Title: DEVICE FOR HIGH-PRESSURE CLEANING WITH HOSE ACCUMULATOR FOR HIGH-PRESSURE HOSE

Abstract: A device for high-pressure cleaning, with hose accumulator for high-pressure hose, and without ratatable or slideable high-pressure connections is provided. The device is highly user-friendly for example by having a compact design facilitated by positioning of a motor-pump unit inside the hose accumulator. Furthermore, a cable/hose fixing member is provided, in order to realize an efficient and simultaneous coiling and de-coiling of the cable and hose.
DEVICE FOR HIGH-PRESSURE CLEANING WITH HOSE ACCUMULATOR FOR HIGH-PRESSURE HOSE

5 TECHNICAL FIELD

The present invention relates to a device for high-pressure cleaning with a means for storage of a high-pressure hose and with a motor-pump unit placed at least partially inside the means for storage of a high-pressure hose.

BACKGROUND ART

It is known in the art to place a motor-pump unit of a device for high-pressure cleaning inside a hose accumulator. The hose accumulators disclosed in DE 41 19 907 A1 and WO 01/39900 A1 are connected rotatably to a motor-pump unit which is fixed relative to the ground. The accumulator reels are used for cables or hoses. Since the accumulators are rotatable relative to the motor-pump unit, the connections between the motor-pump unit and the cables and hoses are slidable or rotatable, which is disadvantageous due to wear and risk of leakage.

A different approach for placing a motor-pump unit of a device for high-pressure cleaning inside a hose accumulator is disclosed in EP 0 438 680 A2, where the low-pressure hose and the electrical cable is placed on accumulators which are fixed relative to the motor-pump unit. Hence, the motor-pump unit will rotate during winding and unwinding of the electrical cable and the low-pressure hose. This opens up for a fixed, non-sliding and non-rotating connection between the motor-pump unit and the low-pressure hose as well as the electrical cable. The high-pressure hose is connected to the device by a releasable connection and stored on a hook on the device. When winding or unwinding the cable and the low-pressure hose, the high-pressure hose will either:

1) have to be detached from the device - which requires an extra operation of the operator and therefore is disadvantageous with regard to user-friendliness;
2) curl the hose due to a semi-fixed (non-rotatable) connection to the pressure pipe - which is highly annoying and may damage the high-pressure hose; or

3) have to be connected to the pressure pipe by a rotatable high-pressure connection - which is disadvantageous due to wear and risk of leakage.

A fixed connection between both the accumulators of the electrical cable and the low-pressure hose may lead to uncompleted coiling of either the cable or the hose if one of these does not pack perfectly within the accumulator. In EP 0 438 680 A2 it is suggested to solve this further disadvantage by forming a combined cable comprising a low-pressure hose and an electrical cable. However, for this to solve the problem, the supply of low-pressure fluid, e.g. water, must be placed very close to a supply of electrical power, which is seldom the case.

DISCLOSURE OF THE INVENTION

It is the object of the present invention to provide a device for high-pressure cleaning with a means for storage of a high-pressure hose without slidable or rotatable high-pressure connections.

It is another object of the invention to increase the user-friendliness of a device for high-pressure cleaning amongst others by providing means to reduce the size and the weight as well as increase the mobility of the device for high-pressure cleaning.

A further object of the invention is to provide a compact and flexible device for high-pressure cleaning which may easily be integrated or connected to e.g. a transportation device equipped with wheels or placed on a wall hanger.

It is yet another object of the invention to provide a device for high-pressure cleaning with automatic coiling and/or uncoiling of an accumulator.

Moreover, it is an object of the invention to provide a device for high-pressure cleaning with a member for locking of an accumulator particularly during use and during storage.
It is a further object of the invention to provide a device for high-pressure cleaning with a means for storage of an electrical cable.

Moreover, a further object of the invention is to provide means for co-coiling of a high-pressure hose and an electrical cable and/or a low-pressure hose.

The above and more objects are realised by the invention as explained and described in the figures, preferred embodiments and claims.

Important parameters for user-friendliness of non-stationary devices for high-pressure cleaning are size and weight, that is the device should be as small and light as possible to facilitate ease of use, transportation and storage. One way to obtain this is not to include elements within the device which are not necessary or which are available at the workplace. A low-pressure extension hose is, generally speaking, always available at the workplace, since an extension low-pressure hose for extending a built-in low-pressure hose is often needed anyway. Hence, a built-in low-pressure hose may advantageously be omitted and replaced by a quick-comb connection male or female part. Omitting the low-pressure hose furthermore reduces the cost of the device.

The high-pressure hose is, on the other hand, an integrated part of a device for high-pressure cleaning and can hence not be omitted. A lance and/or gun is also needed. However, these may be interchangeable with other devices, lances and/or guns. Hence, storage for these parts may advantageously be supplied on or near the device for high-pressure cleaning. High-pressure hoses should not be bent with a low radius since this may damage the hose. By placing the motor-pump unit for production of high-pressure fluid inside a high-pressure hose accumulator, a relatively large diameter hose reel may be used, and yet space may be saved, which leads to a compact unit and a reduction of the total size of the device for high-pressure cleaning.

BRIEF DESCRIPTION OF THE DRAWINGS
Figure 1 shows an overview of a device for high-pressure cleaning in one aspect of the invention,
Figure 2 shows an exploded view of a device for high-pressure cleaning in one aspect of the invention,
Figure 3 shows devices for high-pressure cleaning further comprising means for accumulating an electrical cable,
Figure 4 shows examples of use, transportation and storage of a device according to the invention,
Figure 5 shows close-ups of preferred embodiments of a cable/hose-fixing member, and
Figure 6 shows a preferred embodiment of a cover for a device for high-pressure cleaning.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In Figure 1a, an embodiment of a device for high-pressure cleaning is shown in a side view. The device for high-pressure cleaning comprises a hose accumulator 5 for the high-pressure hose 4 and a casing 1, which is fixed (i.e. does not rotate) relative to the support during coiling and uncoiling of the high-pressure hose 4. The casing in Figure 1 consists of two pieces connected via handles 11, however, the casing may be a one-piece casing or it may comprise multiple pieces. The three handles 11 of the device for high-pressure cleaning in Figure 1 (only two handles are observed) are spaced 120° around the cylindrical-like device. This positioning of the handles is a preferred embodiment, since the device for high-pressure cleaning may rest on two of the handles, while the last handle may be used for carrying the device. A device may be equipped with more handles or the handles used for resting the device may be replaced with dedicated feet. It is obvious to a person skilled in the art that other embodiments of handles and feet may be of use.

The device for high-pressure cleaning may be equipped with a member 17 for automatical coiling and/or uncoiling associated with an accumulator, particularly associated with the accumulator for the high-pressure hose. By "automatical" is meant a member that does not require manual rotating of a handle like the handle 13, which is preferably extensible. Automatical coiling may e.g. be driven by
mechanical means like e.g. a spring or an elastic means, which is loaded during uncoiling, or by an electrical means like e.g. an electrical motor. Automatical uncoiling may e.g. be driven by a motor like e.g. an electrical motor.

The device for high-pressure cleaning may also be equipped with a member 14 for locking the coiling or uncoiling of a hose accumulator. This is particularly useful if the accumulator is equipped with a means for automatical coiling and during storage if the accumulator is not equipped with a means for automatical coiling.

In Figure 1b, a device for high-pressure cleaning is seen in a top view. The device for high-pressure cleaning may have a storage facility 10 for a lance (not shown) and/or a high-pressure cleaning gun (not shown) and/or other accessories during storage. Storage facilities are preferably placed near an edge of the casing and may be shaped as a cylinder as seen in Figure 1b. Hole-shaped storage facilities are preferably through-going or they are equipped with a drain to the outside near the bottom of the storage facility to prevent collection of water and dirt. Other examples of storage facilities are holders placed on the casing and compartments, preferably closable.

The cleaning fluid is usually water, however, additives may be added to facilitate the cleaning action. Such additives may for example be detergents, e.g. liquid or powder soap, surfactants, e.g. emulsifiers, pH-regulators, e.g. hydrochloric acid or buffer mixtures, lubricants, e.g. mineral oil, complex formation agents, e.g. ammonia or EDTA, mechanical grinding agents, e.g. Al₂O₃ or diamonds or chemo-mechanical polishing agents, e.g. colloidal SiO₂. The additive may be added before or after the motor-pump unit but generally addition after the motor-pump unit is preferred, since this may prevent wear of the motor-pump unit. Other cleaning fluids, e.g. based on organic solvents may be suitable for some application like for example removal of graffiti.

In Figure 2, a cross-section of a device for high-pressure cleaner is shown. The device comprises a motor-pump unit comprising a motor 2 and a pump 3. The motor 2 and the pump 3 of the motor-pump unit may be one integrated unit (as shown in Figure 3a) or two units optionally connected by a means 15 of transferring power from the motor 2 to the pump 3. The means 15 of transferring power may for
example be a shaft, a frictional connection or comprise gearing optionally regulated externally. The motor-pump unit 16 produces a high-pressure cleaning fluid at the high-pressure side thereof, whereto a high-pressure hose 4 is connected either directly or via a fixed connection member 12. The motor-pump unit is placed at least partially inside the hose accumulator.

To enhance coiling and uncoiling of the high-pressure hose 4, the motor-pump unit should preferably be placed substantially parallel to the rotation axis 36 of the hose accumulator 5 for the high-pressure hose 4. Preferably, the combined mass-centre of the motor-pump unit 16 and the hose accumulator 5 lies substantially on the rotation axis 36 of the hose accumulator 5 for the high-pressure hose 4, as this will enhance a stable and smooth coiling and uncoiling of the high-pressure hose 4. This is often realised if the motor-pump unit 16 is placed on the rotation axis 36 of the hose accumulator 5 for the high-pressure hose 4. The hose accumulator is preferably equipped with bearings 33 to form a low friction connection to the casing 1 for further enhancement of the coiling and uncoiling of the high-pressure hose.

In a preferred embodiment, the motor-pump unit 16 is fixed to the reel of the hose accumulator 5 for the high-pressure hose 4. In this case, the motor-pump unit 16 will rotate about the rotation axis 36 of the hose accumulator 5 during coiling and uncoiling. This opens for the option of using a fixed connection member 12 between the high-pressure side of the motor-pump unit 16 and the high-pressure hose 4. Here fixed connection is opposed to rotatable or slidable connections, which are disadvantageous due to wear of the connection during use and risk of leakage.

Instead of using a fixed connection member 12, the high-pressure hose 4 may be connected directly to the high-pressure side of the motor-pump unit 16. This embodiment does not comprise any slidable or rotatable liquid bearing parts or connections.

The cable 37 for supply of electrical power may be either integrated in the device for high-pressure cleaning (as shown in e.g. Figure 3) or the cable may be supplied from an external source (as would be the case in Figure 1). If the cable is supplied by an external source, the device for high-pressure cleaning is equipped with a means 7 for watertight electrical connection for connecting to an extension cable.
This means 7 is preferably placed on the end face of the accumulator for the high-pressure hose. However, the cable for supply of electrical power is preferably integrated into the device. To save weight, the cable should usually be shorter than 10 meters, preferably between 1 to 6 meters, for example 5 meters. In the embodiment shown in Figures 3A and 3B, the length of the power cable fixed to the device for high-pressure cleaning may be about the same length as the high-pressure hose. If either the cable or the high-pressure hose is considerably longer than the other one, a cable/hose-fixing member (see below) may advantageously be used to enhance coiling.

The device for high-pressure cleaning is preferably equipped with a controller 39 for controlling of one or more of e.g. outlet pressure, flow rate, operation mode (e.g. on/off), gearing, automatic coiling and/or uncoiling or safety features. The controller is preferably operated via a non-silding and non-rotational connection from the end of the device for high-pressure cleaning. This may for example be realised with a round push button or controller switch 38 placed on the axis of rotation 36. Alternatively, the controller may be operated by means of wireless communication, e.g. by means of infrared light or radio waves, preferably from a transmitter placed near the end of the high-pressure hose or on the lance or gun.

The member 17 for automatic coiling and/or uncoiling shown in Figure 1a may for example comprise an electrical motor fixed relative to the hose accumulator and connected to the casing via a gear wheel to a line of tooth on the inner surface of the casing. Hence, a controlled movement of the hose accumulator relative to the casing may be realised. A person skilled in the art may easily derive other ways to achieve automatic coiling and/or uncoiling without deriving from the disclosed inventive idea.

Figures 2 and 3 show cross-sections of accumulators 4 for high-pressure hoses 5, where the cable 37 for supply of electrical power is integrated into the device for high-pressure cleaning. In Figure 2, the cable 37 is accumulated together with the high-pressure hose 4 on the accumulator 5 for the high-pressure hose. In this embodiment, the coiling and uncoiling of the cable take place simultaneously with the coiling and uncoiling of the high-pressure hose 4. This embodiment shows the
advantage that the connection 31 between the motor 2 and the power cable 37 is fixed, i.e. there is no slidable or rotatable connection.

A cable/hose-fixing member 48 may be supplied near the ends of either the cable, the hose or both the cable and the hose, as shown in Figure 5. The cable/hose-fixing member may fix the shorter of the cable and hose to the other after coiling and thereby prevent the shorter end from being in the way during coiling of the rest of the longer. The cable/hose-fixing member may also connect the cable and the hose before coiling. In this case, the cable/hose-fixing member will diminish the uneven coiling by forcing the longer part to form a loose loop before the coiling is completed. A cable/hose-fixing member is also useful when a larger difference in length of the cable and the high-pressure hose exists. For example the high-pressure hose may be 10 to 15 meters, whereas the cable may be about 4 to 6 meters. In case of simultaneous coiling of the high-pressure hose and the electrical cable, the cable will be completely coiled long before the high-pressure hose. The cable/hose-fixing member is then used for fixing the cable to the high-pressure hose, where it extends from the accumulator. Then the coiling of the high-pressure hose may proceed as the cable fixed to the high-pressure hose will just rotate without intervening with the coiling. As the high-pressure hose is uncoiled, the electrical cable may be released as the cable/hose-fixing member is available, or when the hose has been sufficiently uncoiled to perform the cleaning. A cable/hose-fixing member comprises two sides. The first side is fixed near the end of either a cable or a hose and the other side is equipped with a means for releasably connecting said cable or hose to another cable or hose. In Figure 5a, a cable/hose-fixing member 48 is placed near the electrical plug 47 of the electrical cable and in Figure 5b, a cable/hose-fixing member 49 that is integrated with the plug is shown for a plugged cable end. Cable/hose-fixing members may likewise be placed near the end of the high-pressure hose and/or integrated with the fitting at the end of the high-pressure hose.

If a device for high-pressure cleaning with coiling of the electrical cable is applied for stationary use, the cable may for example be manually coiled onto the accumulator - with the high-pressure hose fully extended - to the point where the desired length of electrical cable is available before commencing the simultaneous coiling of the cable and the high-pressure hose. Hence, the desired length of electrical cable will be available whenever the high-pressure hose is fully extended.
In Figure 3a, the cable 37 is also accumulated on the accumulator 5 for the high-pressure hose, however, the cable 37 coils in a separate compartment. The compartment for the high-pressure hose is separated from the compartment for the electrical cable by a separator 40. This will lead to a more even simultaneous coiling of the high-pressure hose and the electrical cable.

Another way to obtain an even coiling is to accumulate the electrical cable 37 on a completely separate accumulator 34, which will introduce a slidable or rotatable connection; or the accumulator 34 for the electrical cable 37 may be semi-connected to the accumulator 5 of the high-pressure hose 4.

In Figure 3b, an example of an embodiment of semi-connected accumulators is shown. This embodiment is particularly useful when the electrical cable and the high-pressure hose are of approximately the same length. It is observed that the accumulator 34 of the electrical cable 37 is connected elastically by elastic members 32 to the accumulator 5 for the high-pressure hose 4 in the sense that the accumulator 34 for the electrical cable 37 follows the rotation of the accumulator 5 for the high-pressure hose 4 within a fraction of a full rotation. If the electrical cable 37 is coiled for example 20 cm more than the high-pressure hose 4 in the equilibrium position of the accumulators 4 and 34, then the electrical cable 37 should always be completely coiled when the high-pressure hose 4 is fully coiled. The difference in coiling of the high-pressure hose 4 and the electrical cable 37 may be compensated by a loop 35 on the electrical cable 37. Hence, fixed connections may yet be used to connect both the high-pressure hose 4 and the electrical cable 37 to the motor-pump unit 16.

The device for high-pressure cleaning is either equipped with a low-pressure hose or preferably with a low-pressure fluid inlet 6, where an external low-pressure hose may be connected for example by a quick clamp or a standard connection. The low-pressure fluid inlet 6 may be placed anywhere on the device, where a connection may be made to the motor-pump unit 16, however, it is preferred to place the low-pressure fluid inlet on the side of the end face of the accumulator 5. This may be close to the axis of rotation 36 and possibly on the axis, for example utilizing a pipe for both the shaft of rotation and for connecting the fluid to the pump. A quick clamp
or standard fitting may then be placed directly on the pipe. If the device is equipped with a low-pressure hose, this hose is preferably accumulated on the accumulator 5 for the high-pressure hose 4 or on a dedicated accumulator for the low-pressure hose. The dedicated accumulator for the low-pressure hose may be fixed to, semi-connected as described above, or unconnected to the accumulator 5 for the high-pressure hose 4.

It is preferred that the device for high-pressure cleaning is equipped with storage facilities for various accessories, which are useful during operation of the device. Such accessories may for example be a gun, a lance, a brush and/or replacement brush tips or nozzles. The storage facilities may for example be closable compartments or open holes in the cabinet, preferably with drains near the bottom.

In a highly preferred embodiment, the device for high-pressure cleaning is designed as a compact unit, which may easily be connected to devices that will increase the accessibility of the device for high-pressure cleaning. Such devices may for example be a transportation device, a storage device and a stationary use device. Such increased accessibility devices are preferably connected to the device for high-pressure cleaning by a releasable connection so that one device for high-pressure cleaning may be used with the increased accessibility device, which is best suited for a particular application. The releasable connection is preferably established without use of tools; for example a releasable connection may be formed by gravity, a click connection or a pawl, a racket or a catch.

A preferred increased accessibility device is a transportation device 44, for example as the one shown in Figure 4a. The transportation device may be equipped with wheels, preferably 2 or 4 wheels, and/or a compartment 45 for extra accessories like for example brush tips, gun, lance, extension hose and/or extension cable. In a preferred embodiment, the transportation device may be folded up when it is not in use to reduce the space taken up during storage. In another preferred embodiment, the transportation device is suitable for transportation of other items than a device for high-pressure cleaning, like e.g. tools, garbage, garden waste and/or furniture and it may be used for such applications when it is not connected to a device for high-pressure cleaning.
As shown in Figure 4a, the hose accumulator is usually placed to realise a substantially horizontal axis of rotation of the hose accumulator during use. However, the device for high-pressure cleaning may alternatively be positioned in such a way that the axis of rotation of the hose accumulator for the high-pressure hose is substantially vertical during use, e.g. as it is shown in Figure 4b.

Another increased accessibility device is a wall hanger, e.g. like the one shown in Figure 4c. The wall hanger is fixed, preferably permanently, to a wall and a device for high-pressure cleaning may be releasably connected to it. A wall hanger may for example be used for storage of a device for high-pressure cleaning that may be used at other locations, whereto it may be transported for example by lifting or by transportation on a transportation device. A wall hanger for storage is advantageous, since it saves space. Other storage devices suitable for optimising of e.g. storage in a cupboard, under a table, under a ceiling or on a floor are obvious for a person skilled in the art without departing from the scope of the present invention.

It is preferred and will be highly appreciated that the device for high-pressure cleaning may be used as a device for stationary high-pressure cleaning when it is connected to a storage device. To ensure a large operation radius when using the cleaning device, the high-pressure hose may be relatively long. For example the high-pressure hose may be about 10 to 15 meters, whereas traditionally high-pressure hoses have been about 4 to 10 meters. However, longer or shorter high-pressure hoses may be used with devices according to the invention for some applications. Devices for high-pressure cleaning, which are primarily used as stationary units, are preferably equipped with a fitting for connecting to a source for low-pressure cleaning fluid. This fitting is preferably positioned close to or on the axis of rotation of the high-pressure hose accumulator and pointing away from the high-pressure hose accumulator. With this positioning, the effect of coiling or uncoiling of the high-pressure hose will be reduced.

The hose compartment of the high-pressure hose accumulator may be temporarily and at least partially covered with a cover 41. This cover comprises preferably at least two shells.
In a preferred embodiment, the casing 1 of the device for high-pressure cleaning is equipped with a channel on each side of the accumulator where shells of the cover 41 may glide. Hence, the accumulator may rotate without rotating the shells. The channel is preferably equipped with spring-supported bearings 42 to allow for at least two of the shells being able to slide on top of each other to give better access to the otherwise at least partially covered hose. Preferably, the shells may be placed in a temporarily locked position with no access or only a limited access to the hose. This locked position is for example realised with a lock mechanism 43 or when the shells are slid to the most extended positions. In this position, the hose will be protected from dirt from the surroundings. The more open position of the shells, where shells are slid on top of each other, will allow for maintenance like for example releasing of a stuck high-pressure hose.
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Casing</td>
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<tr>
<td>2</td>
<td>Motor</td>
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<td>3</td>
<td>Pump</td>
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<td>4</td>
<td>High-pressure hose</td>
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<td>5</td>
<td>High-pressure hose accumulator</td>
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<tr>
<td>6</td>
<td>Low-pressure fluid inlet</td>
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<tr>
<td>7</td>
<td>Means for watertight electricity connection</td>
</tr>
<tr>
<td>10</td>
<td>Storage facility for lance, gun and other accessories</td>
</tr>
<tr>
<td>11</td>
<td>Handle</td>
</tr>
<tr>
<td>12</td>
<td>Fixed connection member from pump to high-pressure hose</td>
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<tr>
<td>13</td>
<td>Handle</td>
</tr>
<tr>
<td>14</td>
<td>Member for locking high-pressure hose accumulator</td>
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<tr>
<td>15</td>
<td>Means for transferring power from motor to pump</td>
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<tr>
<td>16</td>
<td>Motor-pump unit</td>
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<tr>
<td>17</td>
<td>Member for automatic coiling and/or uncoiling</td>
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<tr>
<td>31</td>
<td>Fixed connection between motor and electrical cable</td>
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<tr>
<td>32</td>
<td>Elastic member</td>
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<tr>
<td>20</td>
<td>Bearing</td>
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<td>34</td>
<td>Accumulator for electrical cable</td>
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<tr>
<td>36</td>
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<td>Controller, switch</td>
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<td>38</td>
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<td>39</td>
<td>Separator</td>
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<td>Cover</td>
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<td>42</td>
<td>Spring-supported bearing</td>
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<td>30</td>
<td>Lock mechanism</td>
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<td>Transportation device</td>
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<td>Compartment for accessories</td>
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<td>46</td>
<td>Wall hanger</td>
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<tr>
<td>47</td>
<td>Plug</td>
</tr>
<tr>
<td>35</td>
<td>Cable/hose-fixing member</td>
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</table>
Plug with integrated cable/hose-fixing member
CLAIMS

1. A device for high-pressure cleaning comprising:
a motor-pump unit (16) comprising a motor (2) and a pump (3), said motor-pump
unit (16) producing a high-pressure cleaning fluid at a high-pressure side thereof,
a high-pressure hose (4) that is connected to the high-pressure fluid produced in
said motor-pump unit (16),
a hose accumulator (5) for said high-pressure hose (4),
said motor-pump unit (16) being placed at least partially inside said hose
accumulator (5).

2. A device for high-pressure cleaning according to claim 1, characterised in that the motor-pump unit (16) is placed substantially parallel to the rotation axis (36) of the hose accumulator (5) for the high-pressure hose (4).

3. A device for high-pressure cleaning according to any of the claims 1 to 2, characterised in that the motor-pump unit (16) is placed on the rotation axis (36) of the hose accumulator (5) for the high-pressure hose (4).

4. A device for high-pressure cleaning according to any of the claims 1 to 3, characterised in that the motor-pump unit (16) is placed such that the combined mass centre of the motor-pump unit (16) and the hose accumulator (5) lies substantially on the rotation axis (36) of the hose accumulator (5) for the high-pressure hose (4).

5. A device for high-pressure cleaning according to any of the claims 1 to 4, characterised in that the motor-pump unit (16) is fixed relative to the reel of the hose accumulator (5) for the high-pressure hose (4).

6. A device for high-pressure cleaning according to any of the claims 4 to 5, characterised in that the connection between the motor-pump unit (16) and the high-pressure hose (4) is fixed relative to hose accumulator (5) for the high-pressure hose (4).
7. A device for high-pressure cleaning according to any of the claims 4 to 6, characterised in that the motor-pump unit (16) is fixed to the high-pressure hose (4) by a fixed connection member (12).

8. A device for high-pressure cleaning according to any of the claims 4 to 6, characterised in that the high-pressure hose (4) is fixed directly to the outlet of the motor-pump unit (16).

9. A device for high-pressure cleaning according to any of the claims 6 to 8, characterised in that the connection between the motor-pump unit (16) and the high-pressure hose (4) does not comprise slidable or rotatable liquid bearing parts or connections.

10. A device for high-pressure cleaning according to any of the claims 1 to 9, further comprising a casing (1) which does not rotate relative to the support during coiling and uncoiling of the high-pressure hose (4).

11. A device for high-pressure cleaning according to any of the claims 1 to 10, characterised in that the axis of rotation of the hose accumulator (5) for the high-pressure hose (4) is placed substantially horizontally during use.

12. A device for high-pressure cleaning according to any of the claims 1 to 10, characterised in that the axis of rotation of the hose accumulator (5) for the high-pressure hose (4) is placed substantially vertically during use.

13. A device for high-pressure cleaning according to any of the claims 1 to 12, further comprising a member (14) for locking the coiling or uncoiling of a hose accumulator (5).

14. A device for high-pressure cleaning according to claim 13, characterised in that the member (14) for locking the coiling or uncoiling of a hose accumulator (5) is working by mechanical, magnetical or electrical means.
15. A device for high-pressure cleaning according to any of the claims 1 to 14, further comprising a member (17) for automatic uncoiling associated with the accumulator (5).

16. A device for high-pressure cleaning according to claim 15, characterised in that the member (17) for automatic uncoiling is driven by electrical means.

17. A device for high-pressure cleaning according to any of the claims 1 to 16, further comprising a means for automatic coiling associated with the accumulator.

18. A device for high-pressure cleaning according to any of the claim 17, characterised in that the member (17) for automatically coiling is driven by mechanical or electrical means, preferably by means of a spring.

19. A device for high-pressure cleaning according to any of the claims 1 to 18, further comprising a quick clamp/standard connection for a low-pressure hose at the low-pressure inlet (6).

20. A device for high-pressure cleaning according to claim 19, characterised in that the low-pressure inlet (6) is placed on the end face of the accumulator (5), preferably close to the rotation axis (36), more preferably on the rotation axis (36).

21. A device for high-pressure cleaning according to any of the claims 1 to 20, characterised in that the low-pressure inlet (6) comprises a quick clamp or standard fitting placed by the end of a pipe, which acts as both the shaft of rotation of the accumulator (5) for the high-pressure hose (4) and for connecting the low-pressure fluid to the pump (3).

22. A device for high-pressure cleaning according to any of the claims 1 to 18, further comprising a low-pressure hose.

23. A device for high-pressure cleaning according to any of the claims 1 to 22, further comprising an electrical cable (37) for supplying of electrical power to the motor-pump unit (16).
24. A device for high-pressure cleaning according to any of the claims 1 to 23, characterised in that said electrical cable (37) is shorter than 10 meters, preferably from 1 to 6 meters.

25. A device for high-pressure cleaning according to any of the claims 1 to 24, further comprising an accumulator (34) for an electrical cable (37).

26. A device for high-pressure cleaning according to claim 25, characterised in that the accumulator (5) for the high-pressure hose is also an accumulator for the electrical cable (37).

27. A device for high-pressure cleaning according to claim 25, characterised in that the accumulator (34) for the electrical cable (37) is fixed to or integrated in the accumulator (5) for the high-pressure hose (4).

28. A device for high-pressure cleaning according to claim 25, characterised in that the accumulator (34) for the electrical cable (37) is rotatably connected to the accumulator (5) for the high-pressure hose (4).

29. A device for high-pressure cleaning according to claim 25, characterised in that the accumulator (34) for the electrical cable (37) is semi-connected to the accumulator (5) for the high-pressure hose (4).

30. A device for high-pressure cleaning according to any of the claims 1 to 22, characterised in that the electrical cable (37) is supplied with means (7) for watertight electrical connection to an extension cable.

31. A device for high-pressure cleaning according to any of the claims 1 to 30, characterised in that the pressurised fluid is substantially water.

32. A device for high-pressure cleaning according to claim 31, where the pressurised fluid comprises one or more additives for facilitating the cleaning action, preferably selected from the group of detergents, pH-regulators, surfactants, lubricants, complex formation agents, mechanical grinding agents and chemo-mechanical polishing agents.
33. A device for high-pressure cleaning according to any of the claims 1 to 32, further comprising means for storage of accessories, such as handle and/or gun and/or lance and/or nozzles, preferably the means for storage is a compartment, which may be closed during use, or cylindrical holes, which may be open or closed.

34. A device for high-pressure cleaning according to any of the claims 1 to 33, further comprising a cover for covering at least a fraction of the accumulator for the high-pressure hose, said cover preferably comprising one or more slidable part(s).

35. A device for high-pressure cleaning according to any of the claims 1 to 34 that is applicable as both a stationary and a portable high-pressure cleaner.

36. A device for high-pressure cleaning according to any of the claims 1 to 35 that is applicable as both a stationary and a portable high-pressure cleaner.

37. A method of cleaning comprising the steps of
- moving a device for high-pressure cleaning according to any of the claims 1 to 32 to within the range of the high-pressure hose (4) of the item that is to be cleaned
- rotating the hose accumulator (5) for the high-pressure hose (4) to uncoil the high-pressure hose (4)
- connecting the device for high-pressure cleaning to a source of low-pressure fluid, optionally by an external water hose
- connecting the device for high-pressure cleaning to a source of electricity, optionally by an extension cable
- cleaning the item.

38. Use of a device for high-pressure cleaning according to any of the claims 1 to 32 for cleaning purposes.

39. A cable/hose-fixing member comprising two sides, the first side is fixed near the end of either a cable or a hose and the other side is equipped with a means for releasably connecting said cable or hose to another cable or hose.
40. A cable/hose-fixing member characterised in being integrated with an electrical plug.

41. Use of a cable/hose-fixing member according to any of the claims 39 to 40 for enhancing simultaneous coiling of a cable and a hose, preferably a high-pressure hose.

42. A device for connecting of a device for high-pressure cleaning to a wall.

43. A device according to claim 37, characterised in that the device for connecting forms a releasable connection between the device for high-pressure cleaning and the wall.

44. A device according to any of the claims 37 to 43, characterised in that the connection is formed and released without using a tool.

45. Use of a device according to any of the claims 37 to 44 for storage of a device for high-pressure cleaning.

46. Use of a device for high-pressure cleaning according to any of the claims 1 to 32 for a stationary high-pressure cleaner, preferably through interaction with a device for connecting the device for high-pressure cleaning to a wall.

47. A device for transportation of a device for high-pressure cleaning with a connection means for connecting said device for transportation to said device for high-pressure cleaning.

48. A device according to claim 47, characterised in that the means for connection releasably connects the device for transportation to the device for high-pressure cleaning.

49. A device according to any of the claims 47 to 48, characterised in that the means for connection is operated without using a tool.
50. Use of a device according to any of the claims 47 to 49 for transportation of a device for high-pressure cleaning.

51. Use of a device according to any of the claims 47 to 49 for storage of a device for high-pressure cleaning.

52. Use of a device for high-pressure cleaning according to any of the claims 1 to 32 for a portable high-pressure cleaner, preferably through connection of the device for high-pressure cleaning to a transportation device.
# INTERNATIONAL SEARCH REPORT

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC**: B06B3/02, F16L3/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched: (classification system followed by classification symbols)

**IPC**: B06B, F16L, A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the International search (name of database and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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**X** Further documents are listed in the continuation of box C.  

**X** Patent family members are listed in annex.

- **"A"** document defining the general state of the art which is not considered to be of particular relevance  
- **"E"** earlier document but published on or after the International filing date  
- **"L"** document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
- **"O"** document referring to an oral disclosure, use, exhibition or other means  
- **"P"** document published prior to the International filing date but later than the priority date claimed  
- **"I"** later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  
- **"X"** document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone  
- **"Y"** document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art  
- **"K"** document member of the same patent family

**Date of the actual completion of the International search**: 28 January 2004

**Date of mailing of the International search report**: 27.04.2004

**Name and mailing address of the ISA**

European Patent Office, P.B. 518 Patentlaan 2
Tel.: (31-70) 946-00-00, Tx: 31 851 epi nl
Fax: (31-70) 946-0018

**Authorized officer**: CHRISTER BÄCKNERT/JAA
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INTERNATIONAL SEARCH REPORT

Box I  Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. □ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. □ Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. □ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II  Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. □ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. □ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. □ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

   1-41, 46, and 52

4. □ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[X] The additional search fees were accompanied by the applicant's protest.

□ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1998)
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-38, 46 and 52

Refer to a device for high-pressure cleaning, a method of cleaning and the use of a device for high-pressure cleaning. The claimed invention provides means and methods for solving the problems of leakage off rotating or sliding high-pressure connections. Another object is to provide a device with reduced size and weight compared to prior-art devices. According to the claims, these problems are solved by a device where the motor-pump unit is being placed at least partially inside the accumulator (reel) for the high-pressure hose. The method incorporates the steps of action related to the device for high-pressure cleaning defined in claims 1-36 and the claimed use is related to the device for high-pressure cleaning defined in claims 1-36.

2. Claims: 39-41

Refer to a cable/hose fixing member for releasably connecting a cable and a hose to one another. According to the claims, one side of the member is fixed either to the cable or the hose and the other end is equipped with a releasable connection means for the other of the hose or the cable.

3. Claims: 42-45

Refer to a device for connecting a device for high-pressure cleaning to a wall and to the use of such a connecting device. The claims do not provide any closer technical features as to the construction of the connecting device.

4. Claims: 47-51

Refer to a device for transportation of a device for high-pressure cleaning and the use of such a transportation device. The claims do not provide any closer technical features as to the construction of the transportation device.
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