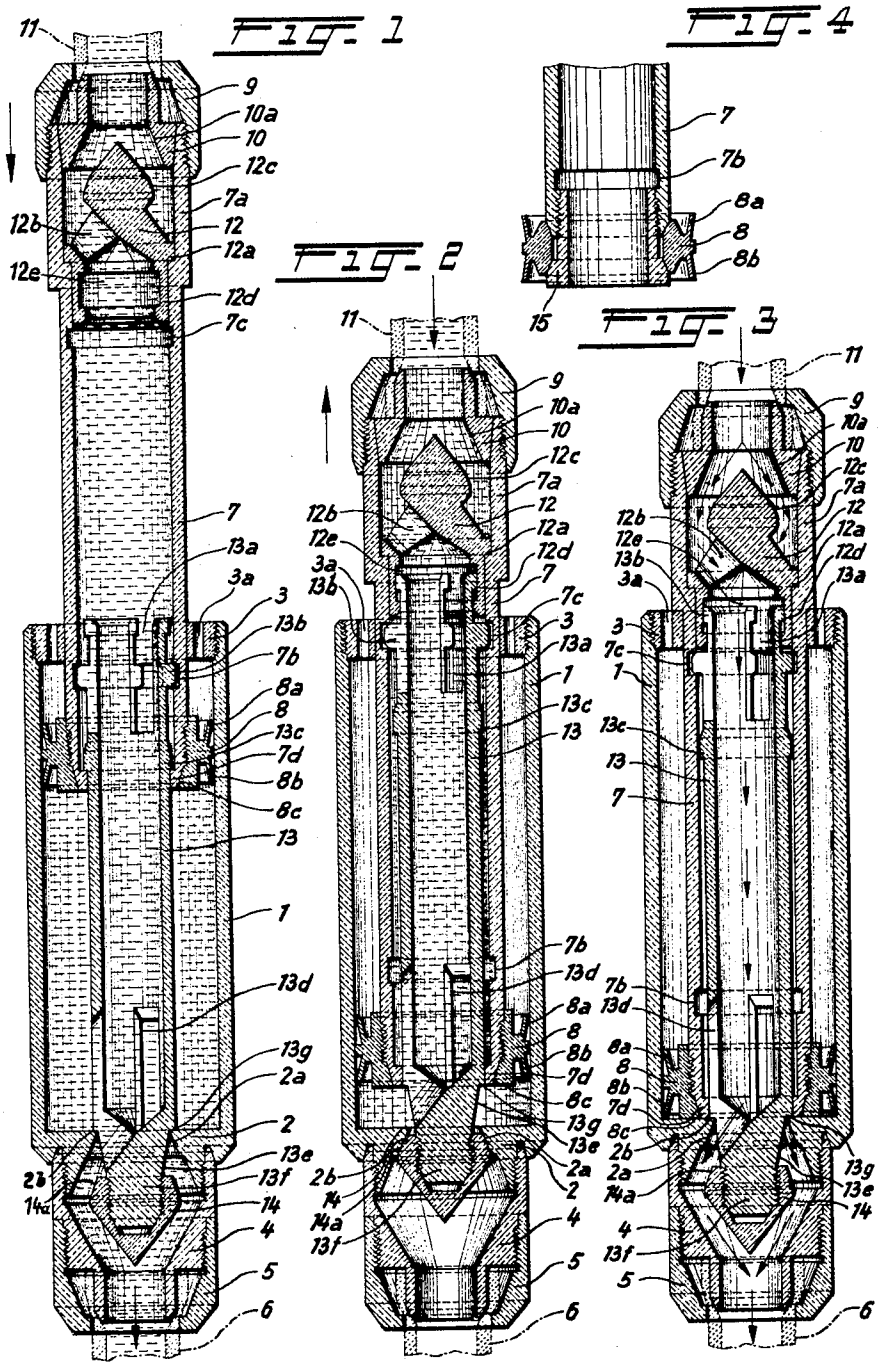
June 21, 1966 J. KRAUS 3,256,835

THROUGH-RUNNING SUCTION AND PRESSURE PISTON PUMP

Filed Jan. 20, 1964



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United States Patent Office 3,256,835 Patented June 21, 1966

3,256,835 THROUGH-RUNNING SUCTION AND PRESSURE PISTON PUMP

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Filed Jan. 20, 1964, Ser. No. 338,926
Claims priority, application Germany, Jan. 28, 1963, K 48,819
4 Claims. (Cl. 103—166.5)

There is known a through-running suction and pressure pump in which on each side of the extension of the piston tube there is provided a displaceable valve in the suction nozzle and in the pressure nozzle respectively, whereby when the piston is displaced, one of the two valves is opened with a positive action and the other valve is closed (Austrian Patent No. 203,371). This pump makes possible the pumping and the independent running-through of fluid. It has not been possible however, to control the through-flow promptly and with assurance. Furthermore it has not been possible to interrupt the flow to the vessels to be filled as desired, so that a pump which was once actuated could not be employed to fill several vessels. In addition, a return flow of the fluid from the filled pump into the filling vessel was not possible.

In a suction and pressure through-running piston pump in which on both sides in the extension of the piston cylinder, in each direction of the piston displacement, there is provided a displaceable valve and wherein an axially displaceable inlet valve is designed in the handle as a drop valve while the outlet valve is carried along by a trailing part, it is proposed, according to the invention, that the piston tube should be provided with a pair of recesses into which extend carries at the trailing part while the piston tube is provided at its inner end with a stop slideable on the trailing part, said stop bearing on the trailing part stop thereby pressing the outlet valve into a blocking position, the trailing part being provided with a stop abutting against the closing part, which securely maintains the outlet valve in its open position while the guide part of the inlet valve is provided with a circular recess in which the gripping parts of the trailing part extend and securely hold the inlet valve in an open outflow position.

In a further embodiment of the invention the end of the trailing part which is disposed opposite the blocking valve is provided with longitudinal slots. A spring-like effect of the trailing part is thus achieved, so that an outward movement of the carriers from the circular recesses in the piston tube is made possible.

According to a further inventive concept, the blocking parts of the valve are designed as pointed cones, so that a complete whirl-free passage of the fluid is assured. Finally it is proposed, according to the invention, to screw into an inner thread of the piston tube a clamping stop for securing the piston and to provide both parts of the piston with respective sealing cones.

These and other important objects of the invention will become apparent from the following description and the accompanying drawing illustrating a preferred embodiment of the invention.

It should be understood, however, that these are given by way of illustration and not of limitation, and that various changes in the details, form and arrangement of the parts may be made without departing from the scope of the invention.

In the drawing:

FIG. 1 is a view in elevation and partly in cross-section of the pump with the pump handle in fully extracted position,

FIG. 2 is a view similar to that of FIG. 1 showing the pump in an intermediate operating position,

FIG. 3 is a view similar to FIG. 1, showing the pump in its initial non-operating position and

FIG. 4 illustrates a modified constructional detail, partly in section, of the means for securing the piston tube to the piston.

Referring now to the drawing in detail, the outlet of the suction and the through-flow pressure piston pump is indicated by the letter A. The pump comprises a cylinder **1** with a seal or terminal portion **2** and a circular cover **3**, provided with a pair of air outlets **3***a*, screwed into the cylinder. The sealing cover provided with a cone is mounted on the cylinder.

An outlet part **4** is screwed on the terminal portion **2** and there is further provided a threaded cap **5** for securing the outlet tube **6**.

In the interior of the cylinder there is displaceably mounted a tubular piston **7** which is guided by the cover **3**. Piston **7** is provided with a piston **8** having pressure and suction lips **8**, **8***b* and a sealing cone **8***c*. The outer end of the tubular piston **7** terminates in a piston handle **7***a*. A threaded cap **9** is mounted on the end of the handle **7***a*. The threaded cap **9** secures an inlet tube **11** with an inlet nipple **10** in a conical seat in the handle **7***a*. The interior of the handle **7***a* is provided with an inlet valve **12** having a seat **12***a*, three passage openings **12***b* and a cone **12***c* which cooperates with the inlet nipple **10**. The inlet valve **12** extends with its rearward portion into a guide **12***d* which is provided with a circular recess **12***c*. A hollow trailing part **13**, for an outflow valve **14**, is mounted in the tubular piston **7**, interiorly of the cylinder **1**. The trailing part **13** with its three carriers **13***b* serves as a stop part for the inlet valve **12**.

The trailing part **13** is provided with three longitudinal recesses **13***a* resulting in a spring action. In addition, the trailing part **13** is provided with carriers **13***b*, extending the height of the recesses **13***a*. The carriers **13***b* can protrude interchangeably into the recesses **7***b* or **7***c* of the cylinder tube. The trailing part is further provided with a limiting stop **13***c* for the inner piston tube end **7***d*, slideable on said trailing part. The hollow trailing part **13** contains three longitudinal recesses **13***d*, adjacent to the outlet valve, which also continue to the conically-shaped part **13***c*, and a stop **13***g*, which bears upon the cylinder part **2** and secures the outlet valve **14** in its open position (FIGS. 1 and 3). This part is provided with a threaded end and with yet another sealing cone and carries the sealing valve **14**, which with its cone-shaped part **14***a* cooperates with the cone **2***a* of the cylinder closing part **2**.

It should be noted that a damage-proof guidance of the piston and particularly of the piston lips is made possible by means of cone-shaped cover **3**.

As shown in FG. 4, the securing of the piston **8** on the piston tube **7** may be effected by screwing a clamp support **15** on its inner thread, whereby both parts of piston **8** are provided with corresponding sealing cones. A convenient exchangeability of the pistons is assured thereby. In addition, the manufacture of pistons is more economical, particularly because expensive materials must be employed for certain purposes.

It is recommended that all parts be made of synthetic material, e.g. material known as "Hart–PVC," when using lye solutions, acids, alcohol, benzine, oil and the like.

The operation of the device is as follows:

When filling from higher disposed into lower disposed vessels, the outlet tube **6** is introduced into the vessel to be filled, while the piston pump is in the initial position shown in FIG. 3. In this position no vacuum flow can as yet take place from the filling vessel. When the handle **7***a* is pulled out of the pump, the valve **14** is closed at the first stop as shown in FIG. 2. During the further

pulling out of the piston handle to the end position shown in FIG. 3 a vacuum is produced. In the complete pumping cycle the piston tube's stop bears on the trailing part's stop **13***g*, thereby pressing the outlet valve into a blocking position, the limiting stop **13***c* abutting against said stop **13***g*, which securely maintains the outlet valve in its open position, while the gripping portions **13***b* securely hold the inlet valve in an open outflow position. The direction of fluid flow during a complete pumping cycle is shown by arrows in FIGS. 1 and 2. With a multiple repetition of the pump cycle the filler **2** as well as the pump are slowly filled and an outflow of the fluid takes place into the vessel to be filled. As soon as the latter is filled, the outflow may be interrupted by pushing back the piston handle as shown in FIG. 2 and the next container may be filled after the piston handle is pressed in. The fluid may be emptied until a complete emptying of the filling vessel is effected.

The pumping cycle is as follows:

The pump is held at chest height, with the discharge tube directed upwards. The inlet valve **12** functions automatically in cooperation with the discharge valve **14**. As the piston handle is moved inwards, the outlet valve **14** is opened, while the air in the cylinder is pressed outwards. The inlet valve **12** is closed partly by its own weight and partly by the slight pressure of air i.e. air overpressure.

When the piston handle is pulled, the outlet valve **14** closes, so that air can no longer reach the cylinder. A vacuum is formed in the cylinder when the piston is pulled back. Due to this vacuum the inlet valve **12** is lifted, so that the fluid may enter the vacuum space in the cylinder.

As the pump handle is moved inwards, the fluid in the cylinder is pressed outwards and flows through the outlet valve **14**, while the outlet side is held downward in the container to be filled.

When the container is filled, the outlet end is closed by pulling back the piston handle to one of the closed positions. This operation is repeated until the required containers are filled. In this case the container from which the liquid is drawn off is lower than that to be filled.

Should the container, from which liquid is to be drawn off, be at a higher level than that to be filled, it is only necessary to actuate the pump until the fluid is discharged from the outlet. When the container is filled, the piston is pulled back and the outlet valve is thereby closed. Now the outlet tube can be introduced into the next container to be filled. Should the fluid in the tube and in the pump flow back into the container from which fluid is drawn off, it is only necessary to insert the outlet tube in this container and to move the piston to the stop, whereby the through-flow opening is freed.

After a completed filling cycle, the bottom outlet is closed by pulling out the piston handle to the first stop as shown in FIG. 2. Thereupon the pump is lifted up, so that the outflow tube is pointed upwardly and the fluid flows back into the filling vessel. By pressing the piston handle again, the pump as well as the tube are emptied and can now be laid aside in a rest position until the next use.

In pumping from vessels into higher position vessels where therefore there is no head or fall, the handle of the piston tube **7***a* must be actuated along the entire stroke length for a while until the vessel is filled as desired.

What I claim is:

1. A through-running suction and pressure pump comprising a cylindrical housing having upper and lower end portions, a piston tube displaceable axially of said housing and having its upper portion formed as a handle, an inlet valve displaceable in said handle and serving as a drop valve, a hollow trailing part displaceable axially in said piston and provided with a conical abutment, an outlet valve carried by said trailing part, said piston tube having a pair of recesses, said trailing part being provided with a pair of carriers extendable into said recesses, said piston tube having an end portion slideable on said trailing part and bearing on said conical abutment, thereby pressing the outlet valve into open position, said trailing part being further provided with a stop element abutting against said housing's lower portion, whereby the outlet valve is held in its open position, said outlet valve having a guide portion provided with a circular recess, said carriers extending into said recesses while the pump is in starting initial position to maintain the inlet valve in open position.

2. The pump according to claim **1**, wherein the end portion of the trailing part disposed opposite the outlet valve is provided with longitudinal slots.

3. The pump according to claim **1**, wherein the outlet valves are constructed as conical valves, whereby a full whirl-free fluid passage is assured.

4. The pump according to claim **1**, wherein the piston tube is provided with an outer thread, an intermediate piston member disposed between said piston tube and said cylinder, said intermediate piston member having an inner thread in engagement with said outer thread, said intermediate piston having sealing cones.

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