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(71) Applicant: **Nilfisk-Advance A/S**
**2605 Bröndby (DK)**

(72) Inventors:
- **Bank Olesen, Hans Jørgen**
  **8900 Randers (DK)**
- **Glavind, Mads**
  **9500 Hobro (DK)**

(74) Representative: **Roerboel, Leif et al**
**Budde Schou A/S**
**Vester Søgade 10**
**1601 Copenhagen V (DK)**

## (54) Control panel for a high-pressure cleaner

(57) A high-pressure washer (1) is described, which comprises a frame (2), a delivery unit (24) supported by the frame (2), such as a motor-driven pump (8) or a heater (7), and a control unit (9) for controlling the delivery unit (24). The high-pressure washer (1) further comprises a cover (11), which defines a opening (33) for releasably receiving the control unit (9) with access to its control panel (10) from the outside of the cover (11).

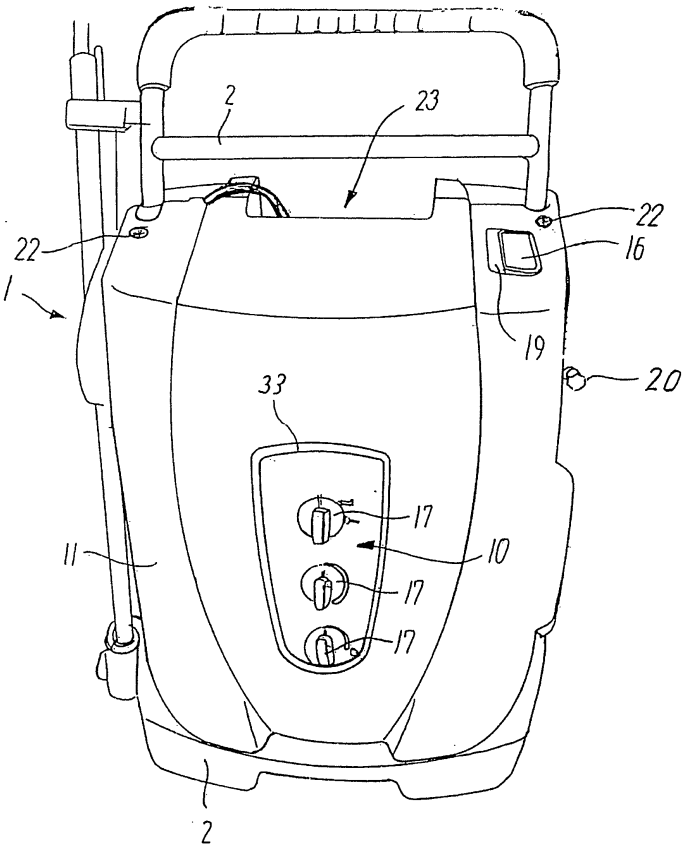


FIG. 1

EP 2 145 698 A1

## Description

### Field of the invention

**[0001]** The present invention generally relates to the placing of a control unit and the associated control panel on a pressure washer, and in particular to a technique facilitating an easier support or reparation of a high-pressure washer having a cover. More specifically, the present invention relates to a pressure washer that can be continuously operated even though the control unit and the associated control panel is not permanently fixed to another part of the high-pressure washer.

### Description of related art

**[0002]** There are high-pressure washers having a control unit mounted on either the frame or on the cover. In the former case, when the control unit is mounted on the frame, the cover has a cut-out or defines an opening where the control panel of the control unit protrudes. This way of mounting requires high tolerances for the control panel to fit in the cut-out or opening. In the latter case, the control unit is usually an integral part of, or permanently fixed, to the cover. When the control unit is a part of the cover, the control panel follows the cover when the cover is dismounted. This is also a disadvantage, since then the cover cannot be removed completely without disconnecting the electrical and/or the liquid conduits connected to the control unit. Naturally, an easily removable cover may be an advantage when servicing or repairing the high-pressure washer. When removing a cover with a permanently fixed control unit, this will demand electrical connectors that are waterproof, which increases the complexity and production cost of the high-pressure washer.

### Object of the invention

**[0003]** An object according to the present invention is to provide techniques that will allow a less complicated maintenance and reparation of high-pressure washers. It is an advantage of the present invention that it allows for a high-pressure washer that can be operated without the control unit and the associated control panel having a permanently fixed position in relation to rest of the high-pressure washer. A particular feature of the present invention is that it allows for a high-pressure washer that can be operated where the placing of the control unit and the associated control panel is primarily limited by the length of the conduits connecting the control unit with the rest of the high-pressure washer.

### Summary/Disclosure of invention

**[0004]** The above object, the above advantage and the above feature together with numerous other objects, advantages and features will be evident from the detailed descriptions given below of preferred embodiments according to the present invention. The objects, advantages and features are according to a first aspect of the present invention obtained by a high-pressure washer for delivering a liquid, said high-pressure washer comprising a frame, a delivery unit supported by said frame, such as a motor-driven pump or a heater, and a control unit for controlling said delivery unit and having a control panel, said high-pressure washer further comprising a cover for protecting said delivery unit, **characterized in that** said cover defines a opening for releasebly receiving said control unit with access to said control panel from the outside of said cover.

**[0005]** In a broad interpretation this means that the control unit may be supported by the cover, that it can be attached to and removed from the cover, and that when being attached to the cover the control panel can be accessed from the outside of the cover by way of the opening. The opening may correspond to a hole in the cover, i.e. the edge of the opening may correspond to a closed path completely defined by the cover. Alternatively, the opening may be a cut-out in the edge of the cover, i.e. the edge of the opening may only in part be defined by the cover.

**[0006]** Clearly, an advantage according to the first aspect of the present invention is that it enables the control unit to be removed from the cover without disconnecting it from the rest of the high-pressure washer, which may otherwise expose electrical connectors or the like. Another advantage may be that when servicing or repairing the high-pressure washer, it may be possible to establish an active delivery mode, i.e. to operate the high-pressure washer, even though the cover is removed completely.

**[0007]** A delivery mode of the high-pressure washer may be defined by properties of the liquid, such as pressure, volumetric flow rate, chemical composition, and/or temperature. The delivery unit may then enable a plurality of different delivery modes, from which an active delivery mode is established by the control unit. It is understood that the delivery unit may be able to change all of the properties of the liquid listed above, or that it may only be able to change some or only one of them. Similarly, the control unit may be able control all parameters that the delivery unit can change, or it may only be able to control some or one of the parameters that the delivery unit can change. This means that it may be necessary to have several control units in order to control all of the parameters that can be changed by the delivery unit.

**[0008]** In order to establish an active delivery mode, the control unit may comprise a valve, fluid regulator, and/or component with similar functions. Further, it may also comprise an electrical switch, relay, regulator and/or component with similar functions. In addition, the control unit may also comprise an electrical circuit, microprocessor, and/or component with similar functions. The control unit may also comprise a mechanical, pneumatic, or hydraulic switch or actuator, or the like. The control panel of the control unit may comprise a push button, manual

switch, lever, knob, handle, key, and/or a component with similar functions for manually setting the active delivery mode.

**[0009]** The cover of high-pressure washer, according to the first aspect of the present invention, may define a closed and an open position relative to the frame, where the closed position is for protecting the delivery unit, and the open position is for enabling the delivery unit to be reached by hand. The cover may, in its closed position, be supported by the frame by one or more locks, bolts, catches and/or the like. Alternatively or additionally, the cover may be supported by a hinge, a hook-and-hole arrangement, and/or the like that allows for a swiveling motion of the cover while still in contact with the frame and/or the delivery unit. In the open position, the cover may be supported by the same hinge, hook-and-hole arrangement, and/or the like. Alternatively, the cover may, in an open position, be completely detached from the frame and/or the delivery unit.

**[0010]** The high-pressure washer may further comprise one or more first fasteners for providing a first mounting for supporting the control unit by the cover, where the one or more first fasteners are manually releasable. A fastener may be defined as a device and/or features that mechanically joins or affixes two or more objects together. To give an example, a first fastener may comprise a hole on the control unit, a bolt with a head at one end and threads at the other end, and a threaded hole on the cover for receiving the threads of the bolt. When engaged, the two holes are placed centered on one another, and the bolt is first put through the hole of the control unit before it is attached to the cover, so that the head of the bolts locks the control unit in a position relative to the cover. An alternative to the threads and the hole on the cover would be to have a hock at the end of the bolt that is opposite from the head, and a pin on the cover to provide a fastening mechanism with a function similar to that of a bayonet mount. The first fastener may not have to involve a loose object, such as a bolt, but may be defined by features of the control unit and the cover alone. As an example, the fastener feature of the control unit and the fastener feature of the cover may together define a manually releasable catch. Another example of this kind would be to have a cover with one or more tracks, and one or more features of the control unit to make it fit in the slot defined by the one or more tracks. Other examples to first fasteners may involve a hook, loop, screw, clips, buckle, clamp, peg, pin, rubber band, strap, and/or a wedge. A first fastener may be of such a construction that no the component and/or feature involved is exposed to any significant wear when employed. Naturally, this would be an advantage if a fastener is employed repeatedly.

**[0011]** A fastener of the one or more first fasteners may further be employed in a second mounting of the control unit on the frame and/or on the delivery unit when the cover is in the open position, e.g. during servicing or repairing. Hence, the fastener employed here may also be employed for providing the first mounting on the cover. This means that some or all of the features on the cover that enables the first mounting may also found on the frame and/or the delivery unit for enabling the second mounting.

**[0012]** The high-pressure washer may further comprise one or more second fasteners for enabling a third mounting for supporting the control unit by the frame and/or by the delivery unit when the cover is in the open position. This may be an advantage during service and repair, especially if the control panel of the control unit is easily accessible when the latter is supported by the third mounting. The one or more second fasteners may be of the same type and/or function as the one or more first fasteners described above. A second fastener may comprise a hook-and-holder arrangement, where the control unit has a fixed hook that can be inserted in a holder on the frame and/or the delivery unit when the control unit has an angle relative to the frame within a certain interval. If the angle is changed outside this interval after the hook has been inserted in the holder, the arrangement will lock the control unit to the frame and/or delivery unit, thereby providing a support of the control unit.

**[0013]** The high-pressure washer may further comprise a communication system coupled to the control unit and to the delivery unit, where the communication system enables a control communication of an active delivery mode from the control unit to the delivery unit. The communication system may further comprise one or more flexible conduits for continuously enabling the control communication when the control unit is supported by the first mounting, and when the open position is changed to the closed position, or when the closed position is changed to the open position. This may be an advantage in the servicing and repairing of the high-pressure washer, as it enables the high-pressure washer to be operated even though the cover is in an open position and the control unit is mounted on the cover.

**[0014]** The communication system may further comprise one or more flexible conduits for continuously providing the control communication when the position of the control unit is shifted relative to the frame and/or the delivery unit. This means that the flexible conduits may continuously provide the control communication when the first mounting is changed, e.g. to the second mounting or the third mounting; the second mounting is changed, e.g. to the first mounting or the third mounting; and the third mounting is changed, e.g. to the first mounting or the second mounting. Naturally, this demands a certain length of the flexible conduits. The high-pressure washer may, by these features, be continuously operated while the positions of the control unit is changed, which may be an advantage when servicing or repairing the high-pressure washer. They will also allow the high-pressure washer to be operated while the control unit is mounted in either of the first, second, or third mounting as described above.

**[0015]** The one or more flexible conduits may comprise

an electrical wire, mechanical wire, hose, tube, optical wire, and/or the like. Further, a flexible conduit may also comprise rigid elements joined by a movable joint, hinge, and/or flexible element, e.g. rigid tubes coupled by a flexible hose.

**[0016]** The high-pressure may in a particular embodiment further comprise a piston pump driven by an electric motor for delivering the liquid under high pressure; a heater for heating of the liquid, where the heater further comprises a burner for providing the conditions of combustion for a fuel, a heater coil through which the liquid passes, and an electrically driven fan to drive the heat of the combustion over the heater coil; and a fuel tank for providing the heater with the fuel. Further, the high-pressure washer may comprise an electrical conduit for supplying the electric motor and the heater with electrical power from an external power source; a chemical container for storing a substance for being employed in defining a delivery mode involving the chemical composition of the liquid; and/or wheels mounted on the frame for lowering the friction when the high-pressure washer is transported along a surface.

**[0017]** The control panel of the control unit may further comprise one or more indicators for indicating the active delivery mode and/or the operational status of the delivery unit. An indicator may comprise a measuring device, e.g. a pressure gauge, a flow gauge, or a thermometer, for determining a measurement on the liquid to be delivered. Further, an indicator may comprise a mechanical moving-pointer type of meter, an electrical scale type of meter comprising light-emitting diodes, an electrical liquid crystal display type of meter, or the like. An indicator may also be integrated with a device for setting the active delivery mode, e.g. a push button, manual switch, lever, knob, handle, key, and/or a component with similar functions, where the position of the device indicates the active delivery mode, e.g. by having a scale or symbols located at the position of the device on the control panel. As an example, a handle may be placed in three positions pointing towards the printed numbers 1, 2, and 3, where the positions provides a low, a mediate, and a high volumetric flow rate, respectively, of the liquid to be delivered.

## Brief description of the drawings

**[0018]** Additional objects and features according to the present invention will be more readily apparent from the following detailed description and appended claims, which are presented in conjunction with the drawing, where:

Fig. 1 illustrates a high-pressure washer with a cover in a close position,

Fig. 2 illustrates a high-pressure washer with the cover removed,

Fig. 3 illustrates a high-pressure washer in a moving state,

Fig. 4 illustrates the inside of the cover without a mounted control unit, and

Fig. 5 illustrates the inside of the cover with a mounted control unit.

## Detailed description of the invention

**[0019]** The exterior of a preferred embodiment of a high-pressure washer is shown in Fig. 1. The high-pressure washer 1 has a frame 2 providing support for its other components, and it is fitted with a cover 11 for protecting the delivery unit. A handle 14 is connected to the frame 2 for making the transport and handling of the high-pressure washer 1 easier. The cover has an opening 33 for receiving a control unit so that the control panel 10 of the unit is reachable by hand. The control panel comprises knobs 17 for manually setting an active operation mode of the high-pressure washer 1. As an example, a first knob may be for turning on and turning off the a heater of the liquid to be delivered, a second knob may be for setting the temperature of the liquid, and a third knob may be for setting the pressure and/or volumetric flow of the liquid. The high-pressure washer 1 has an air inlet-outlet 23 that allows air to reach the fan and heater behind the cover 11. The air inlet-outlet 23 will also enable cooling of the delivery unit by air convection. The cover 11 defines an opening 19 for the exhaust pipe 16 of the heater, where the opening 19 has such dimensions that the exhaust pipe 16 does not reach the cover 11 when it is in its closed position or changed from its closed position.

**[0020]** A preferred embodiment of a high-pressure washer 1 with its cover removed is shown in Fig. 2. The frame 2 supports the delivery unit 24 comprising a fan 5 driven by an electric motor 6, a pump 8 driven by another electric motor 18 for delivering the liquid under pressure, and a heater 20 for heating the liquid. The fan 24 establishes an airflow in the heater 20 leading out through the exhaust pipe 16. The heater comprises a burner and a heater coil (not shown in Fig. 2) contained within its exterior, where the fuel tank supplies the burner with fuel for combustion. The liquid passes through the heater coil, while the airflow drives the heat of the combustion over the heater coil, thereby providing heating of the liquid. The control unit 9 is supported by the heater 7 so that the high-pressure washer 1 can be easily operated by the control panel 10 even though the cover has been removed.

**[0021]** In Fig. 3 a side-view of the presently preferred embodiment of the high-pressure washer in Fig. 1 is illustrated. The cover 11 is attached to the frame by a set of screws 22 at the top of the cover and releasable joints at the front bottom 64 of the high-pressure washer. If the screws 22 are released, this means that the cover 11 can be swung open with the turning point at the front bottom

64. In this motion the opening 19 for the exhaust pipe 16 will not reach the exhaust pipe 16, which otherwise could damage the cover 11 if the exhaust pipe 16 is hot. The fuel tank 4 is located at the back of the of the high-pressure washer 1, where the fuel tank is supplied with fuel through the fuel tank filler 15, which is sealed by a lid screwed in place.

**[0022]** A specific contact area 13 and the pair of wheels 12 will support the high-pressure washer 1 in its vertical position. Another specific contact area 21, which will support the high-pressure washer 1 at rest in its horizontal position, is provided by an element extruding from the fuel tank 4. This extruding element will also fill the function of a hook for supporting winded external hoses or cables, such as a high-pressure cable and an electric cable for supplying the high-pressure washer 1 with electric power. There is a cut-out 65 in the cover 11 that enables a fixedly mounted outlet 20 for the heated high-pressure liquid to be connected to an external high-pressure hose. There is also an inlet 63 for supplying the high-pressure washer 1 with the liquid to be pressurized and delivered by the high-pressure washer 1. The handle 14 connected to the frame 2 will allow the high-pressure washer 1 to be easily shifted from a vertical to a horizontal position, or to be transported by way of its wheels 12. The high-pressure washer 1 in Fig. 3 is in a moving state, in which it can be maneuvered by a person supporting the high-pressure washer by the handle 14.

**[0023]** A part of the inside of the cover 11 of a presently preferred embodiment is illustrated in Fig. 4, where the control unit has been detached and removed from the cover. The cover defines an opening 33 to which the control unit can be closely fitted and through which the control panel can be reached from the outside. There is a pair of hooks 34 below the opening 33 for receiving an arm. The hooks 34 are oriented so that an arm can be supported against the force of gravity when the cover is in a vertical position. There is also a pair of screw receivers 35 which, together with the pair of hooks 34, can be employed to support the control unit against a force in an arbitrary direction relative to the cover 11.

**[0024]** Fig. 5 illustrates the same part of the cover 11 as in Fig. 4, but with the control unit 9 closely fitted to the opening so that the control unit can be reached from the outside. The control unit 9 is attached by quarter-turn screws 31 locked to the screw receivers of the cover 11, and by a fixed arm 30 received by the hooks 34. The cover 11 is attached to the frame 2 by releasable joints 32 so that the cover can be removed completely from the frame 2. Communication means 28, e.g. hoses and electric cables, enables a control communication between the control unit 9 and the delivery units supported by the frame 2. The control unit is fitted with a pair of arms or fasteners 27, which can be received in corresponding holders located on the frame 2 or on a delivery unit, preferably on the heater as is shown in Fig. 2.

**[0025]** The term "supported" is to be understood as if a second item is supported by a first item, and a third item is supported by the same first item, then the third item may be supported by the second item, which in turn is supported by the first item. Additionally or alternatively, the second item may be supported by the third item, which in turn is supported by the first item. As an example, if it is stated that the delivery unit and the control unit are supported by the frame; then the delivery unit and the control unit are individually supported by the frame, or the control unit is supported by the delivery unit, which in turn is supported by the frame; or the delivery unit is supported by the control unit, which in turn is supported by the frame.

## Claims

1. A high-pressure washer (1) for delivering a liquid, said high-pressure washer (1) comprising a frame (2), a delivery unit (24) supported by said frame (2), such as a motor-driven pump (8) and/or a heater (7), and a control unit (9) for controlling said delivery unit (24) and having a control panel (10), said high-pressure washer (1) further comprising a cover (11) for protecting said delivery unit (24), **characterized in that** said cover (11) defines a opening (33) for releasebly receiving said control unit (9) with access to said control panel (10) from the outside of said cover (11).

2. A high-pressure washer (1) according to claim 1, wherein a delivery mode of said high-pressure washer (1) is defined by properties of said liquid, such as pressure, volumetric flow rate, chemical composition, and/or temperature, and where said delivery unit (24) enables a plurality of different delivery modes, from which an active delivery mode is established by said control unit (9).

3. A high-pressure washer (1) according to any of the claims 1 to 2 further comprising one or more first fasteners (30, 31, 34, 35) for providing a first mounting for supporting said control unit (9) by said cover (11), where said one or more first fasteners (30, 31, 34, 35) are manually releasable.

4. A high-pressure washer (1) according to any of the claims 1 to 3, wherein said cover (11) defines a closed and an open position relative to said frame (2), where said closed position is for protecting said delivery unit (24), and said open position is for enabling said delivery unit (24) to be reached by hand.

5. A high-pressure washer (1) according to any of the claims 1 to 4, wherein said one or more first fasteners (30, 31, 34, 35) further enables a second mounting for supporting said control unit (9) by said frame (2) and/or by said delivery unit (24) when said cover (11) is in said open position.

**6.** A high-pressure washer (1) according to any of the claims 1 to 5 further comprising one or more second fasteners (27) enabling a third mounting for supporting said control unit (9) by said frame (2) and/or by said delivery unit (24) when said cover (11) is in said open position.

**7.** A high-pressure washer (1) according to any of the claims 1 to 6 further comprising a communication system (28) coupled to said control unit (9) and to said delivery unit (24), where said communication system (28) enables a control communication of an active delivery mode from said control unit (9) to said delivery unit (24).

**8.** A high-pressure washer (1) according to any of the claims 1 to 7, wherein said communication system (28) further comprising one or more flexible conduits (28) for continuously enabling said control communication when said control unit (9) is supported by said first mounting, and when said open position is changed to said closed position, or when said closed position is changed to said open position.

**9.** A high-pressure washer (1) according to any of the claims 1 to 8, wherein said communication system further comprising one or more flexible conduits (28) for continuously enabling said control communication when the position of said control unit (9) is shifted relative to said frame (2) and/or said delivery unit (24).

**10.** A high-pressure washer (1) according to any of the claims 1 to 9, wherein said communication system (28) further comprising one or more flexible conduits (28) for continuously enabling said control communication when said first mounting is changed to said second mounting or said third mounting, said second mounting is changed to said first mounting or said third mounting, and said third mounting is changed to said first mounting or said second mounting.

**11.** A high-pressure washer (1) according to any of the claims 1 to 10 further comprising a piston pump (8) driven by an electric motor (18) for delivering said liquid under high pressure; a heater (7) for heating of said liquid, where said heater further comprises a burner for providing the conditions of combustion for a fuel, a heater coil through which said liquid passes, and an electrically driven fan to drive the heat of the combustion over said heater coil; a fuel tank (4) for providing said heater with said fuel; an electrical conduit for supplying said electric motor and said heater with electrical power from an external power source; a chemical container for storing a substance for being employed in the defining a delivery mode involving said chemical composition of said liquid; and/or wheels (12) mounted on said frame (2) for lowering the friction when the high-pressure washer is transported on a surface.

**12.** A high-pressure washer according to any of the claims 1 to 11, wherein said control panel (10) further comprises one or more indicators (17) for indicating said active delivery mode and/or the operational status of said delivery unit.

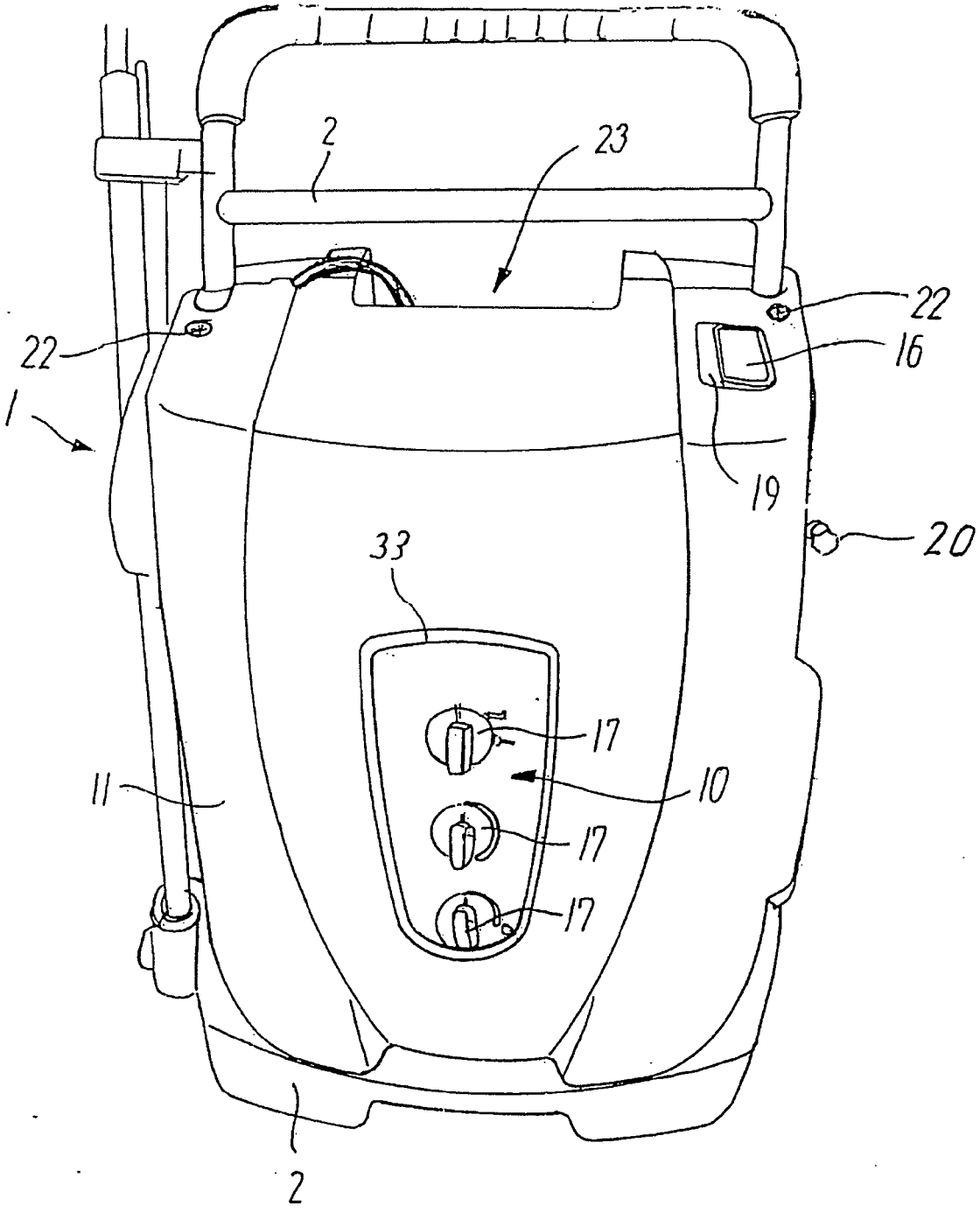


FIG. 1

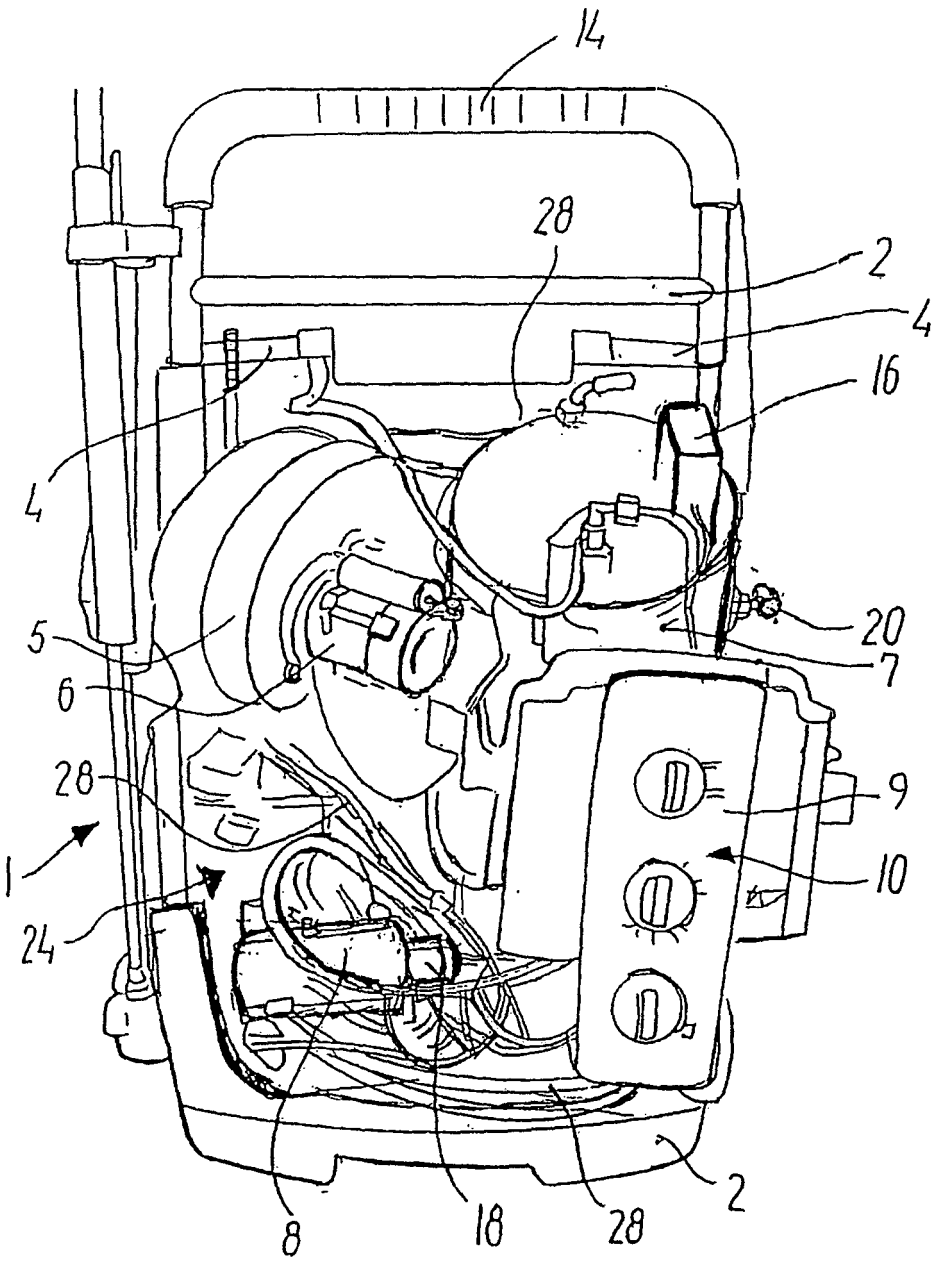


FIG. 2

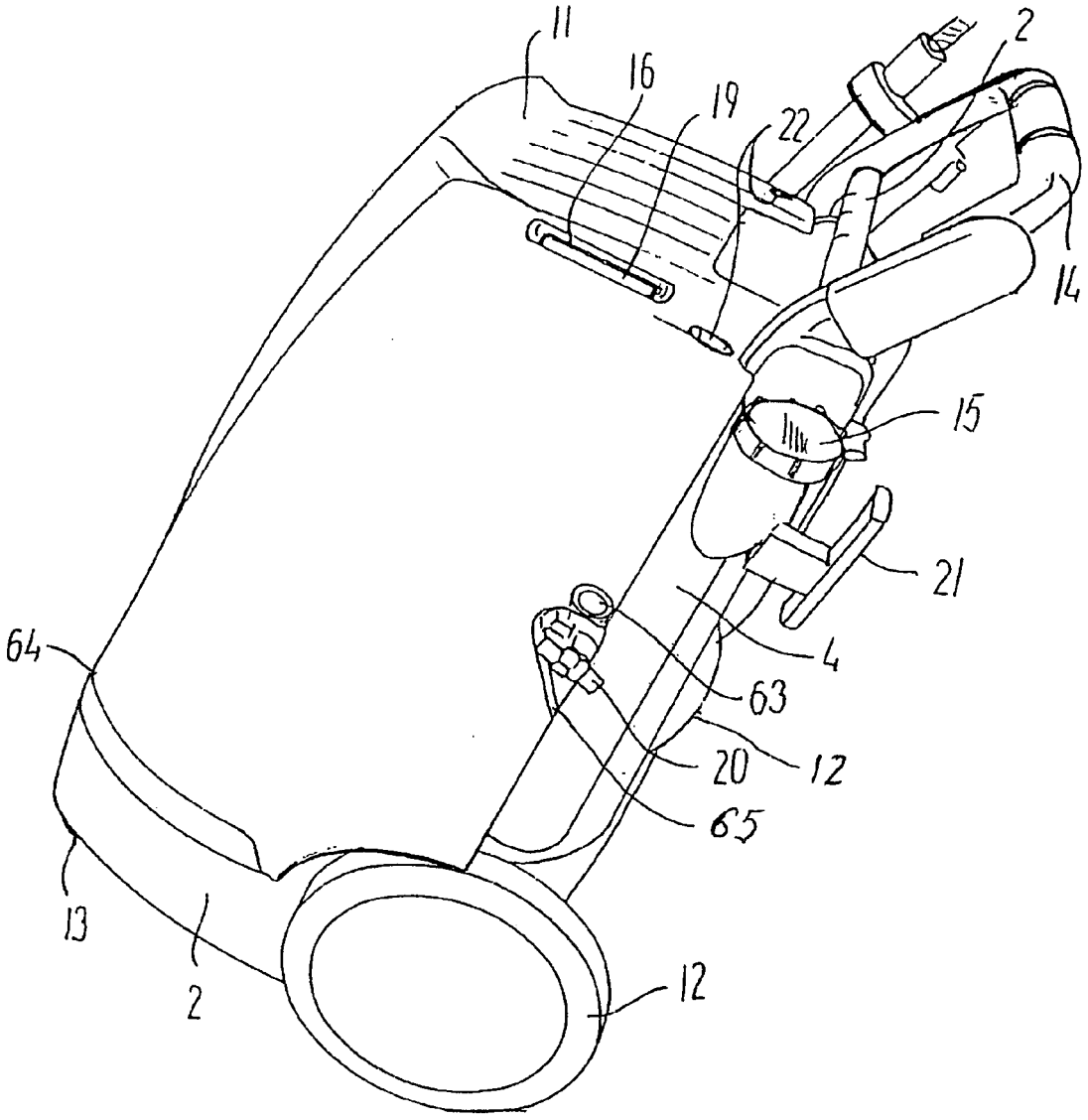


FIG.3

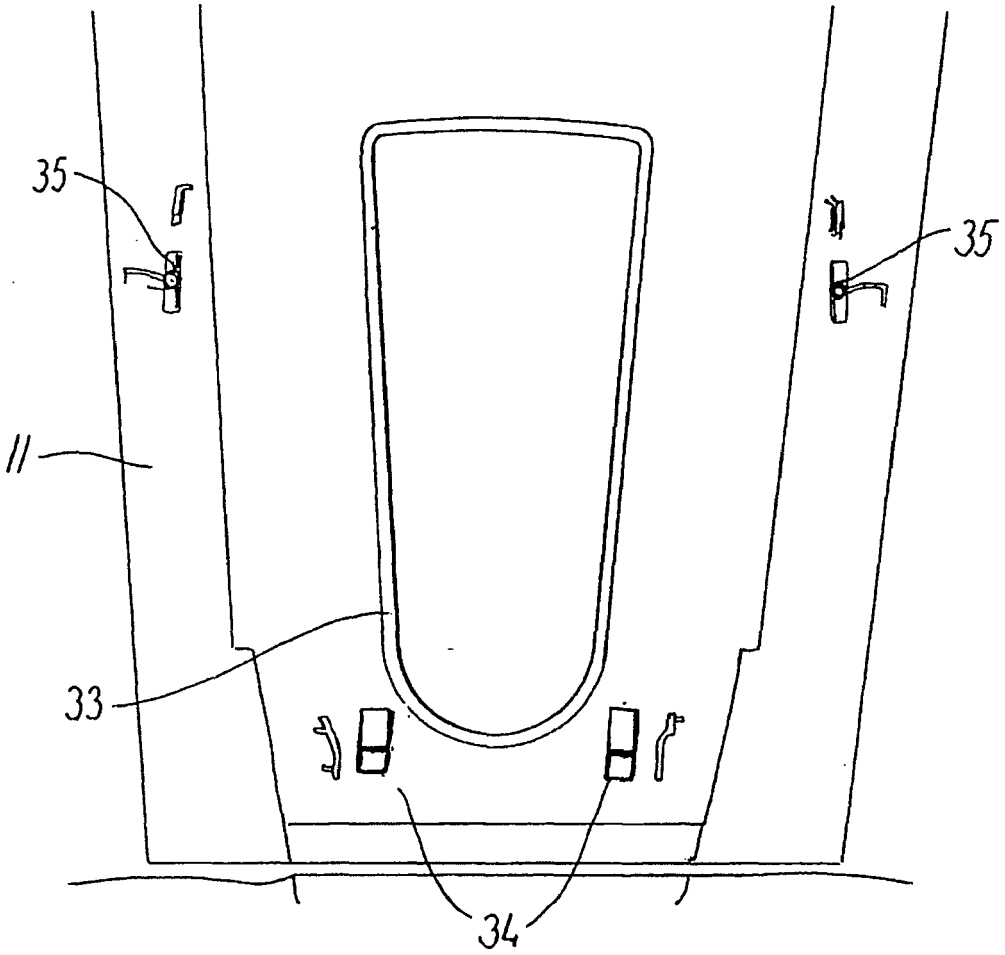


FIG.4

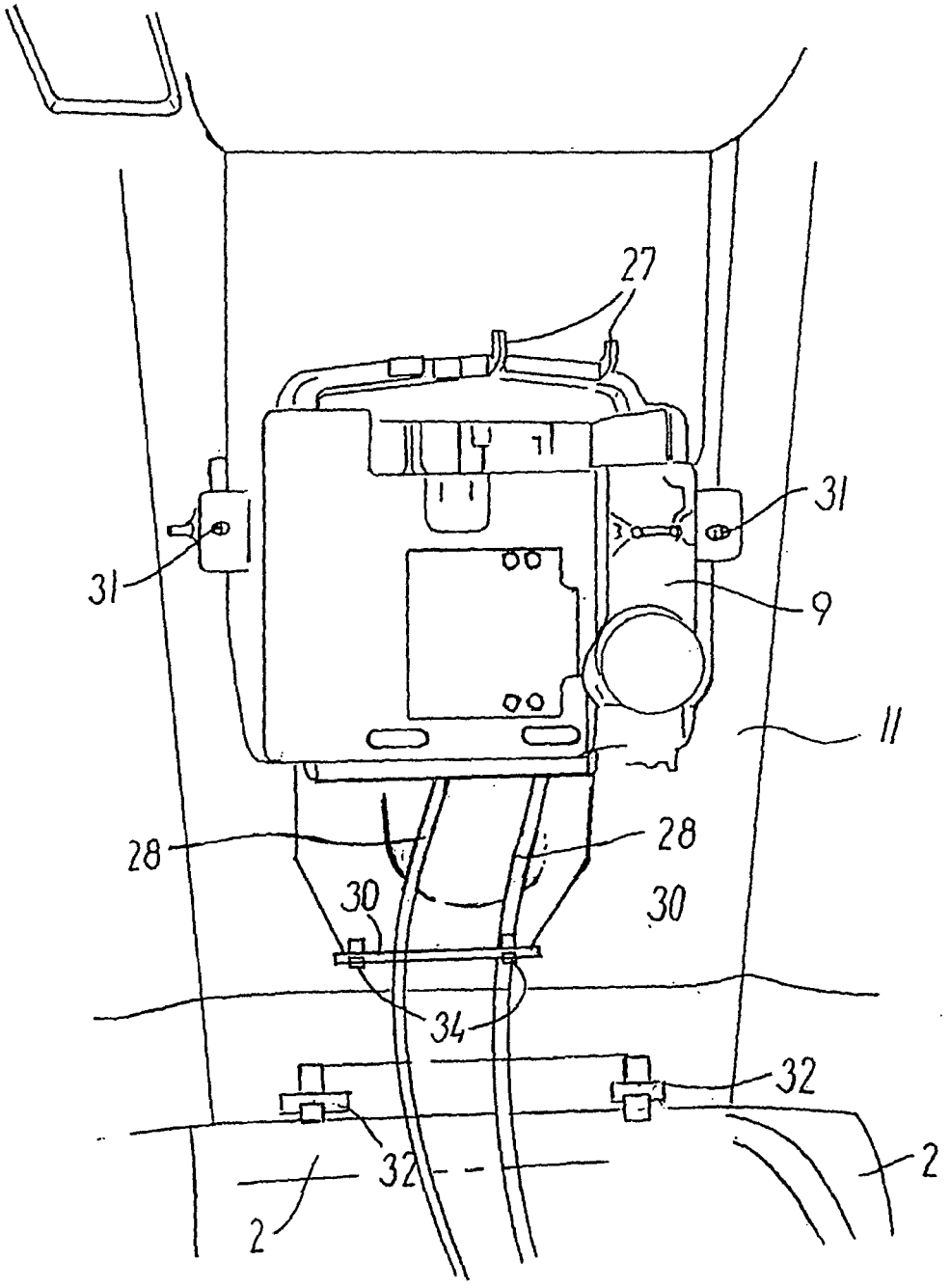


FIG.5

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# EUROPEAN SEARCH REPORT

Application Number
EP 08 01 2993

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| A | WO 03/071915 A (BSH BOSCH SIEMENS HAUSGERAETE [DE]; SEITH THOMAS [DE]) 4 September 2003 (2003-09-04) * abstract; figure 1 * | 1-12 | INV. B08B3/02 |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 27 November 2008 | Muller, Gérard |

CATEGORY OF CITED DOCUMENTS

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 01 2993

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82