Sept. 5, 1961 P. SADLER 2,998,826

ROTARY PUMP VALVE

Original Filed March 2, 1956 2 Sheets-Sheet 1

FIG. 2.

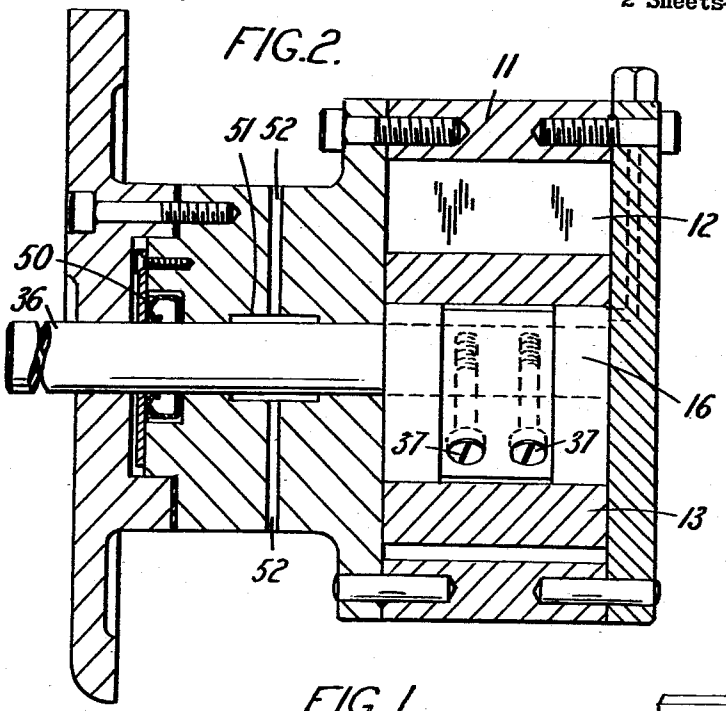
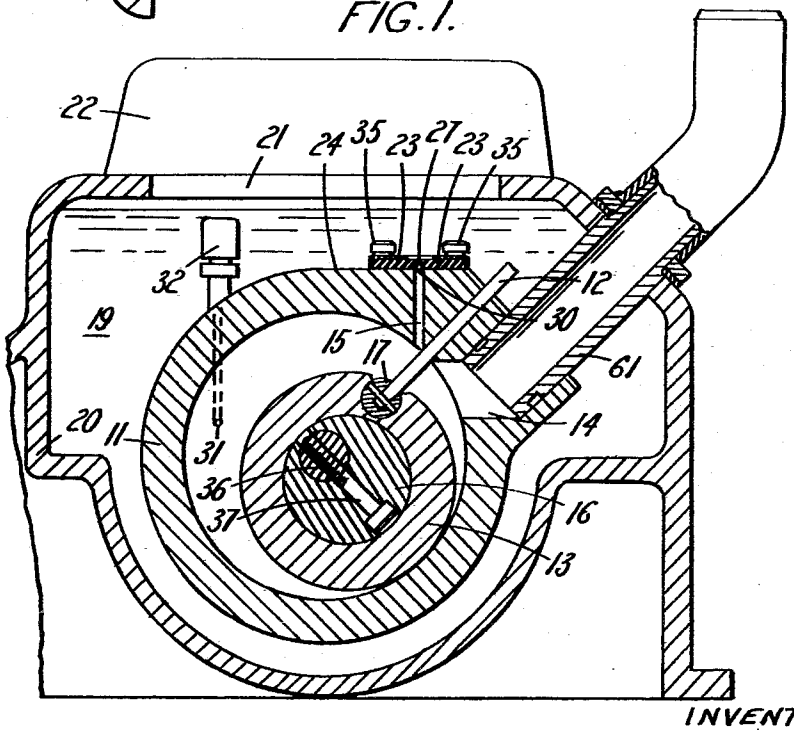


FIG. 1.



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FIG. 3.

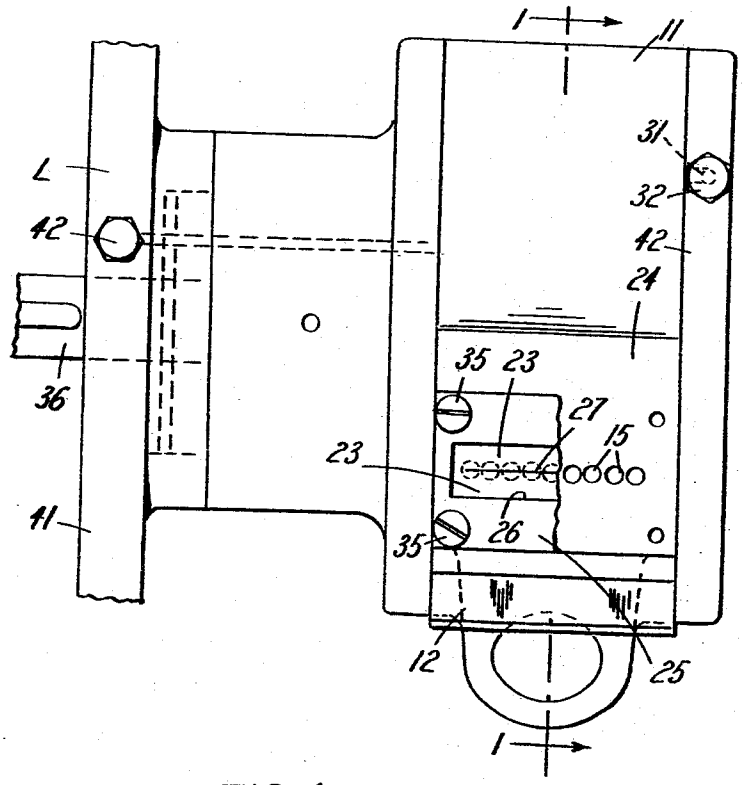
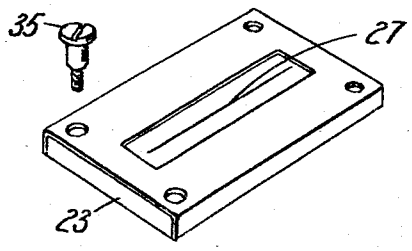


FIG. 4.



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United States Patent Office 2,998,826
Patented Sept. 5, 1961

2,998,826
ROTARY PUMP VALVE

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Original application Mar. 2, 1956, Ser. No. 569,004. Divided and this application Oct. 20, 1959, Ser. No. 851,490
Claims priority, application Great Britain Mar. 4, 1955
1 Claim. (Cl. 137—512.4)

This application is a division of my co-pending application Serial No. 569,004, filed March 2, 1956, now Patent No. 2,929,550.

This invention relates to an outlet value for the type of pump which comprises a hollow casing, a crank rotatable therein, a displacer on the crank, of such size and shape that if carried round by the crank it will make contact or near-contact continuously with the interior of the casing walls, a vane slidable in a slot in the wall of the casing so as to engage the displacer and with it to divide the casing into two chambers of variable volume, an inlet to the casing at one side of said vane and a delivery port at the other side thereof. Under the term "crank" is included not only a crank properly so called but also an eccentric, which is its equivalent.

It is an object of the invention to provide an outlet value for a pump suitable for use as a vacuum pump and capable of evacuating to high vacua, such as corresponds to an absolute pressure of the order of a few microns on the mercury guage.

The invention includes for a vacuum pump of the type described having a vane inclined upwardly from the displacer, a non-return valve for closing the outlet port, which valve consists of a flat seating comprising an outlet port and, overlying the outlet port, a sheet of flexible material such as synthetic rubber which is formed with a closed slit above the outlet port and is clamped on the flat surface surrounding the port at a sufficient distance therefrom to permit the material of the valve element to bend away from the port under the pressure of fluid issuing from the port and so to open the slit.

The following is a description by way of example of certain constructions in accordance with the invention, reference being made to the accompany drawings in which:

FIGURE 1 is a sectional view at right angles to the axis of the crank shaft;

FIGURE 2 is a sectional view along the axis of the crank shaft with the latter in a different position to that shown in FIGURE 1;

FIGURE 3 is a plan of the parts shown in FIGURE 2, with the outlet valve partly removed; and

FIGURE 4 is a perspective view of a valve-member shown in FIGURE 1.

Referring to FIGURES 1 and 2, the construction comprises a stationary body or pump casing **11** having a cylindrical interior bore in which works a displacer **13** mounted on an eccentric shown at **16** and held on a shaft by a pair of screws **37**. A vane **12** set at an angle of 45 degrees to the horizontal slides through the body **13** and has a head **17** which is cylindrical in the direction parallel to the crank-pin **16** and is journalled in one side of the displacer **13**. The effect is that the displacer **13**, while being carried round by the eccentric **16**, does not rotate but acts as though it were a connecting rod which causes the vane **12** to reciprocate to and fro in its slot in the body **11**. The interior of the casing is closed by two end-plates and the dimensions are such that the displacer **13** fits the interior of the casing. The shaft **36** extends through one of the end-plates. Suitable screws

which are not shown hold the end-plates on to the body. The side edges of the vane **12** also fit against the end-plates.

The pump body has an inlet port **14** connected to the vessel or apparatus to be evacuated and located just below the vane **12**. It has an outlet port **15** just above the vane **12** leading upwards to a horizontal seating face **24** on the top of the body. A discharge valve seats on this face **24**.

All these parts are shown as immersed in an oil bath **19** contained in a hollow base **20** for the pump and the inlet port **14** is connected to a large suction pipe **21** coming in from outside the casing. The suction pipe is inclined as shown to ensure that no oil can collect in it. The base **20** is provided with a large opening **21** above the oil bath in its top part, which is closed with a cover **22**.

The discharge valve on the outlet port **15** consists of a sheet of resilient synthetic rubber-like material **23** preferably made from the material sold under the trade name of "Nygon." The "Nygon" valve member is held down on the horizontal seating **24** by means of a rectangular clamping plate **25** which has a central aperture **26**. In FIGURE 3 of the drawing the clamping plate is shown in position but it is supposed that part of the "Nygon" valve member **23** has been removed and it will be seen that the discharge port **15** is not a single port but consists of a row of drilled holes running across the body **11** from side to side. The "Nygon" valve member is shown in detail in FIGURE 4 and it will be seen that it has a central slit **27** which extends above the row of drilled holes of the outlet port **15**. The slit **27** is punched through the "Nygon" sheet by a thin sharp-edged blade and the port holes **15** are entirely covered by the slit **27**. In order to reduce the depth of the knife cut, the "Nygon" may be grooved on the underside, in the portion which overlies the port **15**, as indicated at **30**, FIGURE 1. Owing to the flexibility of the "Nygon" if there is pressure in the outlet ports **15** the edges of the material on each side of the slit will lift, and in lifting, the slit will open and allow the fluid under pressure to escape.

The "Nygon" sheet **23** is not clamped tight on the face **24** by the plate **25**. The screws **35** which hold it down are machined with shoulders which permit the plate to rise a little—about one thirty-second of an inch—but when the pump is working under a substantial vacuum the sheet **23** is held down by the vacuum and does not rise. In the initial stages of evacuation, however, the discharge of air is very heavy and under these conditions the sheet **23** and plate **25** rise to the heads of the screws **35** and let the air out all round. In the later stages of evacuation the air discharge is so small that the fine slit **27** serves the purpose much better.

The slitted Nygon makes an extremely simple form of valve and one which operates practically noiselessly. The valve moreover has the advantage of being fluid-tight without depending upon making a close seating on the metal below; it closes the two sides of the slit against themselves. Furthermore, there is a minimum of vacant space beneath the valve when lifted. All these features make the valve particularly suitable for use in a vacuum pump.

I claim:

A valve unit comprising a valve seating having port means therein; valve means comprising a deformable sheet having a normally closed slit overlying the port means, and a rigid backing reinforcing the sheet and having an opening therein surrounding the slit to allow deformation of the sheet about the slit; and screws passing through the rigid backing and entering the valve seating to locate the valve means on the valve seating,

said screws having elongated shanks to allow the valve means to freely move bodily off the valve seating.

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