

April 14, 1953

F. FELEZ ALVAREZ ET AL

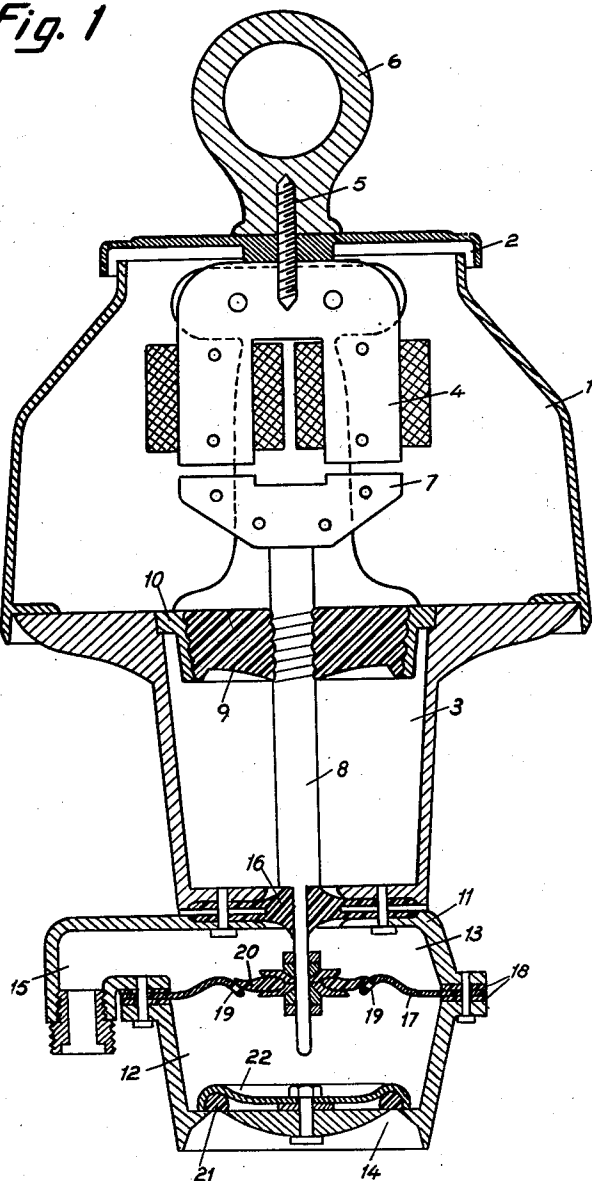
2,634,684

ELECTROMAGNETICALLY OPERATED PUMP FOR RAISING LIQUIDS

Filed Jan. 29, 1951

2 SHEETS—SHEET 1

Fig. 1



Francisco Felez Alvarez & Jose Felez Alvarez INVENTOR.

BY

Henderson, Lind + Ponack

Attorneys.

April 14, 1953

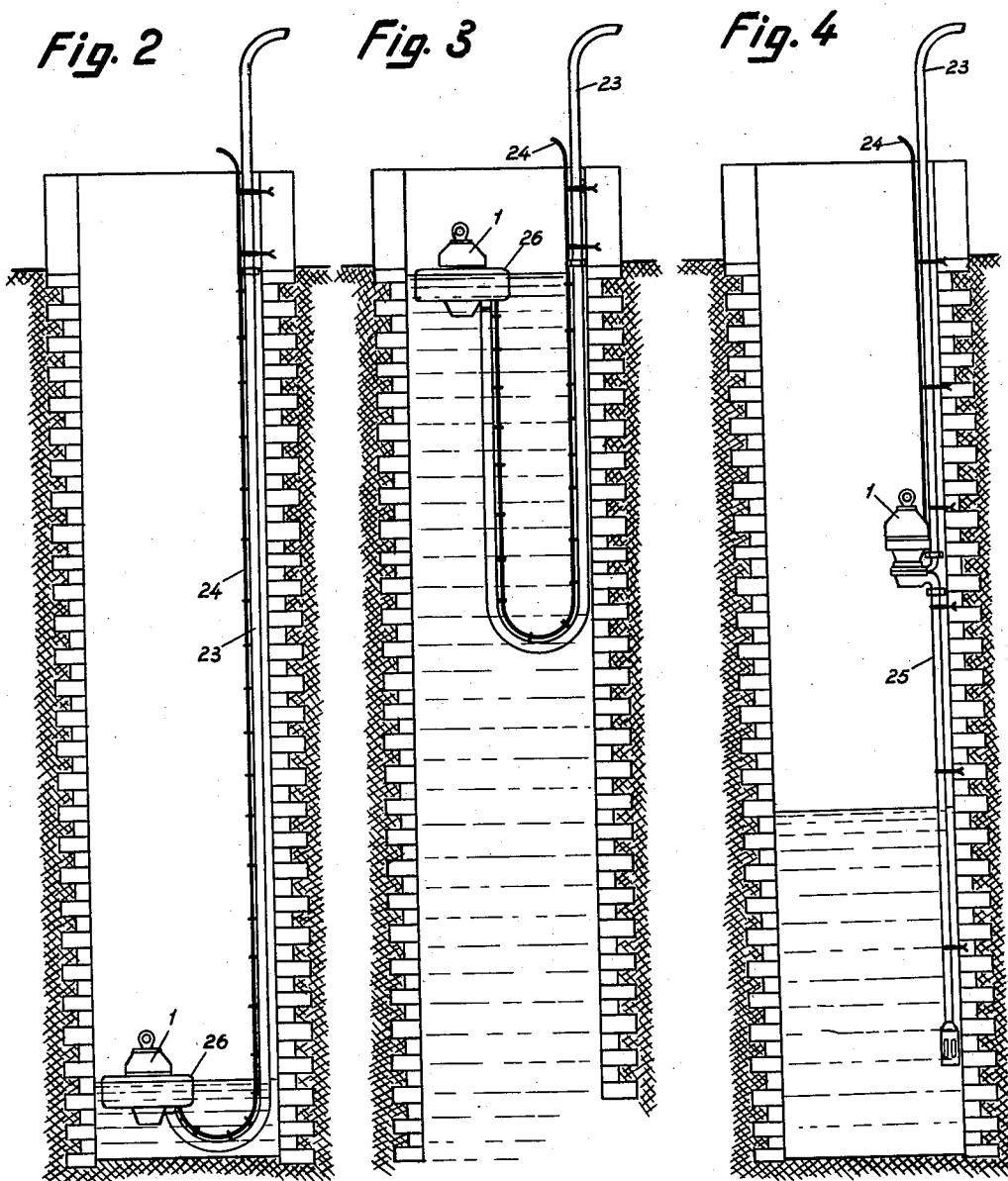
F. FELEZ ALVAREZ ET AL

2,634,684

ELECTROMAGNETICALLY OPERATED PUMP FOR RAISING LIQUIDS

Filed Jan. 29, 1951

2 SHEETS—SHEET 2



Francisco Felez Alvarez and Jose Felez Alvarez

INVENTOR.

BY

Henrich, Lind & Ponack

Attorneys.

UNITED STATES PATENT OFFICE

2,634,684

ELECTROMAGNETICALLY OPERATED PUMP
FOR RAISING LIQUIDSFrancisco Felez Alvarez and Jose Felez Alvarez,
Banolas, Spain, assignors to Enrique Clapes
Massons, Barcelona, SpainApplication January 29, 1951, Serial No. 208,332
In Spain October 17, 1950

1 Claim. (Cl. 103-53)

1

This application is a continuation-in-part of application Serial No. 144,524, filed February 16, 1950.

The present invention relates to improvements in electromagnetically operated pumps for raising liquids.

Said improvements consist essentially in modifications made in the suction and delivery chamber of the pump, the said modifications increasing the overall efficiency and facilitating the assembly of the pump, whilst reducing the cost thereof.

More specifically, the improvements referred to consist in providing as a guide element for the vibrator shaft an elastic block and likewise in providing as a suction and delivery element for the liquid, a likewise elastic washer which bears on a plate having a number of orifices for the passage of the liquid from the suction chamber to the delivery chamber.

A further improvement resides in the provision of a protecting ring for the elastic element opening and closing the admission or suction chamber, the said ring preventing the deformation of the said element.

To enable the present specification to be more readily understood, a drawing is annexed thereto in which, solely by way of example, a practical embodiment is shown of the object of the invention.

In the said drawing, Figure 1 is a sectional elevation of the pump incorporating the improvements referred to, and Figures 2, 3 and 4 represent two practical embodiments of the pump installed in a well.

The body of the pump consists of a barrel of generally frusto-conical shape 1, having a cover 2 arranged on its smaller end and a cover 3 mounted on and closing the larger base, the said parts being secured by means of screws or the like.

In the upper cover 2 is provided an electromagnet 4, supported by the screw 5 screwed into an outer ring 6. Opposite to the magnetic poles of the said electromagnet 4 is a moving armature 7 which is integral with the shaft 8 and carried jointly by an elastic block 9, which bears against a member 10 secured to the cover 3.

The said elastic block 9 has for its object to permit the vibrating movement of the shaft 8 when it is attracted and repelled by the electromagnet 4.

In the lower part of the cover 3 is mounted the barrel 11 divided into two chambers 12 and 13, the first for the suction of the liquid and the second for its delivery. The chamber 12 has an

2

annular inlet 14 for the liquid and the chamber 13 an outlet 15 for the liquid to enable it to be utilized.

To prevent the liquid entering the cover 3 there is provided between the latter and the chamber 13 an elastic joint 16 through which passes the shaft 8, the said joint 16 serving as a guide for the said shaft 8 in its axial displacement.

The barrel 11 is formed by two adapted parts constituting the chambers 12 and 13, a plate 17 being interposed between the two chambers and retained by elastic washers 18, the said plate, which consists of a metal sheet cut in the form of a circular crown, being provided adjacent to its central aperture, a curved portion in which are provided a number of orifices 19 against which bear, in order to close them, an elastic disc or washer 20 made integral with the shaft 8 by a number of retaining washers 2.

Provided in the base of the chamber 12 is a plurality of orifices 14 arranged according to a circular line, concentric with shaft 8, said orifices being closed by an elastic ring 21 on which is fitted a metallic reinforcement 22 intended to prevent its distortion.

The outlet orifices 15 for the liquid is provided with appropriate means for receiving the end of a suitable utilization pipe.

By means of the plate 17 and the elastic disc or washer 20 are formed the two chambers 12 and 13, the specific function of the former being to draw in the liquid which enters at 14 and the second to expel the said liquid through the utilization outlet 15.

The said pump may be utilized either submerged or not, and in the former case the lower aperture 14 being in direct contact with the liquid. Figures 2 and 3 show two positions adopted for the pump described which is mounted on a float to enable it to operate invariably in the same level.

In the case of Figure 4, the pump is arranged at a level higher than the liquid, the suction being obtained through an appropriate pipe.

In the embodiment shown in Figures 2 and 3, the outlet pipe 23 is flexible as is likewise the tube 24 serving to protect the electric wires. In the embodiment shown in Figure 4, the suction tube 25 and the outlet or expulsion tube 23, as well as the tube 24 containing the electric wires, may be rigid.

The mode of operation of the pump incorporating the improvements described, is generally as follows:

On connecting the electromagnet 4 to the elec-

tric supply mains, the periodicity of the current gives rise to the intermittent change of the magnetic field, which is transformed into a rapid sequence of attraction and repulsion of the moving armature 7 in to and fro movement with respect to the poles of the electromagnet 4. This vibration, which is extremely rapid, is transmitted by the shaft 8 to the elastic disc or washer 20, which during its upward movement creates a vacuum in the chamber 12 which compels the closing ring 21 to become separated from its seating, the liquid entering the said chamber 12 from which it is prevented from passing out by the closing ring 21 which during the following movement of the electromagnet 4 is applied against its seating and orifices 14, in order to set up pressure in the chamber 12 during the downward travel of the central disc 20. During this downward travel, the liquid passes through the orifice 19 to the upper chamber 13 overcoming the resistance of the rim of the member 20, the said liquid then being expelled from the chamber 13 during the next upward travel of the shaft 8, this cycle being repeated indefinitely.

It should be pointed out that during the downward travel of the shaft 8 and with the member 20 simultaneously the rim of the latter is not completely separated from the plate 17 since said rim is thinner than the remainder of the member and under the pressure of the liquid and the atmosphere it becomes pressed against the edge of the plate 17, thus closing the orifices 19.

The mode of operation described may be summarised as follows:

a. Upward travel of the shaft 8 and of the elastic member 20 with the consequent opening of the orifices 14 on account of the momentary vacuum set up, and which permits the entrance of the liquid into the lower chamber 12;

b. Downward travel of the shaft 8 and member 20 bringing about the enforced passage of the liquid from the chamber 12 into the chamber 13 through the orifices 19, the chamber 13 becoming filled and is automatically emptied when the preceding stage is repeated, that is to say during the downward travel of the shaft 8.

The materials, shapes and dimensions, both absolute and relative, of the pump designed in accordance with the improvements described, are independent of the object of the invention, provided the variations which may be introduced do not affect its essential features.

Having now fully described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim as new and desire to secure by Letters Patent is:

In an electromagnetically operated pump, a body member, an electromagnet within said body, a reciprocable armature in close relation with the poles of said electromagnet, an elastic disc operable as a piston and valve simultaneously, a reciprocable shaft operatively connecting said armature and elastic disc, a lower cover coupled to said body and surrounding said shaft, a block of elastic material placed between said cover and shaft to guide the latter and allowing reciprocation of the same upon energization of said electromagnet, a pump chamber fixed to said lower cover, a circular crown shaped plate within said chamber dividing the same into a lower suction chamber and an upper expulsion chamber, an inlet valve for said suction chamber and an outlet pipe for said expulsion chamber, a central aperture in said plate, said plate having a slightly curved portion adjacent to said aperture and permanently engaging with a portion adjacent to the edge of said elastic disc, and a plurality of orifices therein in the vicinity of said aperture closable by the said disc, said elastic disc being adapted to maintain the said closed orifices in an upward reciprocation of the shaft to act as a piston and thereby aspirating liquid into said suction chamber and expelling liquid from the expulsion chamber and to compress liquid within the suction chamber during the downward reciprocation of said shaft and allow the said orifices to be opened under the resulting pressure and the liquid to circulate from the suction to the expulsion chamber.

FRANCISCO FELEZ ALVAREZ.
JOSE FELEZ ALVAREZ.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
800,356	Briggs	Sept. 26, 1905
854,670	Schiodt	May 21, 1907
2,043,270	Twiss	June 9, 1936
2,144,662	Paasche	Jan. 24, 1939
2,273,896	Simms et al.	Feb. 24, 1942
2,298,402	Mercier	Oct. 13, 1942
2,430,151	Whitted	Nov. 4, 1947