

E. FITZGERALD.
DIVISION PUMP.

No. 33,936.

Patented Dec. 17, 1861.

Fig: 1.

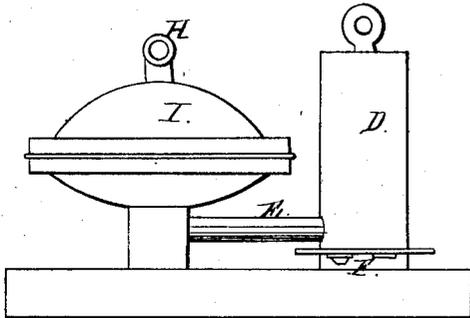


Fig: 2.

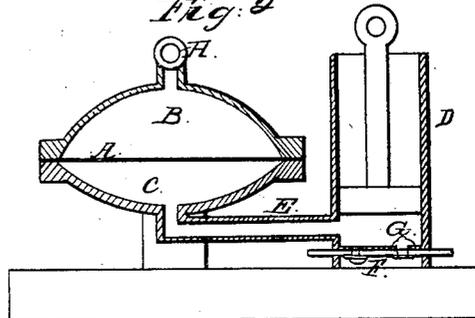


Fig: 3.

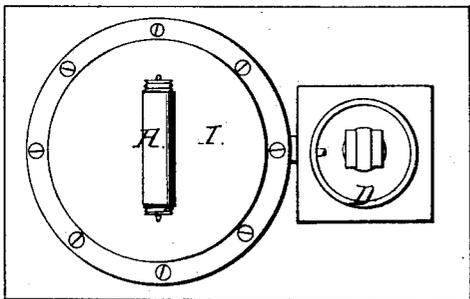
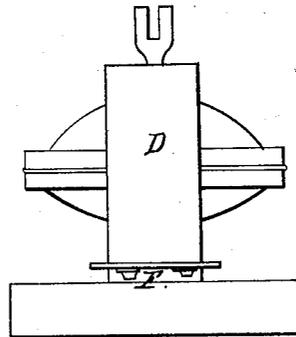


Fig: 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. 33,936, dated December 17, 1861.

To all whom it may concern:

Be it known that I, ELISHA FITZGERALD, of the city, county, and State of New York, have invented a new and useful Pump for Fluids, Semi-Fluids, &c.; and I hereby declare that the following is a full and exact description thereof.

To enable others to make and use my invention, I proceed to describe its construction and operation, reference being had to the drawings hereunto annexed and making part of this specification.

Figure 1 is a side elevation of the division-pump; Fig. 2, a longitudinal section; Fig. 3, a plan, and Fig. 4 an end section.

The same letters refer to the same things in all the drafts.

A is the diaphragm.

B is the upper chamber, made to receive and expel whatever is to be pumped.

C is the lower chamber, or water-chamber, containing the liquid (oil, water, or quicksilver) used in the pump D.

D is any pump used to force a liquid into the chamber C and force the diaphragm up, and fill also the upper chamber B.

E is a connecting-pipe between the pump D and the division-pump I.

F is a valve (connected with D) which will allow the liquid of the pump to escape a little, when the upper chamber has been entirely filled, until the piston is brought down to its lowest position.

G is a valve (connected with the pump D) which will allow a liquid to enter the pump when all has been drawn out from the lower or water chamber until the piston of D has ascended to its highest position. Both F and G have weights or springs upon them, so that they can only act when the other office of the pump has been fulfilled.

H is the inlet and outlet pipe of the upper chamber of the division-pump, and I the division-pump.

The power to operate this machine is applied direct to the piston of the pump D, which may be any sort of pump, except that its valves should be so loaded that they will only work as safety-valves, or after the proper office of the pump is fulfilled. This pump D may contain any liquid—say, quicksilver, oil, alcohol, or water. For all ordinary purposes water

is sufficient. The liquid of the pump D is permanently retained by it, to move back and forth, except that it receives a small addition at one stroke and loses it at the return-stroke, so that there shall always be a little more liquid in the pump than is needed when pressing the diaphragm A up into the upper chamber, and the little that is superfluous escapes by the valve F when sufficient pressure is applied. Except for this valve the division-pump would be liable to burst if there were too much liquid in the pump D, or would fail to deliver all its contents if there were too little, so that the quantity would have to be precise always to have a perfect operation. This valve F obviates the difficulty when there is too much liquid. In the opposite case, when there is too little the other valve G affords the remedy. It admits water, and thus obviates making a partial vacuum.

Between the upper and lower divisions of the division-pump I there is a diaphragm A, which effectually separates the two chambers and prevents the liquid of the pump D from entering the upper chamber B. This diaphragm, shirred or straight, may be made of silk, water proof, or leather, or of india-rubber. Any stuff will do. India-rubber in the form of a thin sheet is best. This diaphragm comes in contact with the substance to be pumped. The upper chamber B should be larger than the lower chamber C, as pressure can force the diaphragm full up to the top better than suction can bring it down to the bottom. Upon the top there is an inlet and an outlet, or, as in the drawings, Fig. 2, but one opening, and that into a pipe with an inlet-valve at one end and an outlet-valve at the other.

In the operation of this pump the downward stroke of the piston of D forces the liquid into the lower chamber C and up to the top of B, except for the thickness of the diaphragm. Then the force being continued a little, (to make sure that the substance in B is fully expelled,) the valve F suffers a little of the liquid to escape against pressure. When the piston of D is raised the liquid is drawn out of the lower chamber C, (that in the upper chamber B having been previously expelled by the descent of the piston in D,) and by the atmospheric or other pressure the

substance to be pumped fills the space of both chambers by depressing the elastic diaphragm. The piston being raised a little after this operation has been performed, the valve G admits against pressure a little liquid to obviate making a partial vacuum.

The main object of the diaphragm A is to keep separate the substance to be pumped from the liquid in D that effects the pumping from that received and expelled through the pipe H; but there are other uses. The diaphragm makes no friction and can be always tight. In this chamber, also, can be received and expelled things not easily pumped by other means—such as thick sirup, soap, semi-fluids, and plastic substances—and they will not clog; also, it is useful to pump air or gas, as it is not liable to leakage and the gas will not enter the water. The effect of this operation is to transfer the action of the pump D to I by any fluid, the diaphragm interposing to prevent contact of the liquid in D with the substance to be pumped by the

division-pump I, so that anything can be pumped by it.

I am aware that flexible diaphragms have been moved by the direct application of mechanical power in pumping apparatuses, and that they have also been applied to separate the air-chamber from the flow of water in pumps. These I do not claim, and I am aware that flexible diaphragms have been used in pumps in many ways to separate the acting fluid from the fluid pumped, and I do not claim the diaphragm A.

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

In combination with the division-pump A B C, using for the pump D the two valves F and G, as described, and for the purposes set forth.

ELISHA FITZGERALD.

Witnesses:

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