

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 October 2007 (18.10.2007)

PCT

(10) International Publication Number
WO 2007/117192 A1

(51) International Patent Classification:
D06F 43/02 (2006.01)

(21) International Application Number:
PCT/SE2007/000260

(22) International Filing Date: 15 March 2007 (15.03.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0600798-3 10 April 2006 (10.04.2006) SE
11/445,779 2 June 2006 (02.06.2006) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

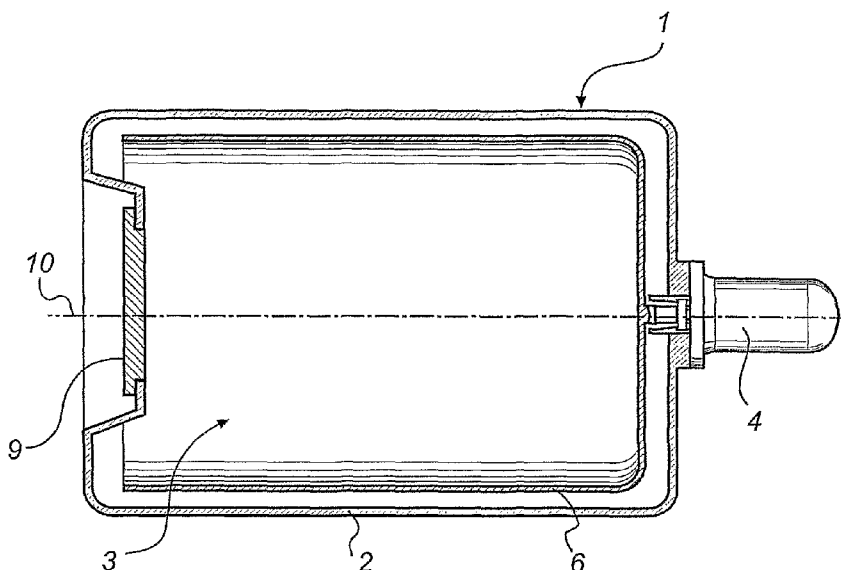
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CLEANING MACHINE



(57) Abstract: The present invention relates to a cleaning machine, such as a laundry cleaning machine, comprising a fluid tight pressure vessel defined by a pressure vessel housing. The pressure vessel housing includes a treatment compartment housing, which defines a treatment compartment, and a driving unit compartment housing, which defines a driving unit compartment and protrudes from the treatment compartment housing. The driving unit compartment is connected to the treatment compartment such that there is fluid communication between the driving unit compartment and the treatment compartment. The pressure vessel housing has an opening for exposing the driving unit compartment, and a removable closing member for closing the opening in a fluid and pressure tight manner. The closing member includes at least a portion of the driving unit compartment housing such that, when the closing member is removed, the driving unit compartment is accessible outside of the treatment compartment.

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CLEANING MACHINETechnical Field of the Invention

The present invention relates a cleaning machine, such as a laundry cleaning machine, comprising a fluid tight pressure vessel defined by a pressure vessel housing.

Background Art

Cleaning machines, which are used with non-aqueous cleaning mediums such as dry cleaning machines for use with densified liquid treatment gas, for example carbon dioxide, are known. Such cleaning machines are usually equipped with a treatment chamber in which a drum is rotatably arranged for receiving objects to be cleaned, such as laundry, and a driving unit, which is operable to rotate the drum. In conventional cleaning machines, the driving unit is placed outside of the treatment chamber and acts on a shaft of the drum passing through a wall of the treatment chamber. Since it is difficult to properly seal the rotating shaft due to the high pressure inside the treatment chamber, the driving unit of more recent machines is placed inside the treatment chamber.

The drum of the cleaning machine should be easily accessible for loading and unloading the laundry. Therefore the driving unit is usually located behind the drum in the treatment chamber of the cleaning machine, c.f. for example US 6,351,973 B1, where a cleaning apparatus for use with carbon dioxide is described.

A problem associated with these known cleaning machines is that the drum has to be removed in order to enable access to the driving unit, for example a motor and possibly a transmission, for service purposes or repairs. This is a time consuming and tedious operation, especially for a machines running with densified liquid state treatment gas, such as carbon dioxide, where the

components are robust and correspondingly heavy in order to withstand the high pressure in such machines.

Furthermore, after removing the drum, the driving unit can only be reached through the washing chamber of the machine. Since the washing chamber usually is very narrow
5 for an operator to crawl into, if at all possible, the access to the driving unit may nevertheless be restricted.

10 Summary of the Invention

It is therefore an object of the present invention to provide a cleaning machine, such as a laundry cleaning machine, which alleviates the above-mentioned problems.

According to the invention this object is achieved
15 by a cleaning machine according to claim 1.

A cleaning machine, such as a laundry cleaning machine, according to the invention comprises a fluid tight pressure vessel defined by a pressure vessel housing; wherein

20 the pressure vessel housing includes a treatment compartment housing, which defines a treatment compartment, and a driving unit compartment housing, which defines a driving unit compartment and protrudes from the treatment compartment housing;

25 the driving unit compartment is connected to the treatment compartment such that there is fluid communication between the driving unit compartment and the treatment compartment;

the pressure vessel housing has an opening for
30 exposing the driving unit compartment, and a removable closing member for closing the opening in a fluid and pressure tight manner; and wherein

the closing member includes at least a portion of the driving unit compartment housing such that, when the
35 closing member is removed, the driving unit compartment is accessible outside of the treatment compartment.

Due to the driving unit compartment housing being arranged protruding from the treatment compartment housing and the removable closing member including a portion of the driving unit compartment housing, it is
5 sufficient to remove the closing member for accessing the driving unit compartment. Thus, it is not required to remove any other components of the cleaning machine, such as for example the drum and possibly the entire front end wall of the prior art machines, for exposing the driving
10 unit compartment. In addition, the driving unit compartment is accessible from outside of the cleaning machine without having to pass through the treatment compartment. Consequently, the access to the driving unit compartment is considerably facilitated compared to the
15 prior art machines.

The invention relates to cleaning machines for washing articles, such as garments and fabrics, and for domestic or professional use. The invention relates especially to cleaning machines adapted to be used with
20 liquified treatment gas, such as carbon dioxide.

The cleaning machine according to the invention includes a fluid tight pressure vessel housing defining a pressure vessel. The fluid tight pressure vessel prevents the cleaning medium from escaping the pressure vessel,
25 which could be harmful if an unhealthy cleaning medium is used, for example carbon dioxide.

The cleaning machine according to the invention includes a treatment compartment and a driving unit compartment defined by a treatment compartment housing
30 and a driving unit compartment housing respectively. In the treatment compartment, the objects to be cleaned are treated with the cleaning fluid. According to the invention, any items may be housed in the driving unit compartment and preferably components of the cleaning
35 machine which are liable to service and repairs, such as at least a portion of a motor and/or a transmission arrangement.

According to the invention, the treatment compartment and the driving unit compartment are in fluid communication with each other. An advantage herewith is that the need of a fluid and pressure tight sealing
5 between the driving unit compartment and the treatment compartment is eliminated. Especially in case of a carbon dioxide cleaning machine, which operates with a high pressure in the treatment compartment and has a rotating shaft passing between the compartments, a fluid tight
10 pressure seal is difficult and expensive to obtain due to the rotating shaft, especially if there are high pressure differences such as in carbon dioxide machines.

Electrical motors are known from the prior art, which function well if exposed to the high pressure and gas of
15 a carbon dioxide dry cleaning machine, c.f. for example US 6,351,973 B1. Consequently, according to the invention, fluid is allowed to travel between the treatment compartment and driving unit compartment such that any pressure differences are equalized.

20 According to the invention, a portion of the pressure vessel housing constitutes a treatment compartment housing and a portion of the pressure vessel housing constitutes the driving unit compartment housing. The treatment compartment housing and the driving unit
25 compartment housing are arranged such that driving unit compartment housing forms a protrusion at the treatment compartment housing. In other words, the driving unit compartment is a separate extension of the treatment compartment having a smaller cross section than the
30 treatment compartment. An advantage herewith is that the driving unit compartment housing is accessible from outside of the treatment chamber. According to the invention, the driving unit compartment can protrude from the treatment compartment in any direction.

35 The cleaning machine according to the invention furthermore includes a closing member, which includes at least a portion of the driving unit compartment housing

and which cooperates with an opening provided in the pressure vessel housing. The opening is closable by the closing member such that the pressure vessel housing defines a fluid tight pressure vessel enclosing both the treatment compartment and the driving unit compartment. Items in the driving unit compartment can be reached through the opening for service or repairs purposes when the closing member is removed.

According to the invention, the closing member can include a portion of the driving unit compartment housing together with adjacent portions of the pressure vessel housing. It is also possible that the closing member includes only a portion of the driving unit compartment housing. The closing member can have any suitable size and shape as long as it cooperates with the opening. However, normally the opening will not be larger than necessary for enable access to items in the driving unit compartment. Thus, the closing member will be smaller and consequently weigh less than an entire end wall of a prior art machine.

According to the invention, when the closing member is removed from the opening, the closing member can be completely separated from the pressure vessel housing or it can be pivotally connected thereto, for example by hinges.

According to one embodiment of the invention, the closing member includes the entire driving unit compartment housing. An advantage herewith is that the interior of the driving unit compartment is exposed from several sides, which facilitates the access of any items therein.

According to one embodiment of the invention, the driving unit compartment housing has a hoodlike shape, i.e. the driving unit compartment housing has side walls, one end wall and one open end as entrance opening. According to one embodiment, the driving unit compartment housing has the form of a circular cylinder with a

hemispherical end plate at one end and an entrance opening at the other end.

According to one embodiment of the invention, the driving unit compartment is substantially smaller than the treatment chamber. Consequently, even for a carbon dioxide cleaning machine having a closing member which includes the entire driving unit compartment housing, the closing member will have a weight manageable by a single operator.

10 According to one embodiment of the invention, the cleaning machine is of a type further including, disposed in the pressure vessel, a drum, for receiving objects to be cleaned, and a driving arrangement. The drum is rotatably arranged in the treatment compartment and the driving arrangement is at least partially arranged in the 15 driving unit compartment. The driving arrangement is connected to the drum and operable to rotate the drum. The driving arrangement normally comprises a motor and possibly a transmission arrangement, which can include a gearing.

20 According to one embodiment of the invention, the driving arrangement extends from the driving unit compartment into the treatment compartment through a transmission opening in the treatment compartment housing.

25 Fluid communication between the treatment compartment and the driving unit compartment can be realized by a fluid communication opening, such as a separate opening or a transmission opening for the passage of parts of any driving unit.

30 According to one embodiment of the invention, the driving arrangement is supported in the fluid communication opening such that liquid communication between the treatment compartment and the driving unit compartment is obstructed. An obstruction can be in the form of for example a shield, a bearing or a seal. 35 Thereby it is achieved that no or only little liquid is

exchanged between the treatment compartment and the driving unit compartment, whereas gas flow for pressure equalizing is permitted. An advantage herewith is that any impurities in the cleaning substance, which for
5 example originate from the objects to be cleaned, will not reach the driving arrangement inside the driving unit compartment, where the impurities could cause damage to the driving arrangement. This risk is reduced even more, if the fluid communication opening is located above the
10 maximum level of the cleaning liquid in the treatment compartment.

According to an embodiment of the invention where fluid communication between the treatment compartment and the driving unit compartment is effected by a separate
15 fluid communication connection, a substantially fluid and pressure tight sealing can be provided in the transmission opening. Such a sealing, even if located round a rotating shaft, is substantially less complicated than a sealing between compartments with high pressure
20 differences, such as in a carbon dioxide cleaning machine. If in addition a suitable filter is provided in the separate fluid connection of the compartments, it is possible to almost entirely prevent impurities to reach the driving unit compartment from the treatment
25 compartment.

According one embodiment of the invention, the entire motor is located in the driving unit compartment. A further advantage is obtained if the closing member includes the entire driving unit compartment housing,
30 i.e. the motor is exposed for service and repairs from several sides thereof when the closing member is removed.

According to one embodiment of the invention, the cleaning machine further includes a support structure mounted to and supported by the treatment compartment
35 housing. The driving arrangement of this cleaning machine according to this embodiment is mounted to the support structure. Since the driving arrangement is fully

supported without the closing member, it is especially easy to remove the closing member and thereafter perform any work on the supported driving arrangement.

According to one embodiment of the invention, the driving arrangement is aligned in a straight line with the axis of rotation of the drum. Consequently, the driving unit compartment is located such that the axis of rotation passes through the driving unit compartment. Thereby is achieved that the transmission from the motor to the drum is especially simple.

Brief Description of the Drawings

The invention may be performed in many different ways, and by way of example only, embodiments thereof will now be described in detail with reference being made to the accompanying drawings, in which:

Fig. 1 is a schematic longitudinal sectional view of a cleaning machine according to a first embodiment of the invention;

Fig. 2 is a schematic sectional view in the longitudinal direction of a cleaning machine according to a second embodiment of the invention;

Fig. 3 is a schematic longitudinal sectional view of a driving unit compartment and an adjacent portion of a treatment compartment of the cleaning machine according to the first embodiment of the invention; and

Fig. 4 is a schematic longitudinal sectional view of a driving unit compartment and portion of a treatment compartment of the cleaning machine according to the second embodiment of the invention.

Fig. 5 is a schematic longitudinal sectional view of a driving unit compartment and portion of a treatment compartment of the cleaning machine according to a third embodiment of the invention.

Detailed Description of Preferred Embodiments of the
Invention

With reference to Figs. 1 and 3, a cleaning machine in the form of a laundry dry cleaning machine adapted to be used with liquefied carbon dioxide according to a first embodiment of the invention is shown.

The cleaning machine comprises a fluid tight pressure vessel defined by a pressure vessel housing 1. The pressure vessel housing 1 includes a treatment compartment housing 2 defining a treatment compartment 3 and an driving unit compartment housing 4 defining an driving unit compartment 5. A drum 6 is rotatably arranged in the treatment compartment 3. A driving arrangement, including a motor 7 and a transmission arrangement 8, is connected to and operable to rotate the drum 6. The motor 7 is arranged in the driving unit compartment 5 and the transmission arrangement 8 extends from the motor 7 in the driving unit compartment 5 to the drum 6 in the treatment compartment 3. At a front end of the cleaning machine, the treatment compartment housing 2 is provided with a laundry opening for loading/unloading the drum 6. The laundry opening is closable by a door 9 in a fluid and pressure tight manner.

The driving unit compartment 5 is connected to the treatment compartment 3 such that there is fluid communication between them. The fluid communication is realized by a fluid communication opening 11 at a rear end of the treatment compartment housing 2, which forms a passage for fluid between the treatment compartment 3 and the driving unit compartment 5. The fluid communication opening 11 is also a transmission opening through which the transmission arrangement 8 extends. A seat 19 is provided around the fluid communication opening 11 on the outside of the treatment compartment housing 2.

The drum 6 is arranged to rotate about a horizontal central axis 10. A rotating shaft 13 of the drum 6 is supported in the fluid communication opening 11 by a

bearing arrangement 12. Thus, the fluid communication opening 11 is located at approximately half the height of treatment compartment 3. Since the cleaning machine is adapted to operate with a level of carbon dioxide liquid up to one third of the height of treatment compartment 3, the fluid communication opening 11 is located above the maximal liquid level of the cleaning machine.

Nevertheless, a sealing ring 14 is arranged in the fluid communication opening 11 for obstructing liquid flow but permitting gas flow between the treatment compartment 3 and the driving unit compartment 5. Thus, the driving unit compartment 5 and the treatment compartment 3, above the liquid level, are filled with carbon dioxide gas and have essentially the same pressure.

A cylindrical support structure 15 is attached to the treatment compartment housing 2 on the outside of the treatment compartment 3 beside the fluid communication opening 11 such that the support structure 15 surrounds the rim of the fluid communication opening 11. Thus, the support structure 15 is mounted to the treatment compartment housing 2 inside the driving unit compartment 5. In the driving unit compartment 5, the driving unit 7 is mounted to the free end of the support structure 15. A gearing arrangement 16, which is part of the transmission arrangement 8, is connected to the driving unit 7 and mounted to the inside of the cylindrical support structure 15. An output shaft 17 of the gearing arrangement 16 is connected to the rotating shaft 13 of the drum 6 by means of a shaft-coupling 18. Thus, the axis of rotation 10 of the drum 6 is aligned with the components 7, 8 of the driving arrangement. Furthermore, the driving unit compartment housing 4 forms a protrusion centrally on the rear wall of the treatment compartment housing 2. The size of the driving unit compartment 5 is substantially less than the size of the treatment compartment 3.

The driving unit compartment housing 4 has a hoodlike shape. The hoodlike driving unit compartment housing 4 comprises a cylindrical main body and a hemispherical distal end. Around a circular entrance opening at the proximal end, the hoodlike driving unit compartment housing 4 is provided with an outward facing circular flange 20. The circular flange 20 is removably connected to the seat 19 by bolts 21. A liquid and pressure tight sealing in the form of an O-ring 22 is arranged between the flange 20 and the seat 19.

The driving unit 7 and the other parts of the driving arrangement that are arranged on the outside of the treatment compartment housing 2 are covered by the hoodlike, cylindrical driving unit compartment housing 4, which thus defines the driving unit compartment 5. The driving unit compartment housing 4 is positioned such that the axis of rotation 10 of the drum 6 is in line with the central axis of the cylindrical driving unit compartment housing 4. The round cylindrical shape of the driving unit compartment housing 4 is favourable with regard to withstanding the high pressure of a carbon dioxide cleaning machine.

Finally, the cleaning machine according to the first embodiment includes a closing member comprising the entire driving unit compartment housing 4. Thus, the opening for accessing the driving unit compartment 5 corresponds to the delimitation of the driving unit compartment housing 4.

According to the invention, the driving unit compartment 5 of the first embodiment of the invention can be accessed in the following way.

The cleaning machine is emptied of the carbon dioxide fluid and the bolts 21 are unscrewed. Thereafter the closing member in form of the hoodlike driving unit compartment housing 4 is removed. Due to the limited size of the driving unit compartment 5, the driving unit compartment housing/closing member 4 has a weight of

approximately 30 Kg. After the removal, the motor 7 is fully exposed and accessible from all sides except from the wall of the treatment compartment housing 2.

Furthermore, the gearing arrangement 16 of the transmission arrangement 8 can be accessed through holes 24 in the support structure 15. Since the driving arrangement is supported in the fluid communication opening 11 and by the support structure 15, any service or repair work can be readily performed.

When the inspection is finished, the driving arrangement is inserted through the entrance opening of the closing member in form of the hoodlike driving unit compartment housing 4. The driving unit compartment housing 4 is then passed over the projecting parts of the driving arrangement and secured to the treatment compartment housing 2 by the bolts 21. The sealing 22 ensure the liquid and pressure tight closing of the pressure vessel housing 1.

In Fig. 2 and 4 a second embodiment of the cleaning machine according to invention is shown. In Figs 2 and 4, those components that correspond to components shown in Figs. 1 and 3 have the same reference numerals. The embodiment according to Figs. 2 and 4 differs from the first embodiment described above substantially only in that the driving unit compartment housing 4 is arranged protruding from the top side of the treatment compartment housing 2 at a rear end thereof and in the layout of the driving arrangement.

The fluid communication between the driving unit compartment 5 the treatment compartment 3 is realized by a fluid communication opening 11 in the top wall of the treatment compartment housing 2. Thus, the fluid communication opening 11 is located as far as possible from the level of carbon dioxide liquid in the cleaning machine. The fluid communication opening 11 is also a transmission opening through which the transmission arrangement 8 extends.

A cylindrical support structure 15 is attached to the treatment compartment housing 2 on the outside of the treatment compartment 3 over the fluid communication opening 11. In the driving unit compartment 5, the motor 7 is mounted to the support structure 15 at the driving unit compartment side thereof. An outgoing shaft 25 of the motor 7 is connected to an angle gear 26 being part of a transmission arrangement 8 by means of a shaft-coupling 18. The angle gear 26 is connected to the support structure 15 at the treatment compartment side thereof. In the treatment compartment 3 the angle gear is connected to a belt driving arrangement 27. The belt 28 of the belt driving arrangement 27 is passed around the drum 6 for rotating the drum 6.

In Fig. 5 a third embodiment of the cleaning machine according to invention is shown. In Fig. 5, those components that correspond to components shown in Figs. 1 and 3 have the same reference numerals. The embodiment according to Fig. 5 differs from the first embodiment described above substantially only in that the fluid communication between the driving unit compartment 5 and the treatment compartment 3 is affected by a connection separate from the transmission opening 11.

The fluid communication between the driving unit compartment 5 the treatment compartment 3 is realized by a fluid communication connection including a fluid communication opening 28 in the rear wall of the treatment compartment housing 2, a fluid communication opening 29 in the cylindrical wall of the driving unit compartment housing 4 and a duct 30 connecting the fluid communication openings 28, 29. The duct 30 is provided with a filter 31 at the fluid communication opening 28.

In the transmission opening 11, a substantially fluid and pressure tight sealing 32 is provided. Thus, it is possible to almost entirely prevent impurities to reach the driving unit compartment from the treatment compartment.

According to the third embodiment, in addition to the hoodlike driving unit compartment housing 4, the duct 32 has to be removed or at least disconnected from the driving unit compartment housing 4, when the driving unit compartment 5 is to be inspected. For this purpose, the duct is releasable attached to the treatment compartment housing 2 and the driving unit compartment housing 4 in a fluid and pressure tight manner.

Claims

1. A cleaning machine, such as a laundry cleaning machine, comprising a fluid tight pressure vessel defined
5 by a pressure vessel housing; wherein

the pressure vessel housing includes a treatment compartment housing, which defines a treatment compartment, and a driving unit compartment housing, which defines a driving unit compartment and protrudes
10 from the treatment compartment housing;

the driving unit compartment is connected to the treatment compartment such that there is fluid communication between the driving unit compartment and the treatment compartment;

15 the pressure vessel housing has an opening for exposing the driving unit compartment, and a removable closing member for closing the opening in a fluid and pressure tight manner; and wherein

the closing member includes at least a portion of
20 the driving unit compartment housing such that, when the closing member is removed, the driving unit compartment is accessible from outside the treatment compartment.

2. The cleaning machine according to claim 1, wherein the treatment compartment housing has a front
25 wall, a back wall and side walls; and wherein the driving unit compartment housing is connected to one wall of the treatment compartment housing, such that the driving unit compartment housing covers less than half the extension of the one wall.

30 3. The cleaning machine according to claim 1 or 2, wherein the driving unit compartment housing has a hoodlike shape, the closing member includes the hoodlike driving unit compartment housing, such that, when the closing member is removed, the interior of the driving
35 unit compartment is completely uncovered for enabling unrestricted access to any items therein.

4. The cleaning machine according to claim 3,
wherein the hoodlike driving unit compartment housing has
an entrance opening and wherein the closing member, which
includes the hoodlike driving unit compartment housing,
5 is detachably attached to the treatment compartment
housing with the entrance opening facing the driving unit
compartment housing.

5. The cleaning machine according to any of the
claims 1 - 4, wherein the treatment compartment housing
10 has a transmission opening which is connected to the
driving unit compartment, and wherein the fluid
communication between the treatment compartment and the
driving unit compartment takes place through the
transmission opening.

15 6. The cleaning machine according to claim 5,
wherein the transmission opening is provided with a
shielding device for reducing liquid communication
between the treatment compartment and the driving unit
compartment.

20 7. The cleaning machine according to any of the
claims 1 - 6, wherein the treatment compartment housing
has a transmission opening which is connected to the
driving unit compartment, and a fluid communication
opening; the driving unit compartment housing has a fluid
25 communication opening; and wherein the fluid
communication openings are connected such that the fluid
communication between the treatment compartment and the
driving unit compartment takes place through the fluid
communication openings.

30 8. The cleaning machine according to claim 7,
wherein the transmission opening is provided with a
sealing, which obstructs fluid communication between the
treatment compartment and the driving unit compartment
through the transmission opening.

35 9. The cleaning machine according to claim 7 or 8,
wherein a filter is provided in the connection between
the fluid communication openings.

10. The cleaning machine according to any of the claims 5 - 9, wherein

a drum, for receiving objects to be cleaned, and a driving arrangement are disposed in the pressure vessel;

5 the drum is rotatably arranged in the treatment compartment;

the driving arrangement is at least partially arranged in the driving unit compartment; and wherein

10 the driving arrangement is connected to the drum and operable to rotate the drum.

11. The cleaning machine according to claim 4 and 10, wherein the driving arrangement extends from the driving unit compartment into the treatment compartment through the transmission opening; and wherein the closing member, which includes the hoodlike driving unit
15 compartment housing, is attached to the treatment compartment housing around the rim of the transmission opening with the entrance opening facing the transmission opening.

20 12. The cleaning machine according to claim 11, wherein a support structure is provided inside the driving unit compartment, which, at least at one side of the transmission opening, is mounted to the treatment compartment housing.

25 13. The cleaning machine according to claim 12, wherein a motor of the driving unit is mounted to the support structure.

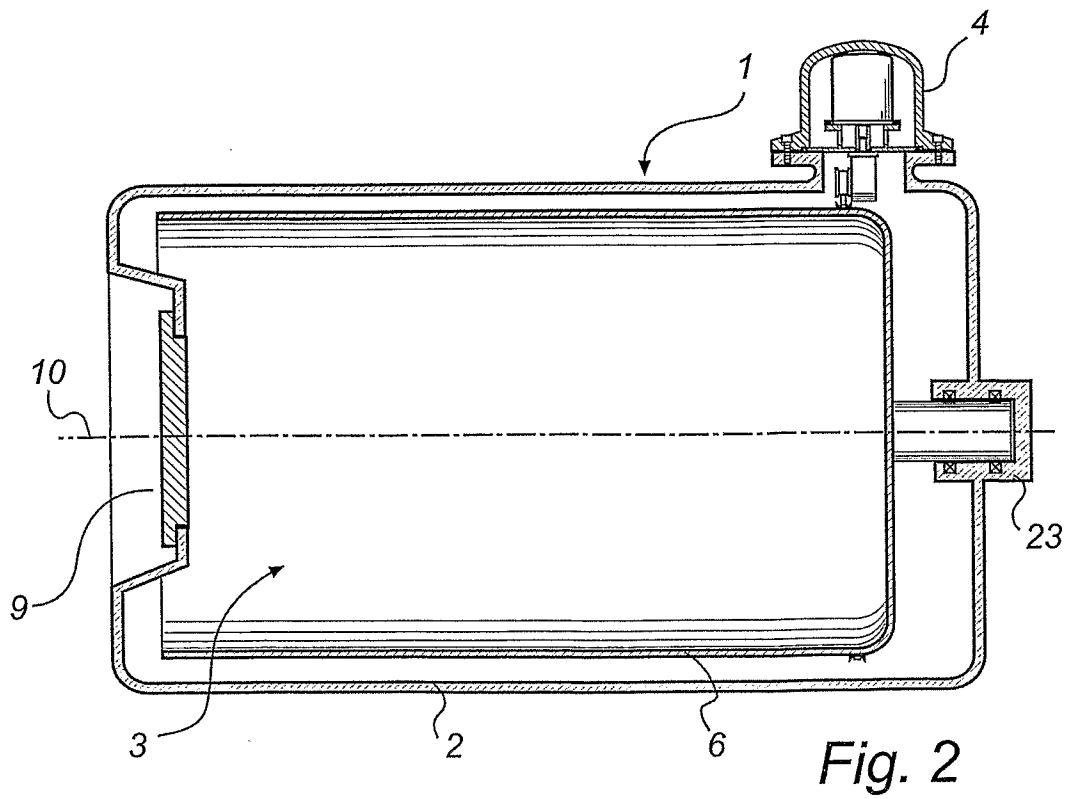
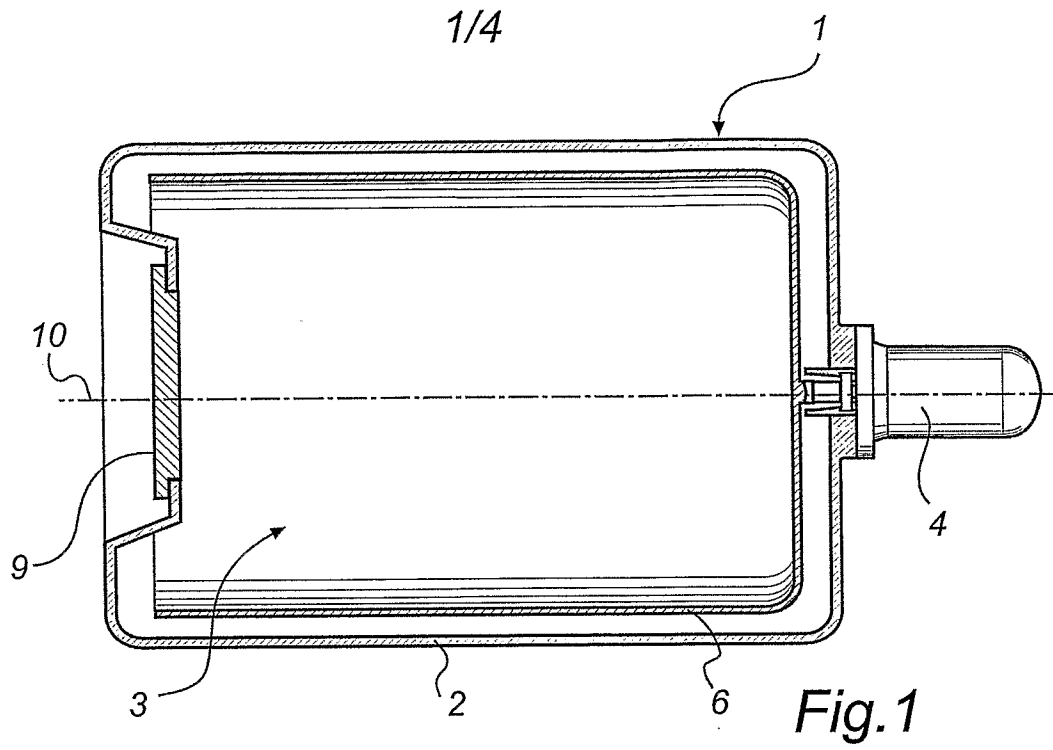
14. The cleaning machine according to claim 12 or 13, wherein a transmission arrangement of the driving
30 unit is mounted to the support structure.

15. The cleaning machine according to any of the claims 10 - 14 wherein the drum is rotatable about an axis, and wherein the driving unit compartment housing is located such that the driving arrangement is aligned with
35 the axis.

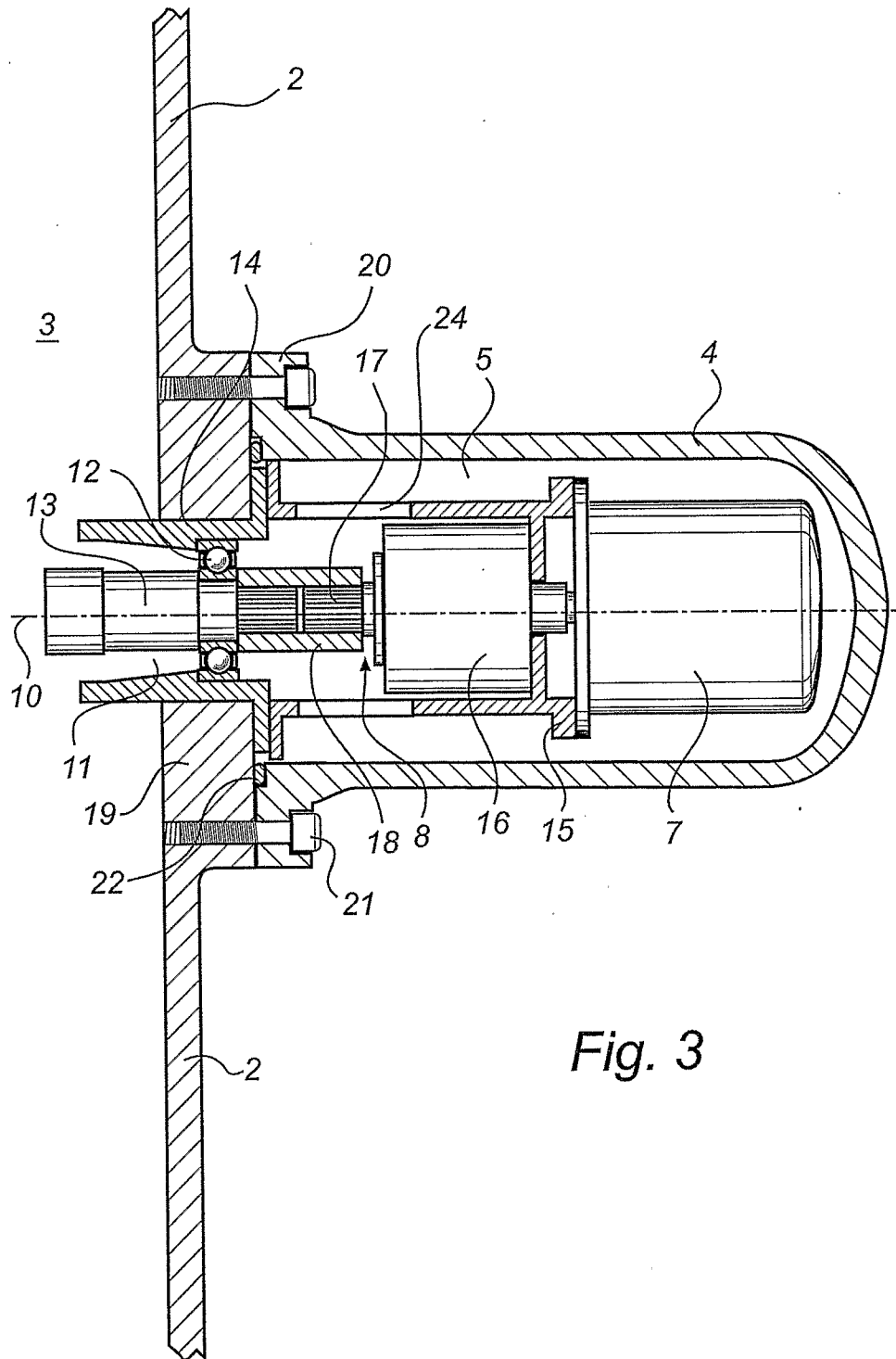
16. The cleaning machine according to any of the claims 10 - 15, wherein the drum is rotatable round an essentially horizontal axis.

5 17. The cleaning machine according to any of the claims 1 - 16, wherein the fluid communication between the driving unit compartment and the treatment compartment takes place above 1/3 of the height of the treatment compartment.

10 18. The cleaning machine according to any of the claims 1 - 17, wherein the pressure vessel is adapted and dimensioned for use with densified liquid state treatment gas, such as carbon dioxide.



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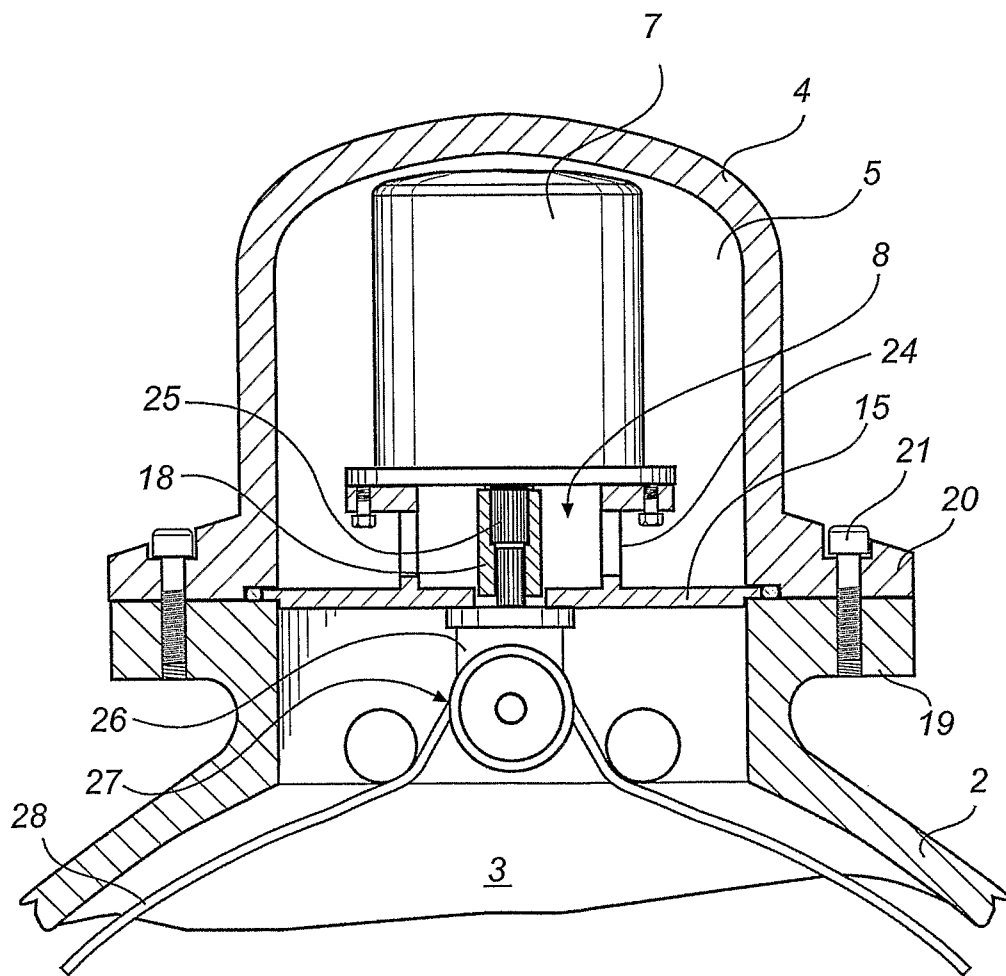
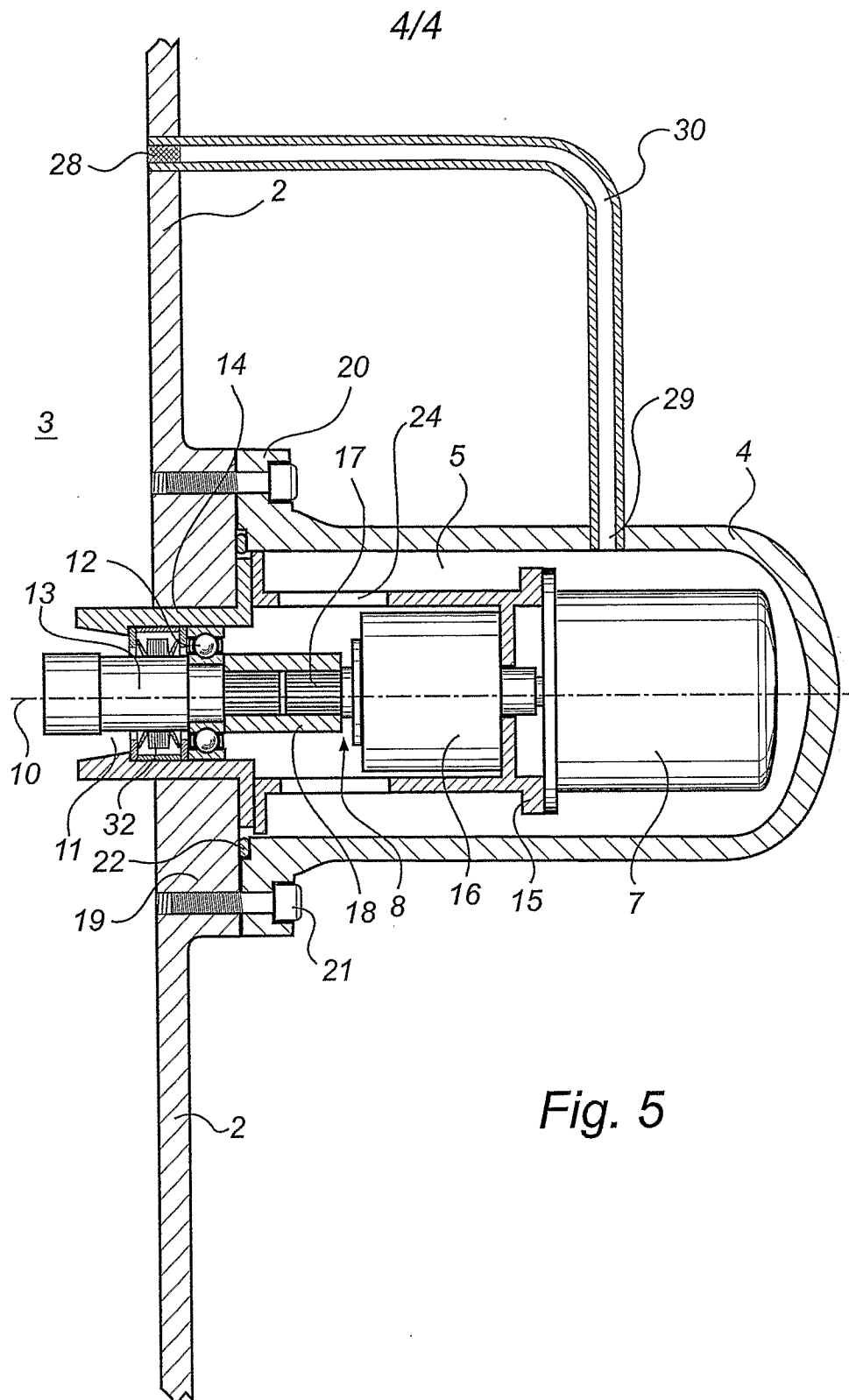


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2007/000260

A. CLASSIFICATION OF SUBJECT MATTER		
IPC: see extra sheet 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: D06F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6351973 B1 (MCCLAIN ET AL), 5 March 2002 (05.03.2002), whole document --	1-10,12-18
Y	US 6148647 A (KABEYA ET AL), 21 November 2000 (21.11.2000), whole document --	1-10,12-18
A	US 6412312 B1 (MCCLAIN ET AL), 2 July 2002 (02.07.2002), whole document -- -----	1-18
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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4 June 2007		02-06-2007
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International patent classification (IPC)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

28/04/2007

International application No.

PCT/SE2007/000260

US 6351973 B1 05/03/2002 NONE

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