

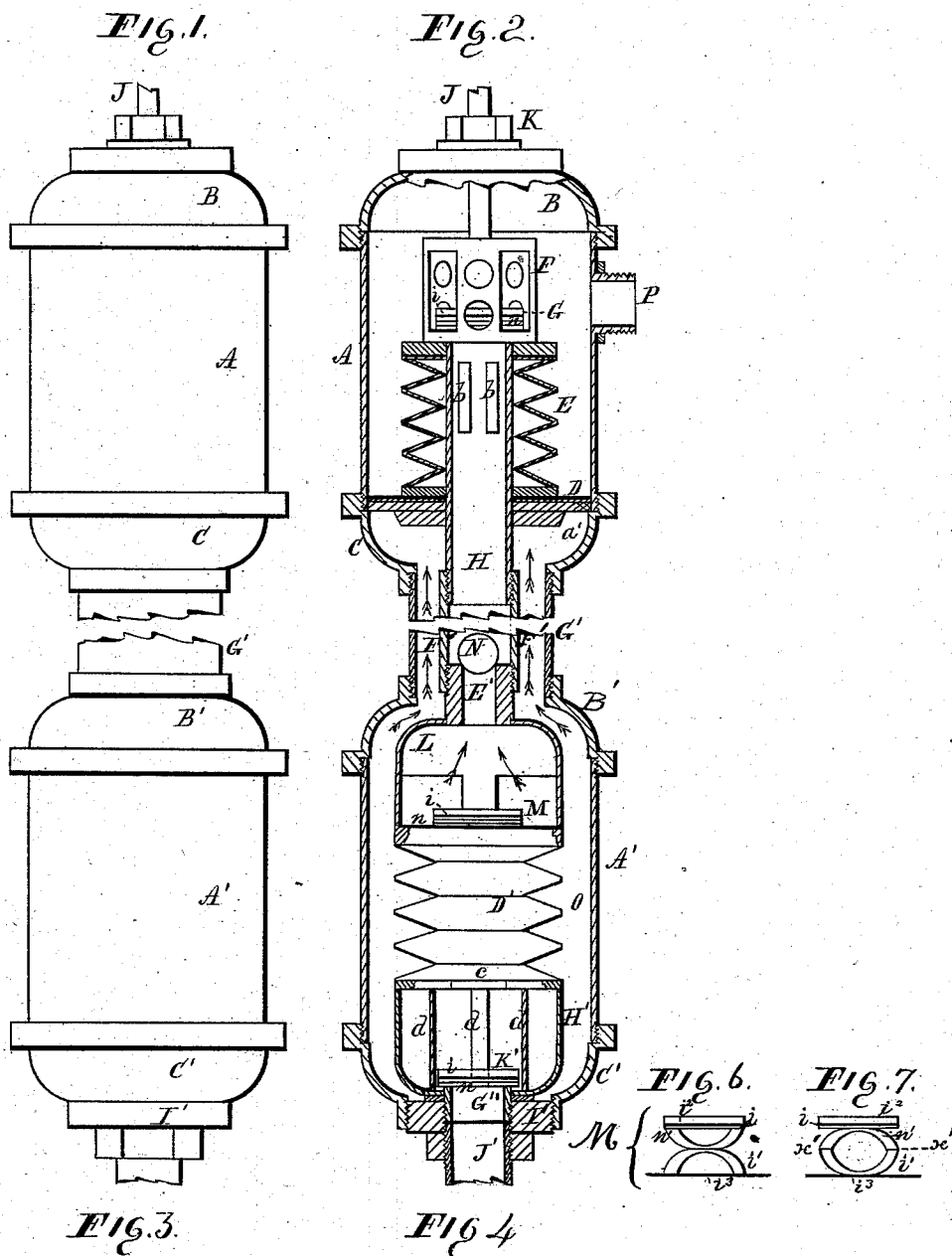
(No Model.)

N. HEMENWAY.

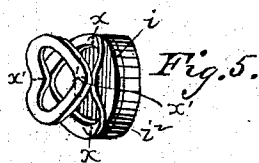
PUMP.

No. 293,461.

Patented Feb. 12, 1884.



Witnesses:
C. Richards
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UNITED STATES PATENT OFFICE.

NATHAN HEMENWAY, OF NAPA CITY, CALIFORNIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 293,461, dated February 12, 1884.

Application filed October 8, 1881. (No model.)

To all whom it may concern:

Be it known that I, NATHAN HEMENWAY, of Napa City, in the county of Napa and State of California, have invented a certain new and Improved Pump; and I do hereby declare that the following is a full, clear, and complete description thereof.

My invention relates to improvements in pumps for raising water from deep wells, mines, &c., as well as for all the purposes of ordinary pumps; and it consists in the peculiar construction and arrangement of the parts, as hereinafter more fully set forth, and pointed out in the claims.

A full and complete description of the pump is set forth in the following specification and illustrated by the annexed drawings, making a part of the same.

In said drawings, Figure 1 represents an external side view of the upper part of the pump. Fig. 2 shows a vertical transverse section of the same. Fig. 3 is an external side view of the lower part of the pump. Fig. 4 shows a vertical transverse section of the same. Figs. 5, 6, and 7 are detached views of a valve used in the apparatus alluded to.

Like letters of reference refer to like parts in the several views.

In Fig. 1, A represents a cylinder, provided with a top and bottom cap, B C, screwed thereon, as seen in Fig. 2.

In the lower part of the cylinder A is a diaphragm, D, to which is secured the lower end of a flexible water-receiver, E.

To the upper end of the receiver is attached an open frame or basket, F, inclosing an upward-opening valve, G. The valve G closes the upper end of the pipe H, which is attached to the lower end of the basket F, and the pipe H passes through the receiver E. The pipe H is not attached to the receiver E; hence it is free to move therein vertically as the receiver may distend and collapse on working the apparatus.

J is a rod passing down through the top of the cap B to the valve-basket alluded to, in the head of which it is fixed for operating the pump, as will be presently shown. The lower part or section, A', of the apparatus or pump is similar to the upper section, A, only differing in some details, and is substantially as fol-

lows: The lower section, like the upper one above described, consists of a cylinder substantially in size and structure resembling the upper one, as will be seen in Fig. 4. In said figure, A' is the cylinder; B' and C', the top and bottom caps. D' is a water-receiver, of the same size, shape, and material as the receiver E, and with which it is in open communication, as shown in Figs. 2 and 4, by means of the pipes H and E' and sleeve F'. The connection of the two cylinders A and A' is made by the coupling-pipe G', all of which connections may be of any desirable length from one foot to many feet, as circumstances may require. The lower end of the receiver D' is connected to a chamber, H', and in open relation therewith by a passage-way, c. Said chamber H' is attached to the cap C' by a pipe, G'', screwed into the nut I' of the cap. The pipe G'' alluded to is in open relation to a pipe, J', also screwed into the nut I', and by which the pump is put in communication with the water to be raised.

In the chamber H', and covering the pipe G'', is a valve, K', opening upward. Said valve is kept in position by guides d. The upper end of the receiver is attached to a frame or basket, L, inclosing a valve, M, which, like the valve K', opens upward. N is a valve for closing the end of the pipe E'.

The practical operation of the above-described pumping apparatus is substantially as follows: The pipe J' is immersed in the water to be raised, and the power for working the apparatus is applied to the rod J, which may be a hand-lever or power from some motor. The pump, as shown in the drawings, is distended, or partially so, which is done by a downward stroke of the pump-handle, or lever, if one be used for that purpose. As the receiver D' is distended from a collapsed condition, a vacuum is produced therein, which is immediately filled with water passing in through the induction-pipe J' as the valve K' opens. On a reverse or upward stroke of the handle the receiver collapses, closing the valve K' and forcing the water up through the valve M into the chamber A'. A continued distention and collapsing of the receiver will fill the said cylinder A' and force the water up through the pipe G' (as indicated by the arrows) into

the space a' below the diaphragm D, by which it is stayed from flowing directly upward into the cylinder A, but, however, finding its way therein through the connecting-pipes E' and H, as follows:

It will be obvious that as the receiver D' continues to distend and collapse the water discharged therefrom through the valve M into the cylinder A' must find an outlet, as the water, not being able to pass through the diaphragm, is forced upward through the pipes E' and H each time that the receiver D' may collapse. This downward-collapsing action of the receiver, by discharging its contents into the cylinder A', forces the water therefrom into the pipe E', opens the valve N, and continues upward through the pipe H, from which it is discharged into the cylinder A through the valve G, and also filling the receiver E by passing from the pipe H through the apertures $b b$ in the sides thereof. From the cylinder A the water is discharged to the outside through the nozzle P.

From the above it will be seen that the cylinders A A' are both filled with water, also the connecting-pipe G', and that the two receivers are filled with water, and both surrounded by the water in their respective cylinders, thereby making them equally balanced by the surrounding water, so that their operation is easy and free from unequal pressure.

For the convenience of drawing, the two cylinders A and A' are shown as connected to each other by a very short pipe, G', and pipes E' and H. In raising water from a deep well or from the ground to a considerable height, the connections of the cylinders are to be lengthened accordingly. If the water is to be raised some hundreds of feet, several cylinders will be required for that purpose, arranged at intervals of some twenty-five or thirty feet or more, all connected to each other, that they may act simultaneously. The lowest one in the number, as A' in the drawings, supplies the next one above, as A, with water by filling the cylinder. This second one, A, operating substantially as the one below, supplies water to the third one above, and the third to the fourth, and the fourth to the fifth, and so on to the highest, which will have the outlet seen at P in Fig. 2. The intermediate cylinders have no outlet, as the water is to be discharged at the top of the well or mine, which may be of greater or less depth. Each of the cylinders becomes a reservoir of water for supplying the next one above, and all supplied from the one lowest in the series of cylinders.

From the above-described arrangement and continuous series of cylinders, it will be obvious that water may be lifted from great depths without the increase of the power required to raise water from a less depth, excepting the increased frictional resistance resultant from the working of the additional cylinders used consecutively for raising the water, as all of the working parts of the apparatus are im-

mersed in the water retained in the cylinder, and buoyed up thereby.

In order to render the lifting parts of the pump as buoyant as possible, the receivers are made of light material impervious to water, and the connecting-pipes E' and H are preferably made of wood treated superficially with any suitable material to render them impervious to water, thereby causing them to float in the column of water being raised through and around them.

The apparatus may be used as a force-pump instead of a lifting one by simply confining the valve G, so that it cannot open, and by having a perforated diaphragm, D, instead of a close one, so that the water may pass up through it instead of through the pipe and valve. In this case the downward stroke of the receiver E will discharge its contents down upon the mass of water below and force it upward into the cylinder A and discharge it therefrom through the nozzle P.

The valve M, above referred to, consists of an upper disk, i , preferably made of rubber, and weighted with a light weight, v , that it may act quickly. Said disk i is attached to the valve-seat v by flexible rings i' and n' , Fig. 8. The rings are connected to each other at two opposite points of their diameters, as at $x' x'$, Fig. 5. The ring n' is attached to the valve at two opposite points of its diameter, $x x$. So, also, is the ring i' connected to the valve-seat in the same way and in the same diametrical lines, which lines are at right angles, or nearly so, to the diameter $x' x'$.

A valve constructed as above described is preferred to other valves, on account of its being of little weight, and when lifted from its seat permits of a free escape of water through the rings on all sides. Other kinds of valves, however, may be used. A hollow ball-valve, as seen at N, will answer well; but the one provided with ring attachments is found to be the best in this place.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In pumps for raising water, a cylinder, A', having secured in the lower end thereof a valve-chamber in open relation to the outside of the cylinder by an induction-pipe provided with a valve arranged within said chamber, and said chamber being in open connection with a flexible water-receiver, having in the upper end thereof a valve, whereby the water from the receiver is discharged into the said cylinder A', substantially as and for the purpose set forth.

2. In an apparatus for raising water, in combination with the cylinder A' and its inclosed chamber and valve, water-receiver and valves M and N, a cylinder, A, arranged above the cylinder A', and provided at its lower end with a diaphragm, having secured thereto a flexible water-receiver with a central perforated tube or pipe therein, and having the upper end provided with a valve and the lower end connected to the receiver D' by a suitable pipe-con-

nection, and the two cylinders connected by a corresponding pipe-connection, substantially as described, and for the purpose specified.

3. In pumps for raising water, the cylinder A, 5 provided with a diaphragm, and water-receiver E, connected to said diaphragm, and having therein a perforated tube or pipe with the upper end furnished with a valve, and said cylinder provided with an outlet, substantially 10 as herein described, and for the purpose specified.

4. The valve M, consisting of a disk, *i*, connected to its seat *i*³ by flexible rings *i'* *n'*, said rings being secured to each other at two opposite points of a diameter, and respectively 15 connected to the valve-disk *i* and valve-seat *i*³ at the ends of two parallel diameters at right

angles to the diameter joining the points of attachment of the rings *i'* *n'*, substantially as shown and described. 20

5. In a pump, the combination, with the collapsible receivers D' E, constructed of light material, of a tubular connection between them, made of wood or other buoyant material, substantially as shown and described, whereby the 25 lifting parts of the pump are rendered buoyant, as set forth.

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

NATHAN HEMENWAY.

Witnesses:

G. H. OBER,
J. H. BURRIDGE.