J. S. ADAMS.

PUMPS.

No. 181,299. Patented Aug. 22, 1876.

Fig. 1

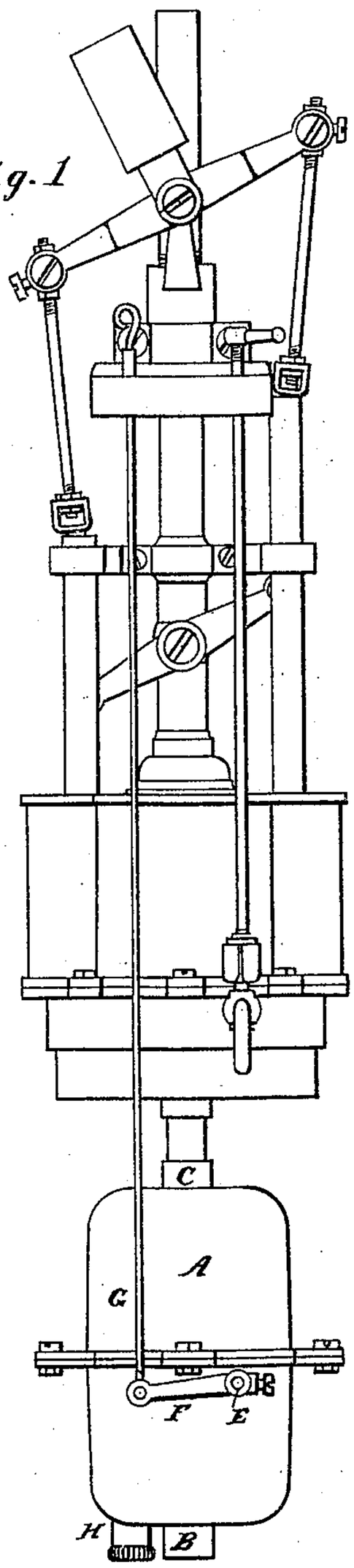


Fig. 2

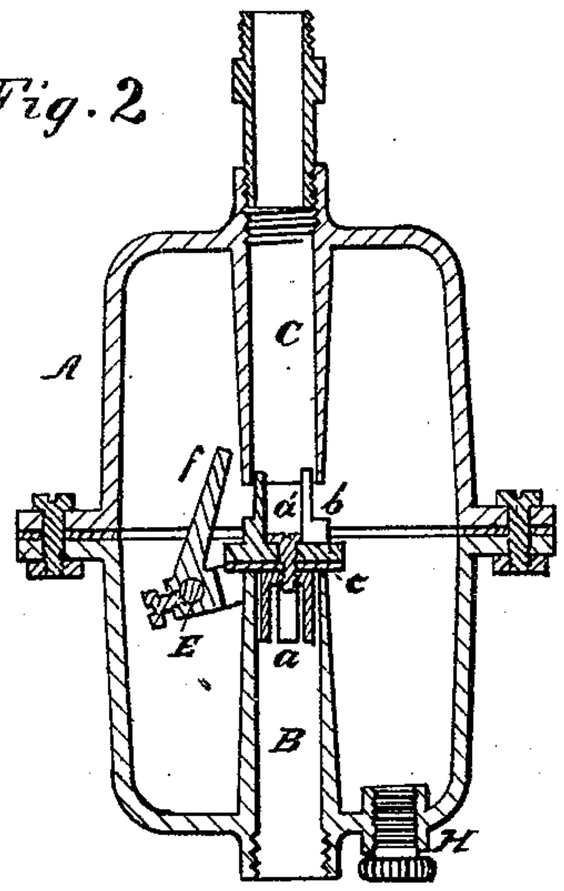
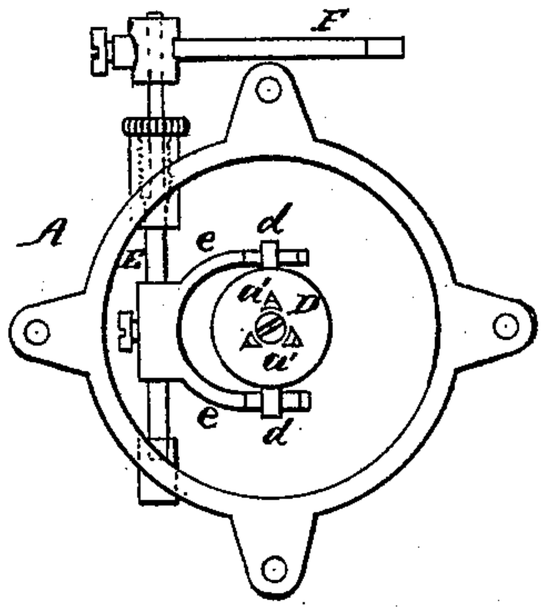


Fig. 3



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IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **181,299**, dated August 22, 1876; application filed March 13, 1876.

To all whom it may concern:

Be it known that I, JOHN S. ADAMS, of Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Pumps; and I do hereby declare the following to be a full, clear, and exact description of the same, which will enable others skilled in the art to which my invention appertains to make and use the said improvements, reference being had to the accompanying drawing, forming a part hereof, and in which—

Figure 1 is a side elevation of a pump provided with my improvements; Fig. 2, a vertical central section of the vacuum-chamber or suction-reservoir, and Fig. 3 a top or plan view of the lower part of the chamber and of certain parts connected therewith.

Like letters of reference indicate like parts.

In the use of suction-pumps connected with drive-wells, deep wells, or with long suction-pipes, great inconvenience results when the pumps are worked with more than ordinary rapidity, in consequence of the reaction of the working-lever, produced by the closing of the vacuum then created between the piston and the lower valve. The parts also make considerable noise for the same reason.

When a long column of water is raised by means of an ordinary suction-pump the column is started, moved, and stopped during each stroke of the piston. The atmospheric pressure is not sufficient to move the water with a speed equal to the movement of a rapidly-worked piston; hence a partial vacuum is produced in the working-cylinder, and the water in the suction-pipe has an intermittent or uneven motion, resulting in the inconvenience and annoyance already referred to.

The chief object of this invention is to remedy these defects, and also to prevent the sand from being drawn into the working parts of the pump. To this end my invention consists of the means, substantially as hereinafter set forth, which I employ for this purpose.

In the drawing, A represents the vacuum-chamber or suction-reservoir, which also performs the function of a sand-trap or settling-chamber, and which should be attached to the lower end of the pump, or to the suction-pipe, as near the pump as may be practicable. B is a vertical pipe, entering the bottom of the chamber A, and C is a like pipe entering its top, and arranged directly over the pipe B. A considerable space exists between the inner ends of these pipes, as shown in Fig. 2. D is a check-valve, arranged on the upper end of the pipe B, and provided with vertical guides *a a*, extending into the said pipe. *a' a'* are vertical guides entering the pipe C, and are shouldered, as shown at *b b*, to prevent the valve from closing the lower end of the pipe which they enter. A considerable space exists between the guides in each set, as represented, and when the upper set performs the function of guides, as well as of stops, the lower set is not absolutely essential; but I deem it preferable to use both. A packing should either be arranged between the valve and its seat, or the adjacent parts should be ground to make a water-tight joint. In the example shown, *c* is a packing clamped between the lower face of the valve and a separate piece from which the guides *a a* extend. *d d* are pins projecting laterally from the valve D. E is a rock-shaft, entering the lower part of the chamber A, and *e e* are rocker-arms extending below the pins *d d*, and notched or hooked to receive them, as shown, and thus prevent these pins from being turned out of the reach of the said arms. The notches in which the pins *d d* rest should be sufficiently long to admit of the vertical play of the valve, while the rocker-arms, which are attached to the shaft E, move in the arc of a circle, through the center of which the shaft passes. F is a crank-arm on the outer end of the shaft E, and G is a rod connected to the arm F by means of a crank-pin, and extending upward through the platform.

The arm F may be caused to descend with certainty by means of a spring or weight when the rod G is released; but it may be pushed down, if necessary, by means of this rod. It is probable that the arm, however, will be sufficiently heavy, when its position is considered, to descend automatically. It may be prevented from descending too far by means of a finger projecting from the shaft E, and arranged for contact with the pipe C, when the downward movement should cease, as shown at *f*, Fig. 2. The finger *f*, however, is

not essential for this purpose, for too great a downward movement may be prevented in various other well-known ways; but some provision should be made for keeping the valve under the control of a device for raising it, for the purpose hereinafter set forth, when the object for which a lifter is employed is to be accomplished. H is an eduction, provided with a removable plug, and arranged in the bottom of the chamber A.

Provision should be made for taking the chamber A apart, so that access may be had to the parts within when necessary. For this purpose I make it in two parts, *g* and *g'*, flanged, as shown, and firmly bolted together. All the joints should be rendered water-tight. Provision should also be made for lifting the pump from the well or cistern with facility, so that the chamber A and the parts operating immediately in connection therewith may be readily examined and repaired, as occasion may require.

When the pump is in operation, the upstrokes of the piston produce a partial vacuum in the chamber A, and the water is thus sucked up through the pipe B until the lower part of the chamber is filled, the valve D being raised by this suction and by the upward flow of the water, but not sufficiently to close the lower end of the pipe C. The shoulders *b b* prevent the closing of this pipe, and the water, therefore, enters it, and is sucked up and discharged through the nozzle of the pump. After the pump is thus filled, the vacuum produced by each upstroke causes the water to enter the vacuum-chamber during each downstroke in sufficient quantity to supply or nearly supply the next upstroke. In other words the vacuum raises the water a part of the way, and the piston raises it the remaining distance, the vacuum acting independently during the downstrokes of the piston. If the water in the pipe B tends to vibrate back and forth therein, this tendency will be prevented by the valve D, which will be closed by the first downward tendency of the water, it being understood that the air in the upper part of the chamber A, by being elastic, would admit of this movement of the water if it were not for the check-valve referred to. The valve D not only performs the functions already mentioned, but also deflects the up-current of water in all directions, so that sand and other foreign particles have a better opportunity to settle to the bottom of the chamber than if the water continued to rise in a straight column. This deposit may be removed by removing the plug in the bottom of the chamber.

In many suction-pumps provision is made for allowing the water to run out of the pipes to prevent it from being there frozen; but, as has already been observed, the valve D prevents the downward flow of water, and I have therefore deemed it best to employ a lifting device in connection with it, so that the water may be allowed to flow back into the well or cistern.

It will be perceived from the foregoing description that during the action of the pump the water will flow constantly into the chamber A, and that it is prevented from oscillating therein and from returning into the well or cistern unless the check-valve is raised to admit of the latter result. By this means the action of the pump is rendered steady, and the water is not roiled by a back flow from the suction-pipe. The water may be retained in the suction-tube while the sand is being removed, and also in the upper parts of the pump, although the upper valves or those above the valve D may leak. In pumps provided with an internal let-off, and also with the chamber and sand-trap A, water may be poured into the top to aid in washing out the sand. The sand may also be removed by removing and taking apart the chamber A.

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

1. The combination of the auxiliary chamber A, pipe B, entering the bottom of the said chamber and extending above the bottom, to constitute a sand-trap, the fixed pipe C, entering the top of the said chamber and terminating above the pipe B, and a check-valve arranged to play between the interior ends of the said pipes, substantially as and for the purposes specified.

2. The combination of the chamber A, pipes B and C, check-valve D, and a valve-lifting device, all arranged substantially as described with relation to each other, for the purposes set forth.

JOHN S. ADAMS.

Witnesses:
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