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ATTACHMENT FOR A VACUUM CLEANER OR A VACUUM-CLEANING PIPE
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- (57) Claim

1. Attachment for a vacuum cleaner or a vacuum-cleaning pipe for the collecting of sucked-up liquid, and configured as a closed container with a suction connection for a nozzle and with a vacuum connection for a hose leading to the vacuum cleaner or the vacuum-cleaning pipe, and with a separation chamber provided in the container and connected to the suction connection for the separation of the sucked-up liquid and collection in a collection chamber, and with a float-controlled valve between the collection chamber and the vacuum connection, characterized in that the suction connection is placed in the top of the container where the container opens out into the separation chamber, which comprises a channel system demarcated by wall surfaces, the undersides of which are located above the collection chamber and whose vertical surfaces are configured at the bottom with a drip edge, while on the underside of the horizontal surfaces there are provided drip cones.



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DK]; Søndergade 24, DK-8783 Hornsyld (DK).(74) Agent: LARSEN & BIRKEHOLM A/S SKANDINA-
VISK PATENTBUREAU ; Skagensgade 64, P.O. Box
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tent), US.

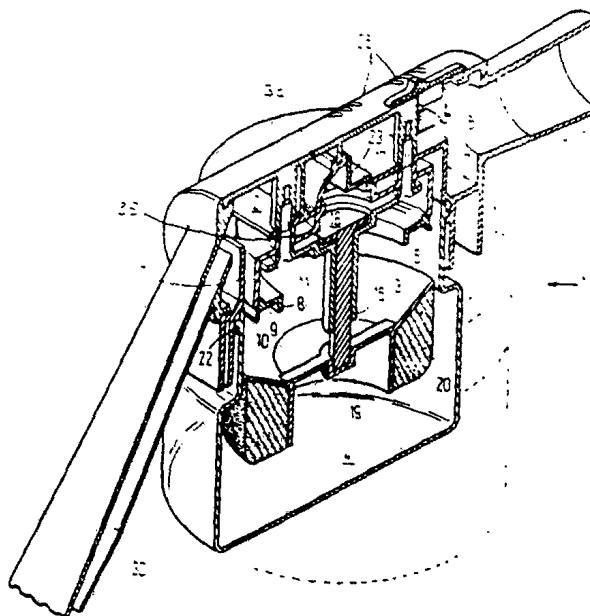
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(54) Title: ATTACHMENT FOR A VACUUM CLEANER OR A VACUUM-CLEANING PIPE



(57) Abstract

For the sucking-up of, for example, cleaning fluid (32) from spot-cleaning of a carpet by means of a vacuum cleaner, there can be used an attachment (1) to which the vacuum cleaner hose (31) is connected, and which according to the invention comprises a separation chamber (3) in which the sucked-up liquid is separated from the suction air by being deposited on the wall surfaces (5, 6, 8, 11) of the chamber, from where it drips down into the collection chamber (21). The liquid is hereby completely separated from the air, whereby a commonly-known vacuum cleaner can be used without any danger of it being damaged. In order to ensure that the suction air through the attachment (1) is cut off in the event of the liquid (33) in the container (21) reaching the vicinity of the suction channel (16), there is provided a valve element (18) and a float element (20) which cuts off the suction air and therewith the liquid through the attachment (1) when the maximum liquid level (34) has been reached in the container (1). A finger-operated valve (23, 24, 25) can optionally cut off the suction air through the attachment (1) for the regulation of the sucking-up.

ATTACHMENT FOR A VACUUM CLEANER OR A VACUUM-CLEANING PIPE

Background of the invention

5 The invention relates to an attachment for a vacuum cleaner or a vacuum-cleaning pipe for the collecting of sucked-up liquid, and configured as a closed container with a suction connection for a nozzle and with a vacuum connection for a hose leading to the vacuum cleaner or the vacuum-cleaning
10 pipe, and with a separation chamber provided in the container and connected to the suction connection for the separation of the sucked-up liquid and collection in a collection chamber, and with a float-controlled valve between the collection chamber and the vacuum connection.

15 The increased use of carpets as floor covering has led to a rising need for the cleaning of this type of covering. Where dry dust is involved, the hitherto-used means is vacuum cleaning, which in most cases is also adequate for
20 normal cleaning.

However, where the spillage of liquids occurs, for example drinks and the like, use must be made of other methods. This will mainly be the sucking-up of the liquid and
25 possible subsequent spot-cleaning by means of special fluids.

Furthermore, the use is known of specially-developed carpet-cleaning machines, which are normally used by professional cleaning personnel, and which therefore can
30 seldom be considered for use in private homes.

Here it is necessary to make use of cleaning agents in fluid or foam form, which dissolve the stain and are thereafter removed by drying.
35

However, this form of spot-cleaning is not particularly effective, in that the amount of fluid is far too small, and thus the dissolving ability is strongly limited. Since vacuum cleaning must not involve the sucking-up of air which contains liquid, there is consequently no help to be found in the use of a vacuum cleaner.

The removal of stains thus becomes troublesome, in that this must comprise a softening by means of the cleaning agent and a subsequent washing out of the cleaning agent from the carpet. This requires not only a considerable amount of liquid, but also a correspondingly large amount of work in the absorption of the liquid by means of absorption elements of material or paper. During this work, the liquid is spread in all directions, and a possible blotch formation will therefore be of a relatively large extent.

To remedy these inconveniences, various attachments have been developed for vacuum cleaners, which can herewith suck up the liquid which exists on the carpet.

From the description of US patent no. 4,179,769 there is known an attachment for the sucking-up and the separation of liquid which can be connected to a vacuum cleaner suction hose. In the suction of liquid, only to a certain degree will it be separated from the air and collected in a collection container when a finger-operated valve opens for the vacuum through the attachment. Consequently, the separation of liquid is not particularly effective, and moreover there is a risk of the sucking-in of liquid when the level of the liquid in the collection container becomes too high.

This gives rise to the risk of damage to the vacuum cleaner motor because of the moisture content of the air. Further-

more, the load on the motor is very high in those cases where the valve is closed for the vacuum due to the flow of air being cut off.

5 From the description in EPO no. 0,188,250 there is known an attachment with a built-in float-controlled valve which serves to block the suction through the attachment when the liquid level gets too high.

10 This attachment is provided with a porous filter element through which the moist air is led, and in which the liquid separation takes place. However, this method of separation is not particularly expedient, the reason being that it results in a considerable reduction of the suction power,
15 in that the formation of droplets will completely or partly block the passage of the air through the filter. Similarly, the airways become relatively short, whereby there is a risk of a liquid content in the air which is harmful for the vacuum cleaner motor. Thus, the equipment would involve
20 a highly reduced suction effect and a low liquid separation.

Both of these types of attachments also suffer the disadvantage that they do not cut off the vacuum in the event
25 of the surface of the liquid reaching the vacuum connection, which can happen if the container is tipped over or the attachment is tilted too much during its use.

Advantages of the invention

30 The attachment according to the invention, with the characterizing features as disclosed in the main claim, namely that the suction connection is placed in the top of the container, where it opens out into the separation chamber
35 which comprises a channel system demarcated by wall surfaces, the undersides of which are located above the

collection chamber and whose lower vertical surfaces are configured at the bottom with a drip edge, while on the underside of the horizontal surfaces there are provided drip cones resulting in a hitherto unattainable separation of the liquid from the sucked-in mixture of liquid and air, and without any significant reduction in the suction effect. Therefore, the attachment can be connected without risk to a normal vacuum cleaner, which makes the cleaning of stains on carpets in private homes a simple matter. This can be done by means of the attachment and a commonly-known vacuum cleaner, in that the attachment ensures that the content of moisture in the air is low, whereby the suction effect of the vacuum cleaner and also its electrical insulation properties are safely maintained.

An open channel system in the separation chamber with this configuration of the walls and the surfaces in the channel system will result in a surprisingly effective separation of the moisture. This is due partly to the turbulent flows imparted to the air in the chamber, and whereby the air is effectively brought into contact with the surfaces, and partly to the many drop-forming surfaces with which the walls and the surfaces of the chamber are provided.

The drip edges and the drip cones will thus in an effective manner promote the separation of the moisture, which quickly and effectively drips down into the collection container. As mentioned, this dripping down of the moisture takes place in an open channel system in such a manner that no restrictions are formed in the passage, and thus there is no loss of pressure in the attachment. This is of utmost importance for the applicability of the equipment, in that the high suction capacity provides an effective induction and herewith the drying of the moist part of the carpet.

As disclosed in claim 2, by allowing the air to leave the

chamber through a horizontal chamber with an upwardly-
extending channel to the vacuum connection, it is ensured
that the air does not contain residue moisture, in that the
remaining moisture will be deposited on the walls of the
5 'chamber during its passage through the chamber, and
possible dripping will be led to the collection container.

As disclosed in claim 3, by placing the shut-off valve in
the top of the container and the float element in the
10 bottom of the container, the closing can be effected com-
pletely without risk of overflow to the vacuum hose.

As disclosed in claim 4, by mounting a finger-operated
shut-off valve on the container, the attachment will lend
15 itself to easy operation by the user during its use, and
since air is led from the outside to the vacuum hose when
the valve is closed, the vacuum cleaner motor is spared for
overload as there will always be a flow of air in the
vacuum hose.

20

The drawing

An example embodiment according to the invention is shown
in the drawing, where

25

fig. 1 shows the attachment seen in perspective,

fig. 2 shows the attachment in cross-section,

30

fig. 3 shows the attachment before it is taken into use,

fig. 4 shows the attachment during suction, and

35

fig. 5 shows the attachment with float-controlled valve
closed.

Description of the example embodiment

As shown in fig. 1, the attachment is configured as a portable container 1, above which there is a hose stub 27 to which a vacuum cleaner hose or vacuum-cleaning pipe 31, see figs. 4 and 5, can be connected.

In the cross-sectional view in figs. 2-5, it can be seen how the attachment is arranged. On the front of the container 1 there is provided a swivel link 28 in which a suction nozzle 29, which extends some distance outwards from the container, is mounted in such a manner that it forms a pivotable suction channel 30 for the liquid.

As indicated in fig. 2, openings are configured anteriorly, and not-shown dust traps could also be provided in the nozzle to prevent nap and the like from being sucked into the container 1.

As shown by the stippled line in fig. 3, the nozzle 29 can be turned to the sides, hereby enabling the treatment of inclined surfaces, e.g. on furniture.

In the top of the container there is mounted a valve 17, 18 and a separation chamber 3. The separation chamber is arranged in such a manner that the liquid, when sucked up, is effectively separated from the air and collected in a lower chamber 4 which is formed in the container 21. By means of a fitting 22 or for example a thread, the container can be secured to the upper part of the container so that the container can be taken off and emptied of liquid 33.

The separation chamber is configured as a channel system comprising a suction connection 2 placed after the swivel link 28, the bottom of said suction connection 2 opening

out into an annular chamber 7 having an outer side wall 5 consisting partly of the chamber and partly of the upper part of the collection container 21, and an inner wall 6 with lower portions which end in a drip edge 10. The bottom of this inner wall 6 is provided with a further inner annular wall 8 to form a downwardly-open gutter channel 9.

The walls and the chambers all open out over the collection chamber 4. The exit from the chamber takes place through a horizontal chamber 13 which is formed between a circular plate 11, which is secured by means of screws to a number of stays 14 in the top of the chamber, and an upper plate 35, which in the middle is provided with an upwardly-extending stub 36 which opens out in a discharge opening 16.

As shown in the partial enlargement in fig. 3, the underside of the plate 11 is provided with drip cones 12.

The middle of the plate is configured with a guide 15 which extends downwards into the container 1. As shown in fig. 5, a valve element 18 is suspended above the guide so that it can move upwards and close the discharge opening 16.

To the valve element 18 there is secured a spindle 19 which can slide in the guide 15, and which at the bottom supports a float element 20 which consists mainly of a ring of synthetic foam material secured in a holder.

As will appear from fig. 5, the float element 20 is moved upwards when the liquid reaches the level 34, and the vacuum in the discharge opening 16 will hereby instantly cause the valve element 18 to close for all further suction through the container 1.

35

The float element 20 is very light, so if the container is

tilted the valve can close before liquid can manage to run out into the discharge opening and the suction hose 31 and possibly damage the vacuum cleaner.

5 On the top there is mounted a finger-operated valve comprising a valve element 23, the front of which closes the discharge opening 16 by means of a tension spring 24 which is secured to the one stay 14.

10 The valve element 23 is additionally provided with a number of slotted openings 26 which match corresponding openings in the top of the container, so that access is hereby provided for air from the outside to the suction connection 27 when the valve is closed, as shown in figs. 2 and 3.

15 When the attachment is to be used for sucking up an accumulation of liquid 32, for example on a carpet, the suction nozzle 29 is swivelled down with its end in the liquid. At the same time, the finger-operated valve is
20 opened by sliding back the button 25, as shown in fig. 4. Access for the air from outside through the openings 26 is hereby cut off, and a suction of the liquid can commence when the vacuum cleaner or the suction is activated.

25 When the liquid reaches the separation chamber 3, it is exposed to impact against the walls in the channel system and its velocity is reduced, whereby the liquid molecules and droplets are deposited on the walls, after which the liquid runs downwards and is collected in the container.

30 After a period of time the surface of the liquid in the container will reach a given level 34, as shown in fig. 5, whereby the float element 20 will be lifted upwards. The valve element 18 will thus cut off the vacuum through the
35 attachment and prevent liquid from flowing to the vacuum hose. Hereafter, the valve button 25 can be released and

the outside air will flow to the vacuum hose 31, whereby the vacuum cleaner is spared.

5 As mentioned earlier, this will also happen if the container is tilted so that there is a risk of liquid reaching the discharge opening 16.

10 By means of this attachment and an ordinary vacuum cleaner, liquid will thus be able to be sucked up in an effective manner without any significant reduction in the suction effect, and without this induction of the liquid giving rise to any risk of damage to the vacuum cleaner.

15 The attachment will be made mainly of synthetic materials, and since there is no significant wear on the parts, it will be inexpensive to produce and will have a long life-time.

20

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Attachment for a vacuum cleaner or a vacuum-cleaning pipe for the collecting of sucked-up liquid, and configured as a closed container with a suction connection
5 for a nozzle and with a vacuum connection for a hose leading to the vacuum cleaner or the vacuum-cleaning pipe, and with a separation chamber provided in the container and connected to the suction connection for the separation of the sucked-up liquid and collection in a collection
10 chamber, and with a float-controlled valve between the collection chamber and the vacuum connection, characterized in that the suction connection is placed in the top of the container where the container opens out into the separation chamber, which comprises a channel
15 system demarcated by wall surfaces, the undersides of which are located above the collection chamber and whose vertical surfaces are configured at the bottom with a drip edge, while on the underside of the horizontal surfaces there are provided drip cones.
- 20 2. Attachment according to claim 1, characterized in that the exit from the separation chamber to the vacuum connection takes place through a horizontal chamber having an underside consisting of a plate and a top consisting of a plate, the middle of which is provided with an
25 upwardly-extending stub which opens out in a discharge opening.
3. Attachment according to claim 1 or 2, characterized in that the valve is placed in a separation chamber close to the vacuum connection and provided with a valve spindle
30 which extends downwards into the collection chamber and has connection with a float element.
4. Attachment according to any one of claims 1-3 characterized in that there is also mounted a
35 finger-operated valve between the valve and the vacuum connection, said valve being provided with a slide valve



which provides access for air from outside through openings in the container when the vacuum is cut off, and when closed opens for the suction in the container.

Dated this 22nd day of March 1995

LARS CHRISTENSEN

By: Patent Attorneys for
the Applicant
F B RICE & CO.



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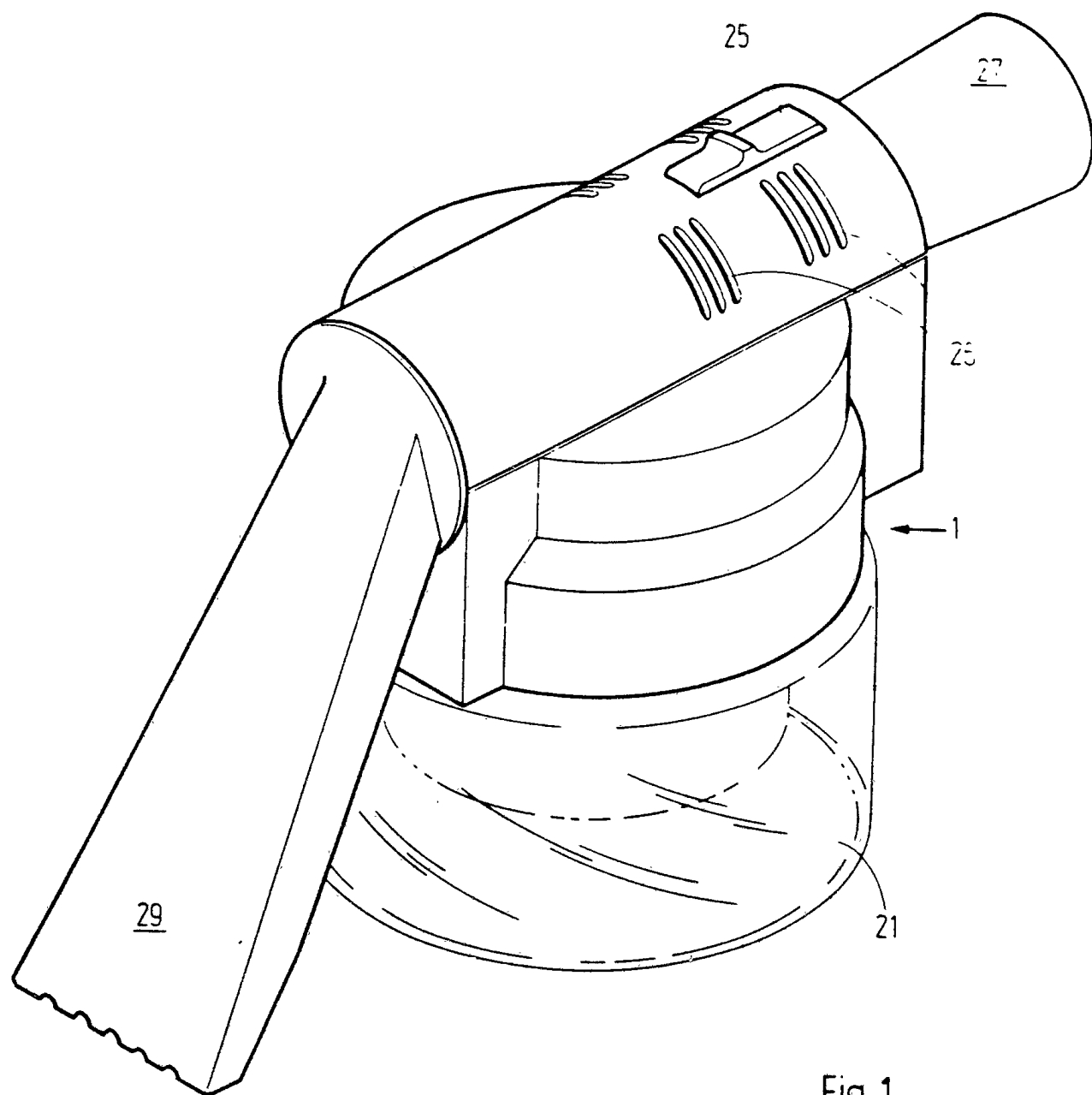


Fig. 1

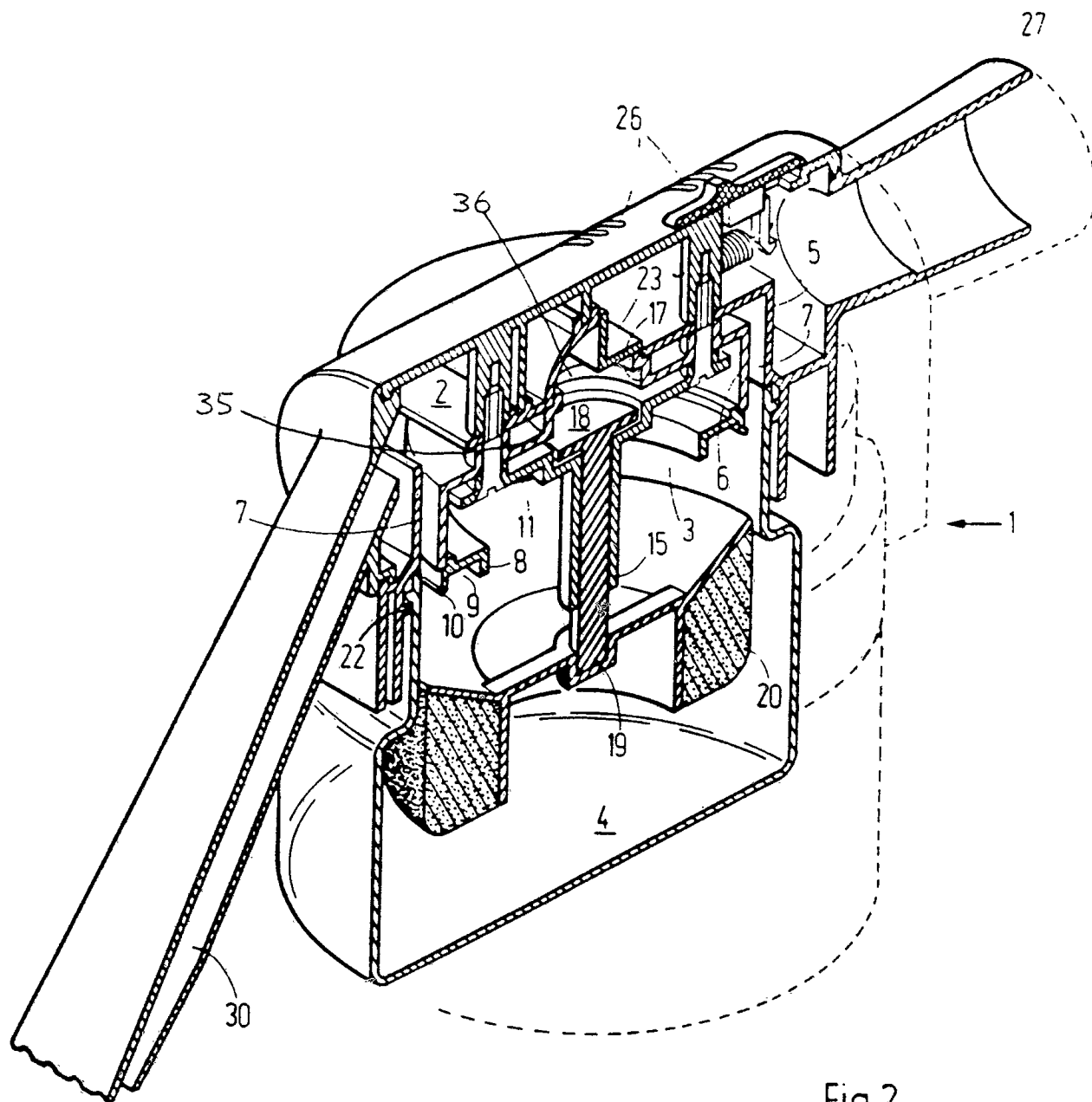


Fig.2

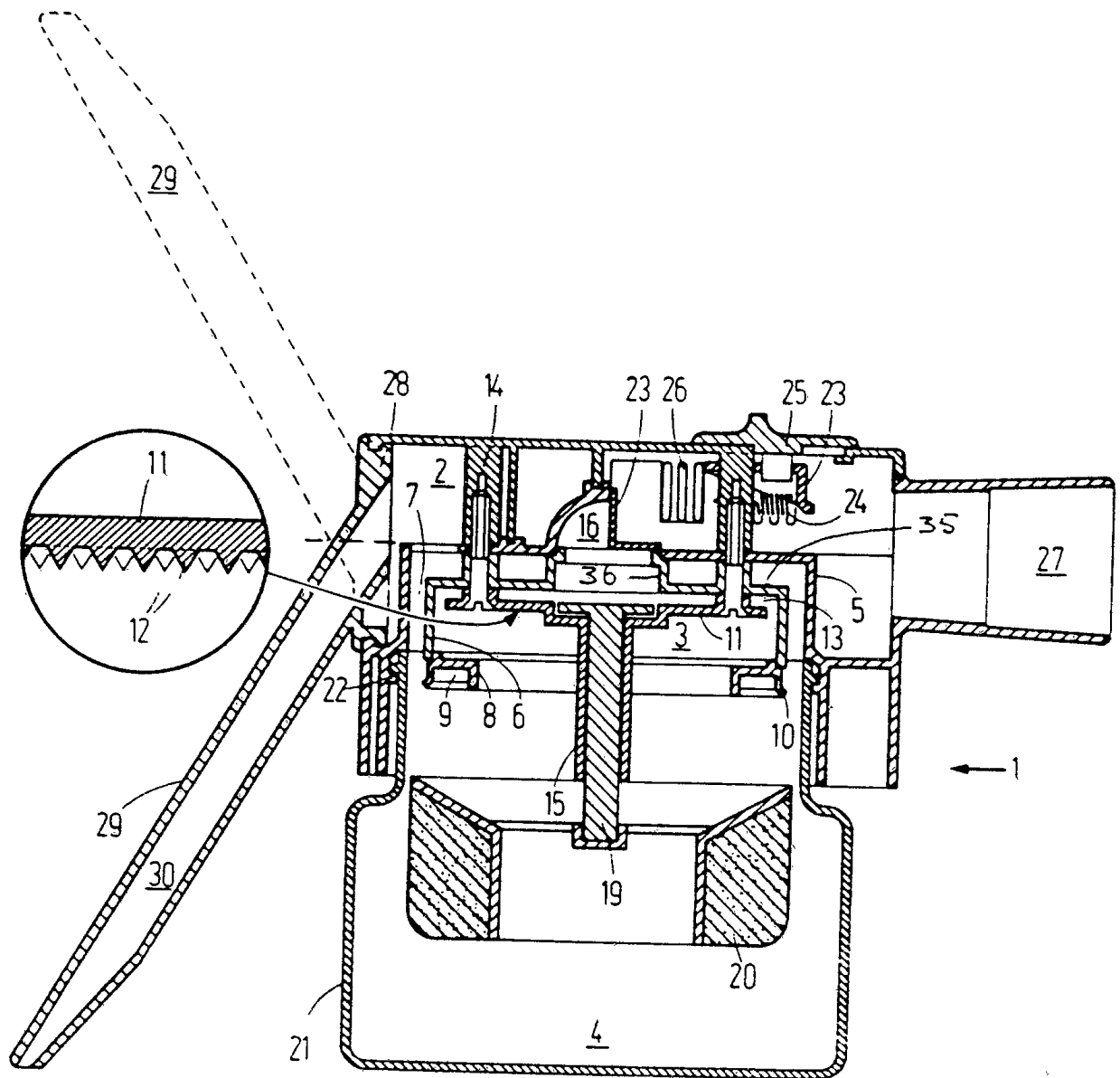


Fig. 3

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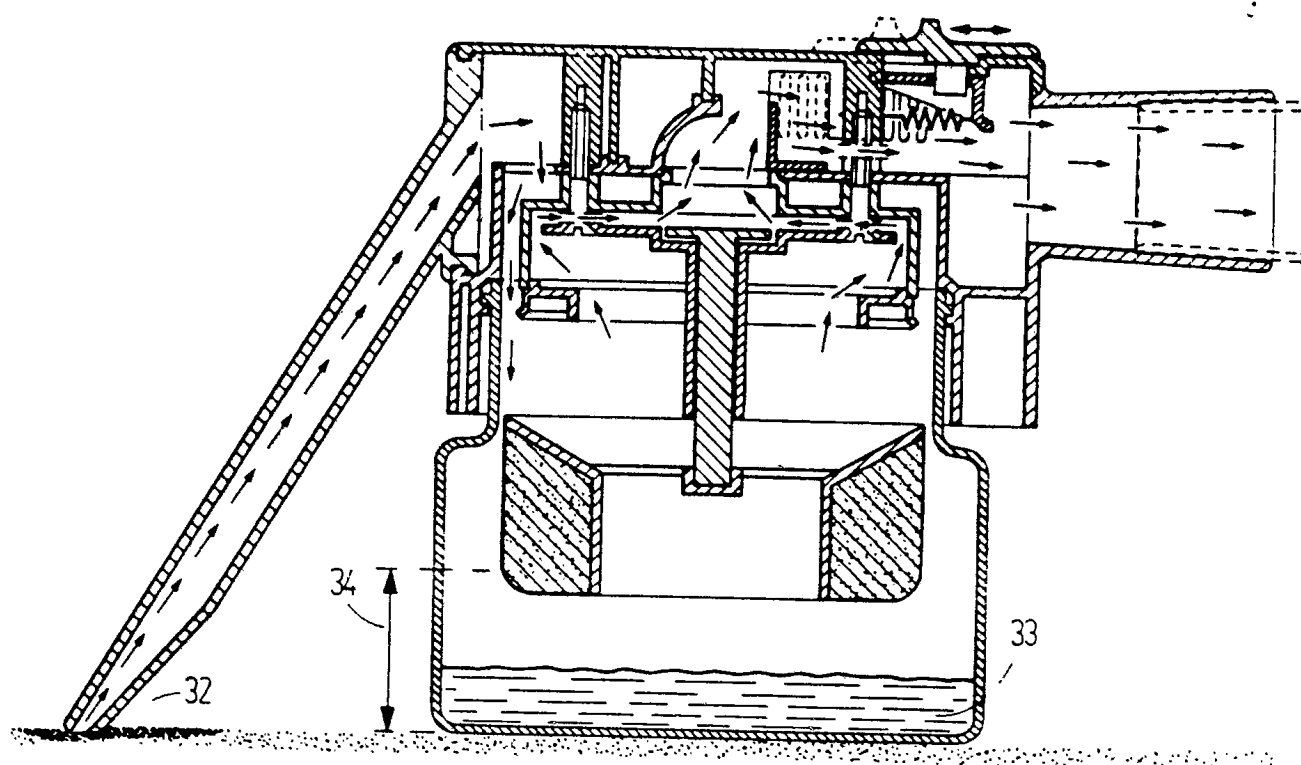


Fig. 4

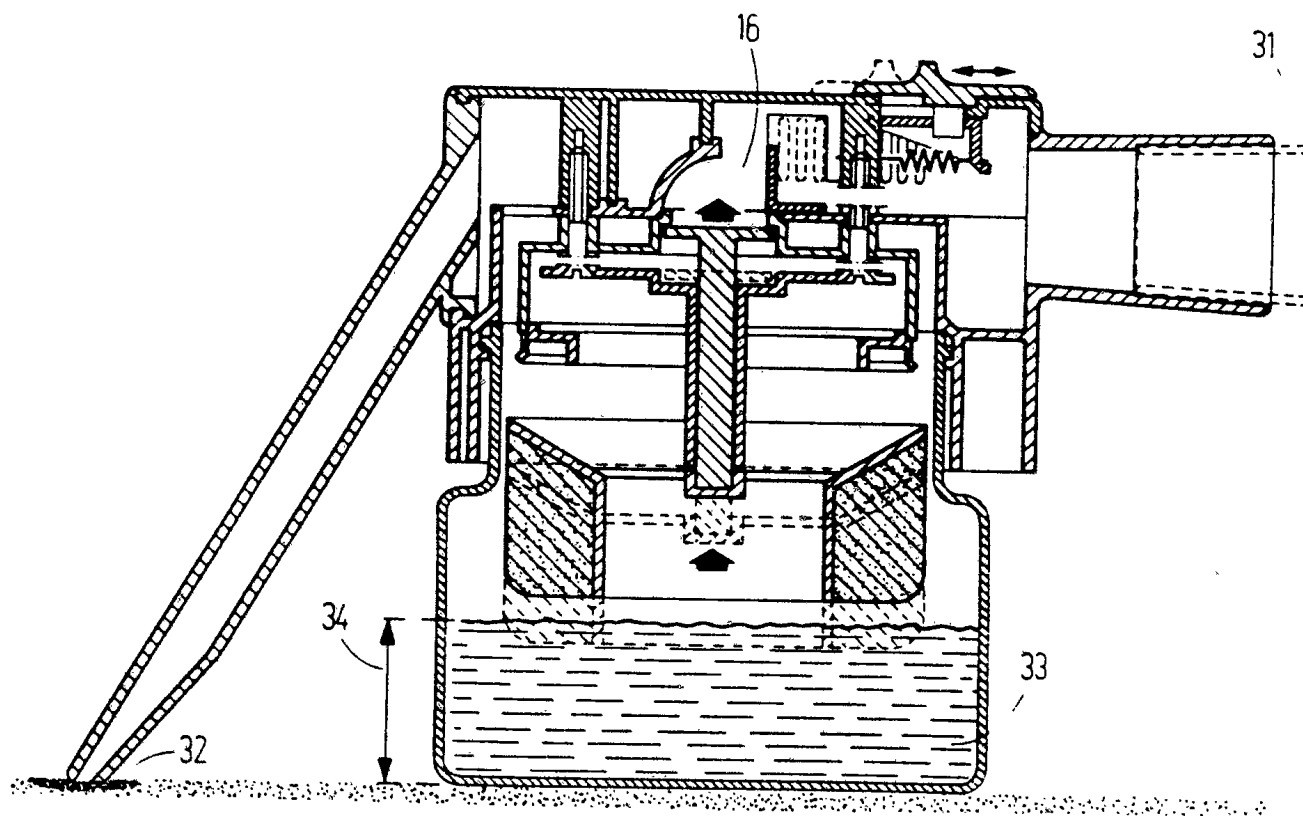


Fig. 5

INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 92/00030

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: A 47 L 7/00																	
II. FIELDS SEARCHED Minimum Documentation Searched⁷ <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; border-bottom: 1px solid black;">Classification System</td> <td style="border-bottom: 1px solid black;">Classification Symbols</td> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">IPC5</td> <td style="vertical-align: bottom;">A 47 L</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸ SE,DK,FI,NO classes as above			Classification System	Classification Symbols	IPC5	A 47 L											
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IPC5	A 47 L																
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="width: 70%; border-bottom: 1px solid black;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 20%; border-bottom: 1px solid black;">Relevant to Claim No.¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>US, A, 4179769 (LUNDQUIST) 25 December 1979, see figures 2,3 --</td> <td style="text-align: center; vertical-align: top;">4</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>EP, A1, 0216112 (SHOP-VAC CORPORATION) 1 April 1987, see abstract; figure 1 --</td> <td style="text-align: center; vertical-align: top;">1-4</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>EP, A1, 0188250 (WIZARD PRODUCTS LTD) 23 July 1986, see page 3 - page 6 --</td> <td style="text-align: center; vertical-align: top;">1-4</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A,P</td> <td>WO, A1, 9111953 (BE-CLEAN PRODUKT I BORÅS AKTIEBOLAG) 22 August 1991, see figure 1 -- -----</td> <td style="text-align: center; vertical-align: top;">1-4</td> </tr> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	US, A, 4179769 (LUNDQUIST) 25 December 1979, see figures 2,3 --	4	A	EP, A1, 0216112 (SHOP-VAC CORPORATION) 1 April 1987, see abstract; figure 1 --	1-4	A	EP, A 1 , 0188250 (WIZARD PRODUCTS LTD) 23 July 1986, see page 3 - page 6 --	1-4	A,P	WO, A1, 9111953 (BE-CLEAN PRODUKT I BORÅS AKTIEBOLAG) 22 August 1991, see figure 1 -- -----	1-4
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A,P	WO, A1, 9111953 (BE-CLEAN PRODUKT I BORÅS AKTIEBOLAG) 22 August 1991, see figure 1 -- -----	1-4															
* Special categories of cited documents:¹⁰ "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 "T" 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 "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. "&" document member of the same patent family																	
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="text-align: center;">4th May 1992</td> <td style="text-align: center;">1992 -05- 0 5</td> </tr> <tr> <td style="border-bottom: 1px solid black;">International Searching Authority</td> <td style="border-bottom: 1px solid black;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center;">SWEDISH PATENT OFFICE</td> <td style="text-align: center;">Björn Kallstenius</td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	4th May 1992	1992 -05- 0 5	International Searching Authority	Signature of Authorized Officer	SWEDISH PATENT OFFICE	Björn Kallstenius							
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SWEDISH PATENT OFFICE	Björn Kallstenius																

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/DK 92/00030**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 28/03/92. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4179769	79-12-25	NONE	
EP-A1- 0216112	87-04-01	AU-B- 575773	88-08-04
		AU-D- 6249086	87-04-02
		CA-A- 1255857	89-06-20
		US-A- 4623366	86-11-18
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