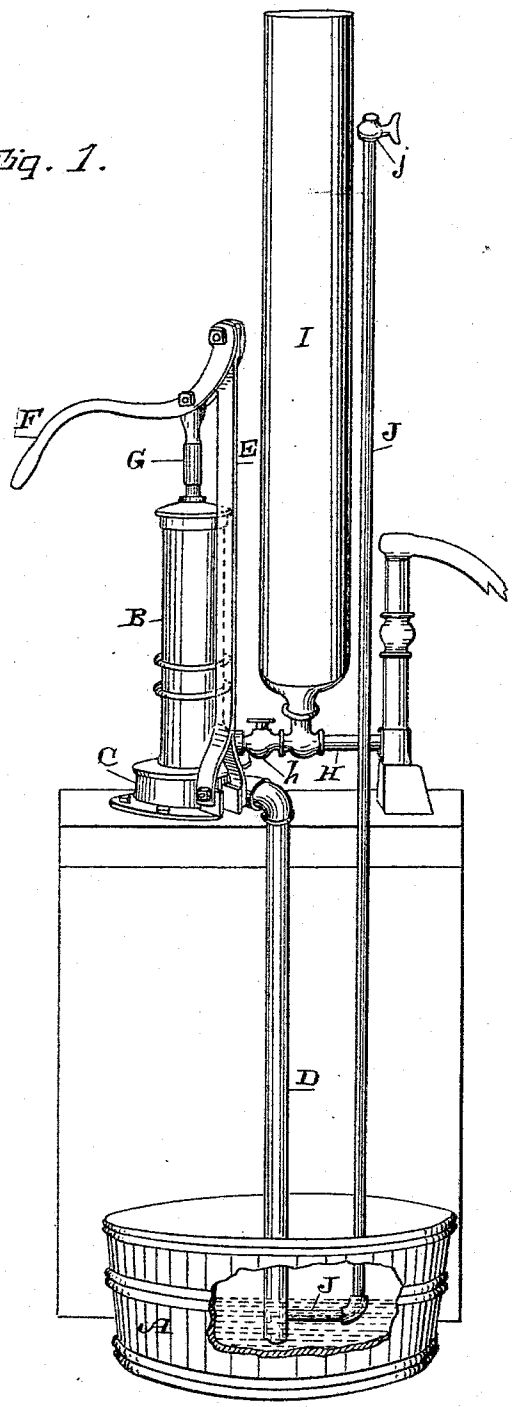
(No Model.) 2 Sheets—Sheet 1.

J. BEAN.

PUMP.

No. 414,667. Patented Nov. 5, 1889.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

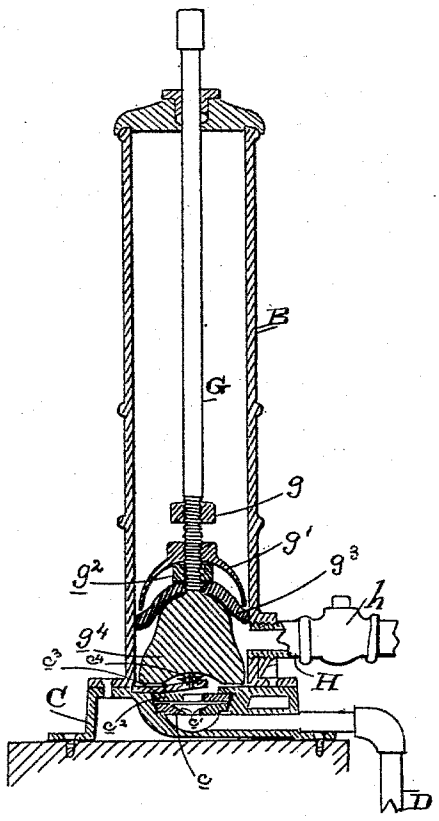


Fig. 3.

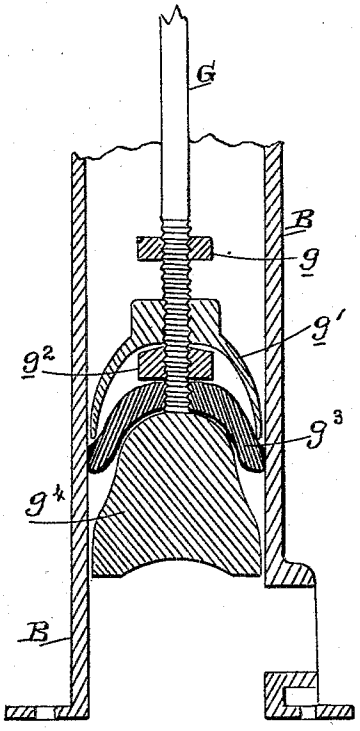
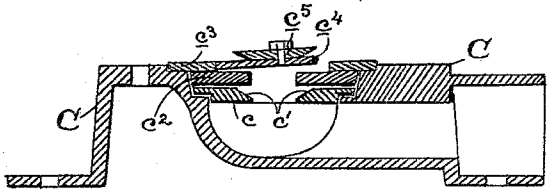


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN BEAN, OF LOS GATOS, CALIFORNIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 414,667, dated November 5, 1889.

Application filed June 6, 1889. Serial No. 313,376. (No model.)

To all whom it may concern:

Be it known that I, JOHN BEAN, of Los Gatos, Santa Clara county, State of California, have invented an Improvement in Pumps; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of pumps; and my invention consists in a novel improvement in the plunger, a novel improvement in the bottom or check valve, and a novel improvement in the outlet from the cylinder and the plunger in connection therewith, all of which I shall hereinafter fully describe.

The several objects of these improvements will be fully set forth in the following description.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my pump. Fig. 2 is a vertical section of cylinder, plunger, base, and bottom valve. Fig. 3 is a larger section of cylinder and plunger. Fig. 4 is a larger section of bottom valve.

A designates any suitable receptacle for the liquid to be pumped. It is here shown as a tub or vessel usually employed as the receptacle for spraying liquor for the treatment of trees, shrubs, &c.

B is the pump-cylinder, mounted upon and bolted to a base casting or plate C, from which extends the suction-pipe D down into the liquid in the tub.

E is the pivotal bracket or support for the pump-handle F, to which is connected the plunger-rod G.

H is the outlet-pipe communicating with the cylinder B near its base, and *h* is a check-valve in said pipe. I is an air-cylinder communicating with said pipe.

J is an air-inlet or feed-pipe, the upper end of which is controlled by a small petcock *j*. This pipe extends downwardly into the tub A and communicates with the suction-pipe D at a point below the level of the liquid in said tub. This pipe forms an air-inlet to the suction-pipe when the petcock is open and a vacuum-chamber to the suction-pipe when closed.

This is the general organization of my pump. The plunger is constructed as follows: The lower end of the plunger-rod G is threaded, and upon this is first seated a jam-nut *g*, then a bell-shaped clamping or compressing nut *g'*, then a holding-nut g^2, then the packing-washer g^3, and then the bearing-nut g^4. The holding-nut g^2 has a diameter small enough to allow the mouth of the bell-shaped clamping-nut *g'* to fit freely over it, so that its edge projects beyond or below it and into contact with the packing-washer g^3, which it presses upon near its rim or periphery, the base of said nut having a diameter but slightly smaller than that of the packing-washer. The bearing-nut g^4 has a conical or tapering top, the blunted apex of which is considerably less in diameter than the packing-washer, being about the same diameter as the holding-nut. The packing-washer is confined between the holding-nut g^2 and the bearing-nut g^4, and it projects beyond both nuts. This washer, while it may be made of any suitable flexible material, is preferably made of rubber-covered duck. Its diameter, when flat, should be slightly greater than the interior diameter of the cylinder B. Now, in operation, it is first confined between nuts g^2 and g^4, and then the clamping or compressing nut *g'* is turned down, so that its base-rim bears upon the washer near its edge. Further movement of the nut *g'* bends downwardly the projecting or unsupported edge of the washer over the top of the bearing-nut g^4, thereby sufficiently reducing its diameter to permit it to be inserted in the cylinder B. This insertion is a complete and clean one, requiring no tamping or poking, as the washer is compressed enough by the nut *g'* to allow it to enter the cylinder easily. Now, when once in the cylinder, the rod G is drawn up sufficiently to expose above the cylinder's top the top of the compressing-nut *g'*, the packing-washer being still fully in the cylinder. Then the nut *g'* is turned to run up slightly, thereby partially relieving the washer of its compressing force, and said washer thereupon expands again and completely and perfectly fills the cylinder, making a properly-tight plunger. Then the jam-nut *g* is run down and all the parts are held firmly in position. Now, when this packing-washer gets worn and needs enlarging, this nut *g'* is run farther up to let the packing expand farther. One or more of these packing-washers may be

used, as desired, at the same time. I have found it best to employ the rubber-covered duck for the washer, as it has considerable elasticity and will expand perfectly when relieved, and I have further found that when using the pump as a spraying-pump the liquor will not affect the rubber or duck, thereby rendering this material well adapted for the purpose. I prefer, however, to remove the upper rubber or layer covering the top of the washer, as it is inclined to stick in the cylinder. The remaining or lower layer of rubber gives the washer sufficient elasticity to expand, as above described.

The lower or check valve of the pump is thus constructed: In the annular seat of the bottom plate or casting is dropped a metal disk *c*, having a central hole bounded by a downwardly-beveled rim *c'*. Upon this disk is laid a flexible washer c^2, made, preferably, of rubber-covered duck and having a central hole of a diameter about equal to that of the hole in the disk. Then upon this is laid the valve-plate c^3, the flexibly-connected flap c^4 of which has attached to its upper side the metal disk c^5, of equal diameter with the flap, and having a downwardly-beveled rim on its under side. The valve-plate and its flap are preferably made of rubber-covered duck. Now it will be seen that the edges or outer portions of both the washer c^2 and the flap c^4 lie in the planes of the beveled surfaces of the disks *c* and c^5, and under pressure yield on said surfaces, so that under the alternate pressure and its relief the flap and washer have a slight movement or work on each other, thereby freeing themselves of intervening sand, which is the object of this construction.

It is advisable in pumps to provide for the introduction and pumping of some air with the water. This is especially so with spraying-pumps, where the air is required to atomize or vaporize the spraying liquid. I accomplish this by admitting the air to the suction-pipe at a point below the level or surface of the liquid being pumped, as by thus admitting it it readily enters the pipe and joins the liquid. This is effected through the air-pipe J heretofore described. A second function of the air-pipe J is that when the pet-cock *j* is closed it forms a vacuum-chamber for the suction-pipe. Now this air rises through the liquid and collects above its surface and between it and the base of the plunger, and unless it be forced completely out at each stroke it soon increases in volume and prevents the operation of the pump. This increase is due to the fact that between the cylinder's exit and the check-valve in the exit-pipe there is always a space, from which the plunger cannot ordinarily force the air; consequently as the plunger rises the air simply comes back into the cylinder and gets above the water again. I avoid this and force the air out at each stroke by the following construction: I raise the exit-communication of the cylinder with pipe H sufficiently above the bottom check-valve to provide for a small space or chamber between its level and that of said valve. I connect or form with the base of the plunger a displacement extension, which is here shown as the bearing-nut g^4, heretofore described, the lower portion of said nut serving this purpose and being made of very nearly the diameter of the cylinder. Now, in operation, as the plunger descends, driving the water before it, the air on the top of the water is forced down, and when the plunger proper reaches the level of the exit-opening the air has been forced through said opening into pipe H; but the displacement extension of the plunger, having passed the exit-opening and filled the chamber between it and the bottom check-valve, has displaced the water in the chamber and forced it after the air into pipe H, so that said air is forced beyond the check-valve in said pipe. Then when the plunger rises nothing but a little water returns into the cylinder.

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

1. In a pump, and in combination with the plunger-rod having a threaded lower end, the plunger consisting of the flexible packing-washer fitted on the rod, the holding-nut and the bearing-nut screwed on said rod above and below the washer and having a diameter less than the washer, and the clamping or compressing nut screwed upon the rod above the holding-nut, and having its base bearing on the washer on a circle of greater diameter than the diameters of said holding and bearing nuts, substantially as described.

2. In a pump, and in combination with the plunger-rod having a threaded lower end, the plunger consisting of the flexible packing-washer fitted on the rod, the holding-nut and the bearing-nut screwed upon said rod above and below the washer and having a diameter less than the washer, the bell-shaped clamping or compressing nut screwed on the rod above the holding-nut and bearing with its base on the washer on a circle of greater diameter than the diameters of the holding and bearing nuts, and the jam-nut screwed on the rod above the clamping or compressing nut, substantially as described.

3. In a pump, the check-valve consisting of the bottom disk having a central hole bounded by a beveled rim, the flexible washer resting on said disk and having a central hole the rim of which lies above the beveled rim of the disk-hole, and the flexible flap of the valve-plate, substantially as described.

4. In a pump, the check-valve consisting of the bottom disk having a central hole bounded by a beveled rim, the flexible washer resting on said disk and having a central hole the rim of which lies above the beveled rim of the disk-hole, the flexible flap of the valve-plate, and the disk on top of said plate having a beveled under rim, substantially as described.

5. In a pump, the combination of the cyl-

inder, the bottom check-valve level with its base, an exit from said cylinder at a point above said valve, so as to leave a flat-bottomed chamber between its level and that of the valve, and a plunger in the cylinder having on its under side a displacement extension adapted to pass the exit and enter and fill the chamber below it, substantially as described.

6. In a pump, the cylinder and the bottom check-valve, an exit-pipe from said cylinder at a point above said valve, so as to leave a chamber between its level and that of the valve, and a check-valve in said pipe, in combination with a plunger in the cylinder consisting of the flexible packing-washer, the clamping or compressing nut and the bearing-nut, said last-named nut having a displacement extension adapted to pass the exit-pipe and enter and fill the chamber below its level, substantially as described.

In witness whereof I have hereunto set my hand.

JOHN BEAN.

Witnesses:
WESLEY PECK,
B. H. NOBLE.