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⑤④ **PUMP STATION.**

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**EP 0 160 641 B1**

## Description

The invention relates to a pump station comprising an upper part suitable as control room and a lower part for collecting liquid, preferably waste water, one or more pumps located in said lower part, which are connected to a discharge pipe via valve means, each valve means comprising a stop valve, which is fixedly connected with the discharge pipe, and a non-return valve, which together with the corresponding pump is arranged in a pump unit, each pump unit being connectable to and detachable from the discharge pipe, and further comprising guide means for guiding the pump units from the lower operational position to an upper position, where they are accessible to repair and/or replacement.

A pump station of this kind is known from SE—B—422 484. This known pump station has the following advantages. Both the pumps and the non-return valves of a pump station need frequent service, cleaning activities etc., whereas the stop valves are not critical with this respect. Those parts which need most attention i.e. the pump and the non-return valves can be easily inspected and/or repaired by lifting the pump units with the pumps and non-return valves from the lower part of the pump station to the upper part of the pump station. Thus, easy repair and maintenance of these parts is possible without excessive tubing which would be required if pumps and return valves would be located in the upper part of the pump station.

In the previously known pump station there are essentially two parts for each pump which lead from the upper part to the lower part of the pump station, i.e. the guide means for the pump units by which the pump units are guided from the lower operational position to the upper position for maintenance or replacement, and the control rods which lead from the upper part to the stop valves.

By these parts the room at least in the lower part of the pump station is partly obstructed.

The object of the invention is to provide a better and simpler construction.

One solution according to the invention is characterised in that each guide is pivotable about a longitudinal axis and is connected to a stop valve so that by rotating a guide the stop valve cooperating therewith can be opened and closed.

A second solution according to the invention is characterized in that each guide is a hollow pipe and contains an extended shaft with which the cooperating stop valve can be opened and closed.

The present invention will be described more fully with reference to the accompanying three figures, in which

Fig. 1 shows a previously known pump station including units comprising pump and non-return valve, said units being in their operative position,

Fig. 2 shows the same known pump station as Fig. 1, but with one unit comprising pump and non-return valve being removed from its operating position, and

Fig. 3 shows a previously known pump with pump and non-return valve as a unit located outside the pump station.

In the drawings 1 is the lower part of a previously pump station consisting of two parts located one on top of the other. The lower part 1 is provided at the top with a peripheral flange 2 and supports 3 for said peripheral flange. A floor 4 is located on the peripheral flange, and above the floor there is an upper part 5 having a door 6, a skylight 7 and a ventilation pipe 8. The lower part 1 is provided with a pipe socket 9 for connection of a pipe supplying the lower part 1 with waste water. The lower part is connected to a discharge pipe 10. Two units 11 and 12 are arranged in the bottom of the lower part, each consisting of a pump and a non-return valve. In the unit 11 the pump is designated 13 and the non-return valve 14. In the unit 12 the pump is designated 15 and the non-return valve 16. Non-return valves 14 and 16 may be KG non-return valves PN 10, marketed by Ahlsell & Agren and described in their prospectus sheet for September, 1976. The orifice of connecting part 19 outside the lower part 1 is in a pipe socket 9 for connection to the discharge pipe 10. The connecting part 19 is provided with a foot 30 for mounting same on the bottom of the lower part 1. As can be seen from the drawings, each non-return valve is provided with a flap which blocks the flow in reverse direction. The unit comprising pump and non-return valve will be termed "pump unit" in the following. The pump unit 11 is provided with an outlet opening surrounded by a flange 17. The flange 17 and edge of the outlet opening together form a flat contact surface abutting and cooperating with the branch pipe 18 of the connecting part 19. The branch pipe 18 forms an inlet opening to the connecting part 19 and has a flat end surface cooperating with the flat surface of the pump unit at its outlet opening. At its inlet end the branch pipe 18 is also provided with a flange 20 like the outlet opening to the pump unit 11. Similarly, the pump unit 12 is connected to a branch pipe 21 also having a contact flange 22 and the pump unit 12 having a contact flange 23. Each branch pipe 18 and 21 has a stop valve 24 and 25, respectively. The stop valve may be a Beta sluice valve NT 4 of make Ahlsell & Agren. Such a sluice valve is described in prospectus AA—No. 580008. An operating shaft 26 is attached to the stop valve 24 and extends to the upper part 5, and is provided at the top end with a control wheel 27. The stop valve 25 is similarly provided with control shaft 28 with wheel 29.

Guides 32 and 33 are provided for the pump units. A lever 34, joined to the pump unit 11, cooperates with the guide 32. The guide 32 and lever 34 control the horizontal position of the pump unit 11. The latter unit is also provided with guide fingers 36 to control the pump unit 11 laterally. The pump unit 12 is also provided with similar guide fingers 37. Each pump unit 11 and 12 is provided with a hoisting wire 38 and 39, respectively. It is no doubt evident that the guides

may be of a different length provided the function described below is fulfilled. Their upper ends might terminate at the lower side of the floor 4.

The means described which is known as state of the art functions in the following manner. It is assumed that the two pump units 11 and 12 are in the positions shown in Fig. 1. If one pump unit, 12, is to be inspected it need only be lifted straight up by means of the hoisting wire 39. During the first stage of lifting the lateral movement of the pump unit is controlled by the flat contact surfaces between the outlet opening of the unit 12 and the inlet opening of the branch pipe 21. The pump unit can then be moved sideways and vertical movement is controlled by the guide means 33. When the pump unit 12 has reached the control room it is transported to workshop premises for service and is replaced by an identical unit fitted to the guide means 33 and lowered to the lower part 1. When the pump unit approaches the branch pipe 21 the control fingers 37 will come into operation to bring the flat end surface of the unit's output opening parallel to the end surface of the inlet end of the branch pipe 21. Contact between the two flat surfaces provides adequate sealing between the branch pipe 21 and the outlet opening of the pump unit. The two branch pipes can be opened and closed by the valves 24 and 25 via operating shaft 26 with its wheel 27 and via operating shaft 28 with its wheel 29. Lateral control of the pump unit when moving up and down can also be achieved by other control means, such as by arranging grooves in the guides and by inwardly directed pins or ridges arranged on the support arms of the pump units and cooperating with said grooves.

The arrangement of both stop valve and non-return valve in conjunction with each pump entails considerably less piping than with other known pump stations where the valves are arranged in the upper part.

It is also a great advantage for the outlet pipe socket to be arranged at the bottom of the pump station as this greatly facilitates cooperating with the discharge pipe.

Thus a pump unit is known which can easily be removed for inspection and replaced by a spare pump unit. All inspection of such a pump unit therefore can be carried out in premises specially for the purpose. This avoids the pump station being used for servicing purposes for which it is unsuitable.

It should be evident that the upper part 5 and floor 4 can be replaced by a lid, in which case the components arranged in the control room according to Fig. 1 must of course be limited in axial extension.

According to the invention the two guides 32 and 33 may be pivotable about their longitudinal axes. Due to their pivoting ability they might replace the operating shafts 26 and 28, the guides then being connected to the stop valves 24 and 25. There are then only two rodlike units in the lower part 1. The guides 32 and 33 are used to open and close the stop valves 24 and 25. Another

possibility is for the guides to be hollow and the operating shafts 26 and 28 for opening and closing stop valves 24 and 25 to be located inside the guides.

To prevent the non-return valves 14 and 16 from closing with a sudden impact a force is arranged to counteract a closing movement, thus closing the non-return valve gently. The force may be provided by a spring, a hydraulic means or a member acting in the same way as the bumper on a car.

#### Claims

1. Pump station comprising an upper part (5) suitable as control room and a lower part (1) for collecting liquid, preferably waste water, one or more pumps (13, 15) located in said lower part, which are connected to a discharge pipe (10) via valve means, each valve means comprising a stop valve (24, 25), which is fixedly connected with the discharge pipe (10), and a non-return valve (14, 16), which together with the corresponding pump (13, 15) is arranged in a pump unit (11, 12), each pump unit being connectable to and detachable from the discharge pipe (10), and further comprising guide means (32, 33) for guiding the pump units (11, 12) from the lower operational position to an upper position, where they are accessible to repair and/or replacement, characterized in that each guide (32, 33) is pivotable about a longitudinal axis and is connected to a stop valve (24, 25) so that by rotating a guide (32, 33) the stop valve (24, 25) cooperating therewith can be opened and closed.

2. Pump station comprising an upper part (5) suitable as control room and a lower part (1) for collecting liquid, preferably waste water, one or more pumps (13, 15) located in said lower part, which are connected to a discharge pipe (10) via valve means, each valve means comprising a stop valve (24, 25), which is fixedly connected with the discharge pipe (10), and a non-return valve (14, 16), which together with the corresponding pump (13, 15) is arranged in a pump unit (11, 12), each pump unit being connectable to and detachable from the discharge pipe (10), and further comprising guide means (32, 33) for guiding the pump units (11, 12) from the lower operational position to an upper position, where they are accessible to repair and/or replacement, characterized in that each guide (32, 33) is a hollow pipe and contains an extended shaft (26, 28) with which the cooperating stop valve (24, 25) can be opened and closed.

#### Patentansprüche

1. Pumpstation, die einen oberen Teil (5), der als Kontrollraum geeignet ist und einen unteren Teil (1) zum Sammeln von Flüssigkeit, insbesondere Abwasser, eine oder mehrere Pumpen (13, 15), die in dem unteren Teil angeordnet sind und die mit einem Abflußrohr (10) über Ventilmittel verbunden sind, wobei jedes Ventilmittel ein

Absperrventil (24, 25), das fest mit dem Abflußrohr (10) verbunden ist, und ein Rückschlagventil (14, 16) enthält, das zusammen mit der entsprechenden Pumpe (13, 15) in einer Pumpeinheit (11, 12) angeordnet ist, wobei jede Pumpeinheit mit dem Abflußrohr (10) verbindbar und von demselben lösbar ist, und die weiter Führungsmittel (32, 33) zum Führen der Pumpeinheiten (11, 12) von der unteren Betriebsstellung zu einer oberen Stellung aufweist, in der sie für Reparatur und/oder Austausch zugänglich sind, dadurch gekennzeichnet, daß jede Führung (32, 33) um eine Längsachse drehbar ist und mit einem Absperrventil (24, 25) verbunden ist, so daß durch Drehen einer Führung (32, 33) das damit zusammenwirkende Absperrventil (24, 25) geöffnet und geschlossen werden kann.

2. Pumpstation, die einen oberen Teil (5), der als kontrollraum geeignet ist und einen unteren Teil (1) zum Sammeln von Flüssigkeit, insbesondere Abwasser, eine oder mehrere Pumpen (13, 15), die in dem unteren Teil angeordnet sind und die mit einem Abflußrohr (10) über Ventilmittel verbunden sind, wobei jedes Ventilmittel ein Absperrventil (24, 25), das fest mit dem Abflußrohr (10) verbunden ist, und ein Rückschlagventil (14, 16) enthält, das zusammen mit der entsprechenden Pumpe (13, 15) in einer Pumpeinheit (11, 12) angeordnet ist, wobei jede Pumpeinheit mit dem Abflußrohr (10) verbindbar und von demselben lösbar ist, und die weiter Führungsmittel (32, 33) zum Führen der Pumpeinheiten (11, 12) von der unteren Betriebsstellung zu einer oberen Stellung aufweist, in der sie für Reparatur und/oder Austausch zugänglich sind, dadurch gekennzeichnet, daß jede Führung (32, 33) eine hohles Rohr ist und eine verlängerte Achse (26, 28) enthält, mit der das zusammenwirkende Absperrventil (24, 25) geöffnet und geschlossen werden kann.

#### Revendications

1. Station de pompage comprenant une partie supérieure (5) agencée en chambre de contrôle et une partie inférieure (1) pour recueillir un liquide, de préférence des eaux résiduaires, une ou plu-

sieurs pompes (13, 15) situées dans ladite partie inférieure et qui sont reliées à un conduit de décharge (10) par des moyens de vannage, chaque moyen de vannage comprenant une vanne d'arrêt (24, 25), qui est reliée fixement au conduit de décharge (10), et un clapet antiretour (14, 16) qui, avec la pompe correspondante (13, 15), est disposé dans une unité de pompage (11, 12), chaque unité de pompage pouvant être reliée et déconnectée du conduit de décharge (10), et comprenant également des moyens de guidage (32, 33), pour guider les unités de pompage (11, 12) entre la position de fonctionnement inférieure et une position supérieure dans laquelle elles sont accessibles pour réparation et/ou pour remplacement, caractérisée en ce que chaque moyen de guidage (32, 33) est monté pivotant autour d'un axe longitudinal et est relié à une vanne d'arrêt (24, 25), de sorte que par rotation d'un moyen de guidage (32, 33), la vanne d'arrêt (24, 25) associée peut être ouverte et fermée.

2. Station de pompage comprenant une partie supérieure (5) agencée en chambre de contrôle et une partie inférieure (1) pour recueillir un liquide, de préférence des eaux résiduaires, une ou plusieurs pompes (13, 15) situées dans ladite partie inférieure et qui sont reliées à un conduit de décharge (10) par des moyens de vannage, chaque moyen de vannage comprenant une vanne d'arrêt (24, 25) qui est reliée fixement au conduit de décharge (10), et un clapet antiretour (14, 16) qui, avec la pompe correspondante (13, 15), est disposé dans une unité de pompage (11, 12), chaque unité de pompage pouvant être reliée et déconnectée du conduit de décharge (10), et comprenant également des moyens de guidage (32, 33) pour guider les unités de pompage (11, 12) entre la position de fonctionnement inférieure et une position supérieure dans laquelle elles sont accessibles pour réparation et/ou pour remplacement, caractérisée en ce que chaque moyen de guidage (32, 33) est un tube creux et contient un arbre allongé (26, 28) par l'intermédiaire duquel la vanne d'arrêt associée (24, 25) peut être ouverte et fermée.

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FIG. 1

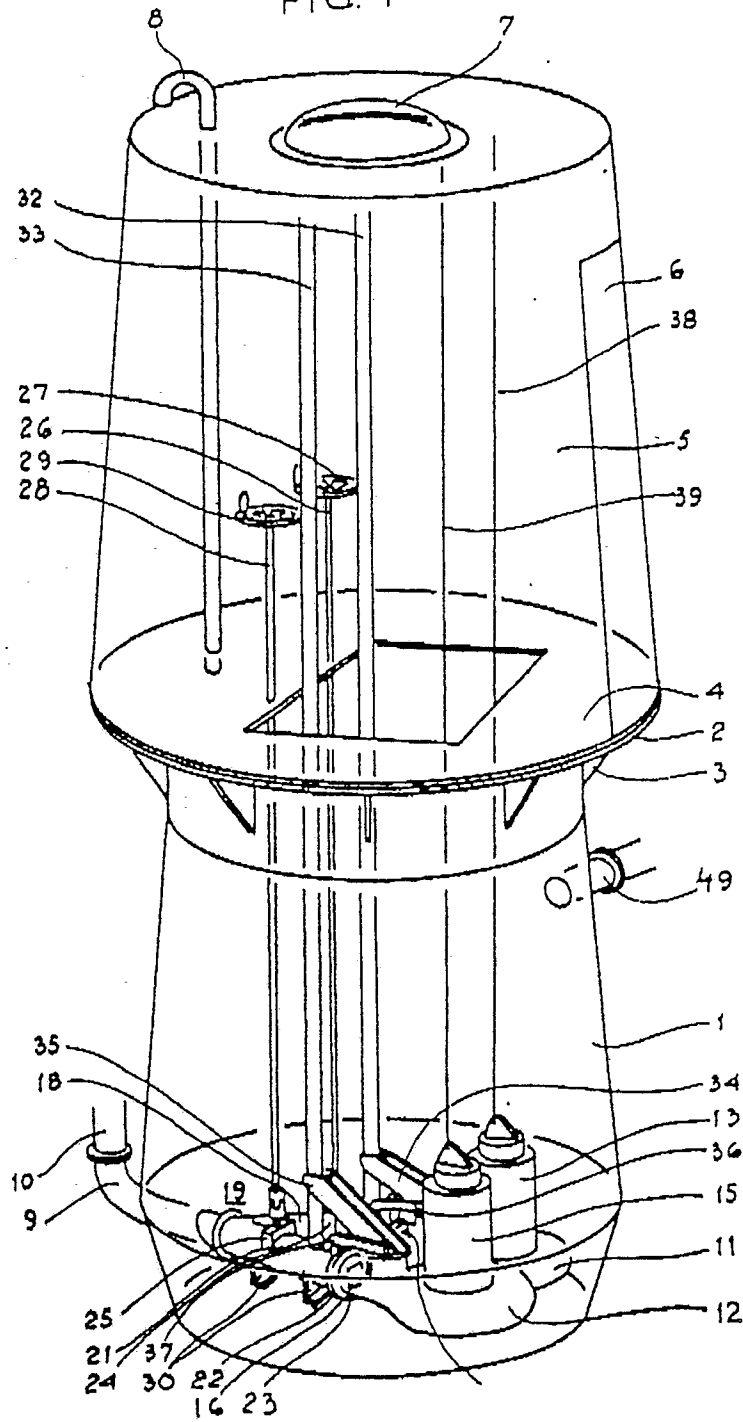


FIG. 2

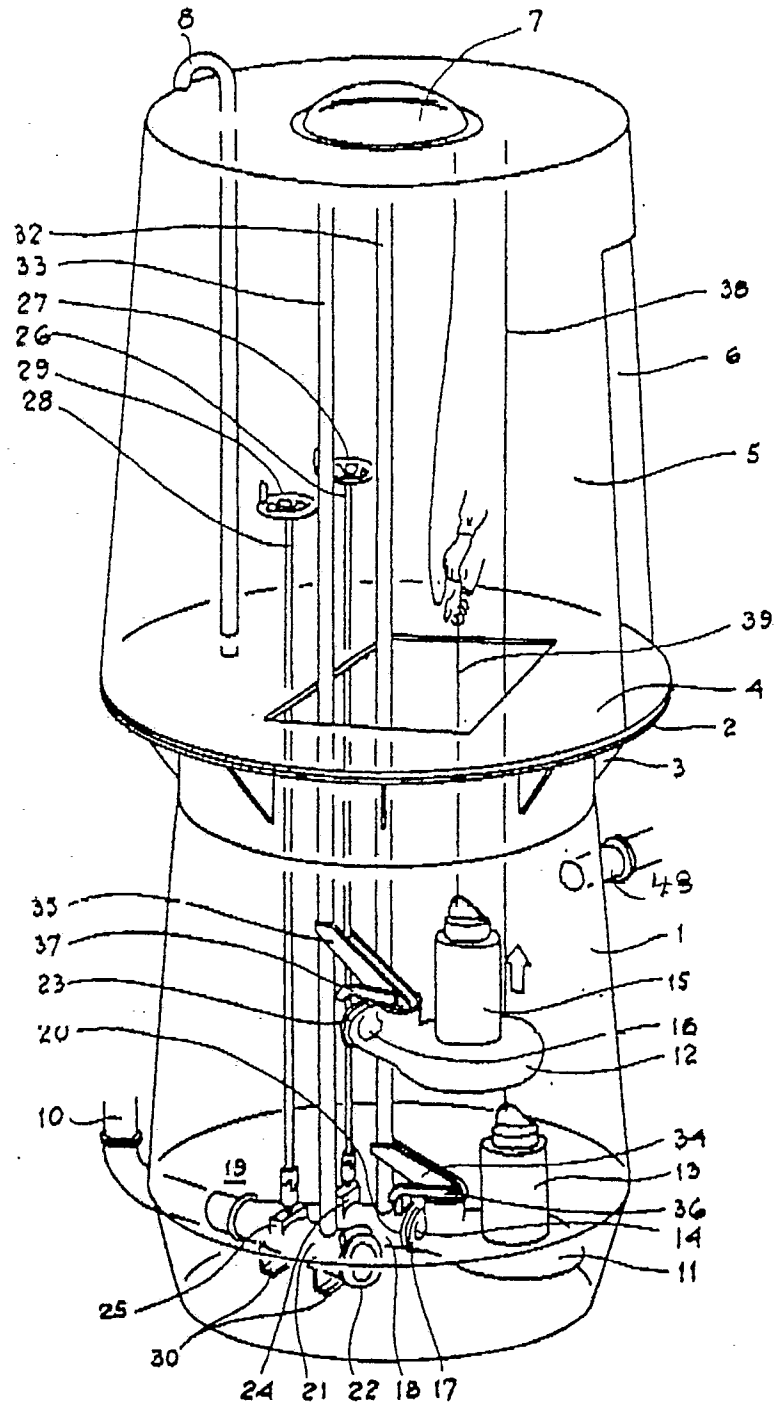


FIG. 3

