

McPherson & Joyce,

Force Pump,

N^o 14,247.

Patented Feb. 12, 1856.

Fig. 1.

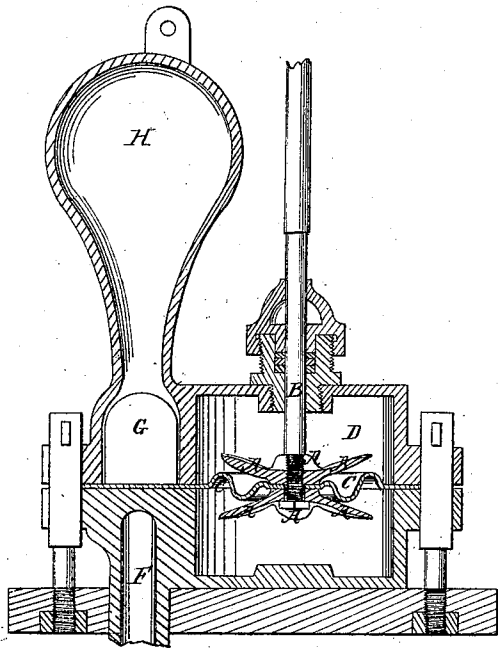


Fig. 2.

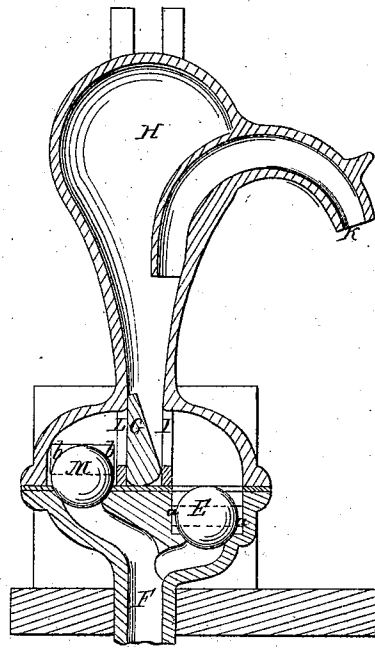
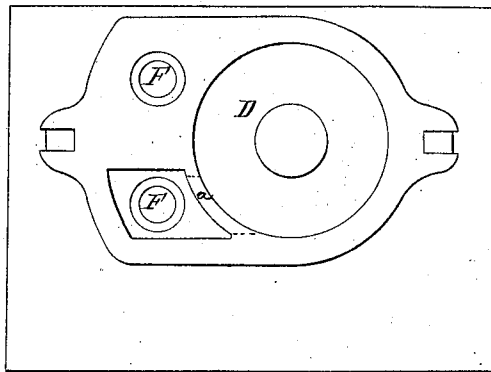


Fig. 3.



UNITED STATES PATENT OFFICE.

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DIAPHRAGM-PUMP.

Specification of Letters Patent No. 14,247, dated February 12, 1856.

To all whom it may concern:

Be it known that we, JOHN L. McPHERSON, of New Vienna, in the county of Clinton and State of Ohio, and JACOB O. JOYCE, of Cincinnati, in the county of Hamilton and State of Ohio, have made a new and useful Improvement in the Construction of Diaphragm-Pumps; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1, represents a longitudinal vertical section, through the center of said pump, Fig. 2, represents a vertical cross section through the center of the air chamber and the valves. Fig. 3, represents a top view of the lower part of said pump showing the apertures by which the water enters and the ball valve seats.

The nature of our invention consists, first, in the use of a corrugated rubber diaphragm, by means of which a longer stroke of the piston may be had without overstraining said diaphragm; second, in combination with the corrugated diaphragm the flaring followers for taking up the diaphragm in accordance with the stroke of the piston, and thirdly, in the wedge shaped valve hung loosely in its seat, and having the heel of the wedge for its turning point as will be described.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

A in Fig. 1, represents an upper and lower follower plate which are secured on the piston rod B, by means of a screw and nuts and clamping the diaphragm C, between them. That side of each piece A which is next the diaphragm C, is rounded in such a manner, as that it will gradually take up the folds, or corrugations of the diaphragm, as the stroke of the pump is increased beginning at that part nearest the center, and extending toward the circumference, and thus put only so much of the diaphragm into actual use, as the stroke of the piston may require, and not overstrain or cut the material of which the diaphragm is composed.

The diaphragm C is made of a thin elastic sheet of india rubber or any other elastic material; and that part of it which is inside the pump chamber D, is corrugated in such a manner, that the folds form concentric circles around the piston rod B, which are shown in a section in Fig. 1. Thus the fol-

lower can be raised and depressed to a great extent, without overstraining the elasticity of the india rubber, and thus injuring it; and as the quantity of water which is discharged by a pump is by equal diameters of the chambers in proportion to the stroke of the piston, it is thus obvious that a corrugated diaphragm such as described can discharge more water than any ordinary diaphragm pump as heretofore used, without overstraining or cutting the diaphragm. By my plan the folds or corrugations are merely drawn out, and the stroke of the piston does not depend upon the elasticity of the material alone.

When the follower A is raised a vacuum is created below it, as in an ordinary double acting pump, and the chamber below the diaphragm being in communication with the ball valve E, by means of the passage a, the ball E is raised by means of the pressure of the water through the suction pipe F, and fills the entire space underneath the diaphragm; the follower being depressed again, the valve E, closes, and the pressure of the water opens the valve G, and enters the air vessel H, through the passage I, whence it is discharged through the spout K.

The valve G, is shown in a cross section in Fig. 2, and in a side view in Fig. 1. It consists of a wedge shaped piece of metal whose sides are plain or smooth, and can thus fit tightly against the sides of the chambers in which the passages I and L, are formed close on one or the other, by simply turning on its rounded basis. The advantage of this valve is that it is very easily operated upon by the water, it not being attached or connected with any part of the pump but lying loosely in its seat, and that when once fixed in its proper place it will not require as frequent repairs as the common valves, as there is no special part of it liable to be cut or worn away. The heel of the valve upon which it turns or vibrates being much the heaviest portion of it, holds it in place and it rocks upon its seat with perfect freedom. In the position of the valve G, as shown in Fig. 2, the water in the air vessel H, closes by its pressure the aperture L, which will be opened when the pressure inside the chamber is higher than in the air vessel. When the follower is depressed and thus forces the water into the air vessel H through the passage I, it at the same time creates a vacuum in the upper

part of the pump chamber D, which being in communication with the ball valve M, by means of the passage *b* is filled with water, which by the successive raising of the fol-
 5 lower is forced through the passage L into the air vessel, and then the wedge valve G, closes the passage I; thus it will be seen that this diaphragm pump is a suction and force
 10 or double acting pump as by each stroke it draws the quantity of water from the suction pipe which is equivalent to half the size of the pump chamber, and at the same time forces an equal quantity into the air vessel, or through the nozzle K.

15 Having thus fully described the nature of our invention what we claim therein as new and desire to secure by Letters Patent is—

1. The application to pistons of pumps, of a corrugated diaphragm, which admits of
 20 greater length of stroke without overstraining the material substantially as described.

2. We also claim in combination with a corrugated diaphragm, the flaring or rounded followers A, so that they will approach and take up the folds of the diaphragm in
 25 accordance with the length of stroke given to the piston rod as described.

3. We also claim the wedge shaped valve G, which lies loose in its seat, and rocks on its rounded base, to open or close the pas-
 30 sages I, L, as herein set forth.

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