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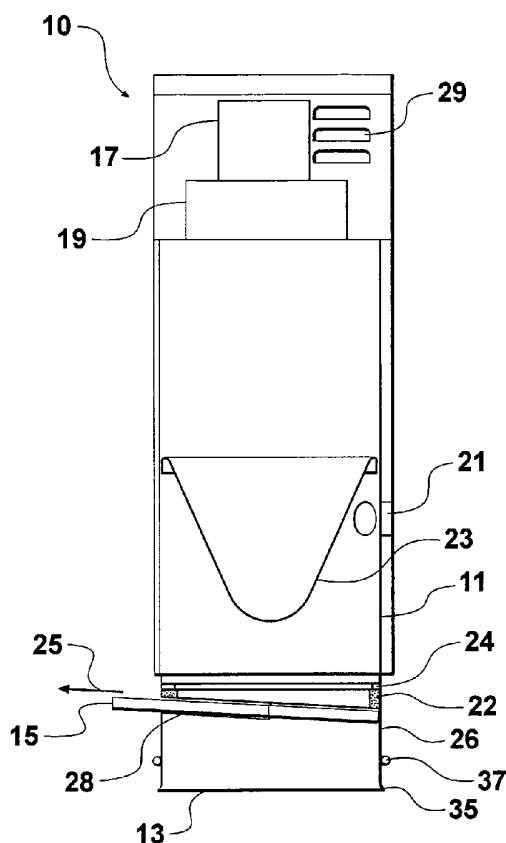
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[Continued on next page]

(54) Title: A VACUUM CLEANER WASTE



(57) Abstract: A vacuum cleaner waste receptacle (10) preferably for a central vacuum cleaning system which includes a collection chamber (11) adapted to receive waste matter collected by the central vacuum cleaning system. The collection chamber (11) has a waste inlet (21) and a separate waste outlet-chute (13) controlled by a shut-off valve (15), wherein opening the shut-off valve (15) allows collected waste to empty from the chamber (11) by force of gravity; preferably the shut-off valve (15) is in the form of a slide valve which controls the flow of waste out through a chute (13), the chute (13) being adapted to allow a rubbish bag to be connected, allowing the waste to flow into the bag without spillage.



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- of inventorship (Rule 4.17(iv)) for US only

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A VACUUM CLEANER WASTE RECEPTACLE

TECHNICAL FIELD

This invention relates to a vacuum cleaner waste receptacle, and in particular, though
5 not solely, to a vacuum cleaner waste receptacle for use in conjunction with a central
vacuum cleaning system.

BACKGROUND ART

Central vacuum cleaning systems provide an alternative to the use of conventional
portable vacuum cleaners. In use, a central vacuum cleaner may be installed in a
10 building to provide a single self-contained whole-house vacuum cleaning system.

There are many advantages of using a central vacuum system instead of a
conventional portable vacuum cleaner. In particular, the use of a central vacuum
system significantly reduces the number of airborne allergens put back into the living
space. This is because a conventional vacuum cleaner typically releases a lot of dust
15 and allergens back into the air during its operation. In contrast, central vacuum
systems tend to be more hygienic in this respect because their dust collection units
and filters are usually placed outside of the living space of a house, for example in
the garage.

However, the removal of dirt from the waste container of a central vacuum system
20 can be a cumbersome and often unhygienic task. Central vacuum systems typically
have large dirt collection pails or bags so that they do not have to be emptied
frequently, like a portable vacuum cleaner. The consequence is that these pails or
bags can hold as much as 30 kilograms of dirt and can be difficult to handle. In the
case of a pail, the dirt must be tipped out and into a secondary waste receptacle, and
25 this can release an unhygienic cloud of fine particles. Similarly, in the case of a
collection bag, as the bag is disconnected and handled it is not uncommon for a large
amount of dust to be released from the neck of the bag which is usually coated in a
thick layer of fine dust.

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It is not uncommon for the waste containers in vacuum cleaners to become over-fill if they are not emptied regularly enough, and this often leads to additional problems when removing a waste pail or a dust collection bag. The waste that is accumulated about and above the mouth of the pail or bag can end up spilled all over the floor
5 when the pail or bag is removed. This creates an unpleasant mess to be cleaned up and usually an accompanying cloud of unhygienic dust.

OBJECT

It is therefore an object of the present invention to provide a vacuum cleaner waste receptacle for a central vacuum system which goes at least some way towards
10 overcoming the above mentioned problems or which will at least provide the public with a useful choice.

STATEMENTS OF THE INVENTION

Accordingly, in a first aspect, the invention may broadly be said to consist in a vacuum cleaner waste receptacle for a vacuum cleaning system which includes a
15 collection chamber adapted to receive waste matter collected by the vacuum cleaning system, the collection chamber having a waste inlet and a separate waste outlet controlled by a shut-off valve, wherein opening the shut-off valve allows collected waste to empty from the chamber by the force of gravity.

Such a receptacle is particularly suitable for use in a central vacuum cleaning system
20 where large quantities of waste are collected. This is because the waste can be transferred into a bag or other receptacle for disposal with greater ease and with improved hygiene. For example, a clean bag can be fitted to the waste outlet, and then the valve opened to allow the contents of the collection chamber to discharge into the bag. The neck of the bag can then be tied and the bag removed from the
25 waste outlet and taken away, with minimal risk of the escape of dust or other unpleasant pollutants. This eliminates the need to handle a full waste pail and to invert it to empty its contents into a waste bag or rubbish bin with the resulting cloud of unpleasant dust, or the need to remove a dust collection bag which can also

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produce a cloud of dust as it is handled. And, even if the waste receptacle has been over filled the collected waste can be emptied out without the risk of spillage.

Preferably the valve is a slide valve. A slide valve is advantageous for a number of reasons; it can have very few moving parts, it can be relatively simple to manufacture, in the fully open position the valve member can be completely removed from the flow path of the valve, and it can be opened and closed using a simple linear motion. And in addition, the valve member of a slide valve can be wiped clean as it slides past its own seals, which is advantageous in a dirty and dusty environment like that within a vacuum cleaner.

10 Preferably the waste outlet includes a waste chute. A waste chute is advantageous since a bag can easily be fitted about the chute in a manner to form a seal between the two, enabling the waste to be transferred into the bag without any leakage of dust to the surroundings during the transfer.

15 Preferably the slide valve includes a sliding member in the form of a plate which is adapted to slide into and out of the waste chute. Such a valve is particularly effective and simple to manufacture, the plate can be a durable plastics material for example which can slide easily within a slot, and when the valve is opened the valve presents little or no obstruction to the flow of the contents as they exit the collection chamber.

20 Preferably the slide member of the slide valve is angled from the horizontal plane, with the lowest portion of the slide at or adjacent to the portion of the valve which is first to open, when the receptacle is in its normal attitude of operation. This sloping arrangement of the valve slide means that any heavy objects among the contents of the collection chamber will tend to find their way to the lowest point on the valve slide and will tend to exit through the valve first when the valve is opened. This is advantageous in that these heavy objects can be hard and have sharp edges, for example stones, nails or screws, and it is preferable that they exit the valve first and are not dragged by the slide member against the slide valve guides and/or seals which could result in damage to the valve.

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Preferably the angle of the slide member from the horizontal is within the range of 3 to 20 degrees.

Preferably the slide valve forms the base of the collection chamber. Such an arrangement is not only simple to manufacture but it is also convenient to be able to
5 open the entire base of the collection chamber when discharging its contents.

Preferably the valve includes a seal adapted to minimise the flow of air into the collection chamber through the valve when the valve is in the closed position.

Preferably the waste outlet is located at or adjacent to the base of the collection chamber. This is advantageous since it allows the contents of the collection chamber
10 to be discharged with the assistance of the force of gravity.

Preferably the waste outlet has a similar cross sectional size and shape to that of the collection chamber in the horizontal plane, when the receptacle is in its normal attitude of operation. Such a waste outlet size and shape allows the contents of the collection chamber to be discharged without undue obstruction.

15 Preferably the collection chamber is cylindrical in shape. Such a shape is advantageous since it allows circular air motion which is useful for cyclonic separation of dirt from the air flow in the vacuum cleaning system.

Preferably the waste chute has sidewalls which are parallel to the sidewalls of the collection chamber. Such an arrangement could be formed for example by including
20 the waste chute as a simple extension of the cylindrical sidewalls of the collection chamber.

Preferably the sidewalls of the waste chute include an opening or slot through which the valve member is able to slide. The slot is advantageous for a number of reasons, it allows access for the valve member to enter the passage, and the edges of the slot
25 can support and guide the valve member. Using a slot, these advantages are all achieved without the requirement for any additional hardware, guides or protrusions on the inside of the waste chute, meaning that when the contents of the collection

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chamber are discharged dirt is not likely to become entrapped and make it difficult to reinstall the valve member.

Preferably the outlet end of the waste chute is adapted to mate with a secondary waste receptacle, for example, adapted to allow a rubbish bag to be connected.

5 Preferably the receptacle further includes a means to secure a secondary waste receptacle to the waste chute, for example a rubber "O" ring which can be placed over the neck of a rubbish bag to tightly secure the bag to the waste chute and prevent dirt escaping while the contents of the collection chamber are emptied into the bag.

10 Optionally the exterior surface of the waste chute includes an outwardly extending protrusion adapted to help secure the secondary waste receptacle, for example the outwardly extending protrusion can be an outwardly extending flange or flared portion on the exit end of the waste chute.

Preferably the vacuum cleaner waste receptacle further includes a filtration device
15 that is adapted to block the flow of dirt particles from the collection chamber to the vacuum pump of the vacuum cleaning system.

Preferably the filtration device is situated in the upper regions of the collection chamber. Such a location is advantageous in that it allows the dirt to be removed from the collection chamber via the lower part of the chamber using gravity to assist
20 the flow.

In a second aspect, the invention may broadly be said to consist in a central vacuum cleaning system incorporating at least one vacuum cleaner waste receptacle substantially as specified herein.

In a third aspect, the invention may broadly be said to consist in a method of
25 emptying the waste collected in a vacuum cleaner waste receptacle including the steps of;

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- securing a secondary waste receptacle to a waste outlet on the vacuum cleaner waste receptacle,
 - opening a valve associated with the vacuum cleaning waste receptacle to allow the waste to transfer into the secondary waste receptacle, and
- 5 • removing the secondary waste receptacle from the waste outlet of the vacuum cleaner waste receptacle for disposal of the waste.

While the secondary waste receptacle could be a waste bin, preferably the secondary waste receptacle is a rubbish bag.

10 Preferably the method further includes a step of closing the secondary waste receptacle prior to removing it from the waste outlet of the vacuum cleaning waste receptacle. This could be carried out by tying off the neck of a rubbish bag for example.

DESCRIPTION

15 The invention may also broadly be said to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of the parts, elements or features, and where specific integers are mentioned herein which have known equivalents, such equivalents are incorporated herein as if they were individually set forth.

20 Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the accompanying drawings in which:

FIGURE 1 is a side view of a vacuum cleaner waste receptacle for a vacuum cleaning system without a removable plate installed,

25 **FIGURE 2** is a bottom plan view of the vacuum cleaner waste receptacle shown in figure 1,

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FIGURE 3 is a cross-sectional side view BB as defined in figure 2, showing a removable plate installed,

FIGURE 4 is a cross sectional view AA as defined in figure 1, again with the addition of the installed removable plate, and

5 **FIGURE 5** is a top plan view of the removable plate.

With reference to **Figures 1 to 4** a vacuum cleaner waste receptacle (10) is shown comprising a collection chamber (11), a waste chute (13), a removable plate (15), a motor (17), a vacuum pump (19), an inlet duct (21) and a filter element (23). The receptacle (10) is suitable for use as part of a vacuum cleaning device or system, and
10 in the configuration shown it is designed to be used in a central vacuum cleaning system. When the motor (17) is operated the vacuum pump (19) draws air out of the collection chamber (11) through the filter element (23). Replacement air is drawn through the inlet duct (21) into the collection chamber (11) and this air will typically contain many types of dirt, for example dust, fibres, dead skin cells, bacteria, hairs,
15 insects, etc when the receptacle (10) is in use. The inlet duct (21) is angled in such a way as to promote a swirling flow within the collection chamber (11) allowing some of the dirt to be separated from the airflow by cyclonic action.

The collection chamber (11) and waste chute (13) are formed from a single stainless steel tube or canister (26), made from stainless steel sheet, having a diameter of
20 approximately 300 to 350 millimetres, and a combined length of approximately 900 millimetres. The motor (17) and the vacuum pump (19) are fitted to the top of the canister (26) and an outer curved shroud (27) is used to house and cover the assembly. This curved shroud (27) is also made from stainless steel sheet and includes vent grilles (29) to allow air from the vacuum pump (19) to exit the shroud
25 (27).

The sidewall of the canister (26) is provided with a slot (28) approximately 80 to 100 millimetres above the bottom lip of the waste chute (13). The slot (28) is approximately 15 to 17 millimetres wide and extends in a generally horizontal direction about half way around the circumference of the canister (26). The slot (28)

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is used to allow the removable plate (15) to enter through the sidewall of the canister (26) and provides a guide for the removable plate (15) as it enters or exits the canister (26) and a support for the removable plate (15) when it is installed into the canister (26). While it can be said that the slot (28) is oriented generally
5 horizontally, it is preferred that the slot (28) is inclined at a small angle to the horizontal so that the removable plate (15) is held at a similar small angle – this is explained in further detail below.

The removable plate (15) forms the base of the collection chamber (11) when it is installed as shown in figure 3. The removable plate (15) is situated immediately
10 above the waste chute (13). The removable plate (15) can be completely removed from the receptacle (10) by withdrawing it in the direction shown by the direction arrow (25). When the removable plate (15) is partially or fully removed any collected dirt in the collection chamber (11) is allowed to fall through the waste chute (13) under the force of gravity.

15 In figure 3 a sealing ring (22) and a seal support ring (24) are shown situated in the lower regions of the collection chamber (11). The seal support ring (24) is securely attached to the internal diameter of the canister (26) forming an inwardly projecting flange and the sealing ring (22) is secured to the lower surface of the seal support ring (24). The sealing ring (22) is made from a closed cell formed rubber and presses
20 lightly against the removable plate (15) when it is installed. The sealing ring (22) helps to prevent air leakage into the collection chamber (11) when the receptacle (10) is in use. When the vacuum pump (19) is operating the removable plate (15) is pulled upwards by the vacuum pressure created in the collection chamber (11) and this draws the removable plate (15) firmly against the sealing ring (22). It can be
25 seen in the figure that the sealing ring (22) is thicker at one end than at the other, and this tapering thickness matches the slope or incline of the removable plate (15). The sealing ring (22) is fitted so that it extends downwards approximately 6 to 8 millimetres across the opening of the slot (28), and this allows the sealing ring (22) to be compressed by the removable plate (15) when the vacuum pressure in the
30 collection chamber (11) draws the removable plate (15) against the sealing ring (22).

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The sealing ring (22) extends far enough into the slot (28) so that the sealing ring (22) positively contacts the removable plate (15) even when the removable plate (15) is resting on the lower lip of the slot (28) when there is no vacuum pressure in the collection chamber (11).

- 5 The arrangement of the removable plate (15) and the sealing ring (22) is such that when the removable plate (15) is removed or reinstalled, the edge of the sealing ring (22) will wipe the upper surface of the removable plate (15) clearing it of any dust or the like. This is advantageous since it is important to keep dirt and dust away from the contact surfaces between the sealing ring (22) and the removable plate (15) so
10 that a good seal can be achieved.

- In figure 3 it can be seen that the removable plate (15) is inclined at an angle of approximately 6 degrees to the horizontal with the lowest point on the plate (15) situated adjacent to the part of the waste chute (13) which will open first as the removable plate (15) is withdrawn, that is, when moved in the direction of the arrow
15 (25). This angle is to encourage heavy objects to fall to the lowest point in the collection chamber (11) so that they will exit the chamber as soon as the removable plate (15) is withdrawn, reducing the possibility that these objects will get caught between the removable plate (15) and the sealing ring (22) which could cause scouring of the removable plate (15) or damage to the sealing ring (22).

- 20 It can be seen in the figures that the lower lip of the waste chute (13) has a small flared portion (35), and situated above the flared portion is an O-ring (37). These features and their uses are explained in further detail below.

- With reference to both **Figures 4 and 5**, it can be seen the removable plate (15) is generally circular in profile, with a handle portion (30) extending to one side, and the
25 average diameter of the removable plate (15) is close to the diameter of the waste chute (13). In closer detail it can be seen that the removable plate (15) is in fact in the shape of two slightly different sized semi circular shapes which abut each other along their straight edges, the first semi circular shape (31) having a radius slightly less than that of the internal radius of the waste chute (13) and the second semi

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circular shape (33) having a radius slightly greater than that of the external radius of the waste chute (13). The handle (30) extends outwards from the periphery of the second semi circular shape (33), and it can be seen in figure 5 that the lines of the handle (30) and the second semi circular shape (33) have been blended somewhat for improved strength and aesthetics. The blended shape which effectively provides gussets each side of the handle (30) reduces the chance of the handle (30) breaking off if the removable plate (15) is accidentally dropped.

The removable plate (15) can be made from a range of materials and initially the plate has been made from a 10 millimetre thick plastics plate material, which has been advantageous since it slides with relative ease against the metal edges of the slot (28).

When the collection chamber (11) becomes full of dirt, a bag or other receptacle can be placed under the waste chute (13). Preferably the mouth of the bag is placed over the outer diameter of the waste chute (13) and the O-ring (37) is placed over the bag to hold it and to seal it against the outer diameter of the waste chute (13). The flared portion (35) assists in retaining the bag on the outer diameter of the waste chute (13). Then the removable plate (15) can be withdrawn by grasping the handle (30) and withdrawing it in the direction of the arrow (25). This allows contents of the collection chamber (11) to fall through the waste chute (13) and into the bag or other receptacle. Then, preferably after waiting a short time to allow the dust to settle, the neck of the bag can be tied off and the O-ring (37) removed from the mouth of the bag and the bag removed from the receptacle (10) to be disposed of.

This allows the receptacle (10) to be emptied of dirt without the need to lift or invert a waste collection pail, or to disconnect and lift out a full waste collection bag. The process of emptying the dirt from the receptacle (10) is clearly more convenient and hygienic than with previous central vacuum systems. And, no matter how full the collection chamber (11) is, as long as the bag placed under the waste chute (13) is big enough, the contents can be transferred into the bag without spillage.

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Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof.

VARIATIONS

- 5 While the vacuum cleaner waste receptacle has been described as having a canister made of stainless steel and with a diameter of 300 to 350 millimetres and a length of 900 millimetres, it is envisaged that the material and the dimensions could vary to suit particular applications, for example the canister could be made of plastics or other metals, and the dimensions could be much smaller or larger, for example a
10 larger unit for heavier duty use could be as large as 700 millimetres in diameter and 1800 millimetres in length.

- Similarly, while the example described above uses a valve in the form of removable plate which is adapted to slide into and out of a slot in the canister, it is envisaged that the valve could take a number of forms, for example a pivoting slide valve or
15 gate, or a plate or canister end fitting which is installed using clamps.

While the invention has been described with reference to a fixed receptacle for use in a central vacuum cleaning system, it is envisaged that the invention could equally be applied to a portable vacuum cleaner providing similar advantages in the method of disposing of the waste collected by the vacuum cleaner.

20 DEFINITIONS

The term "central vacuum cleaning system" used herein is intended to mean a system including a vacuum pump, a waste collector and a system of ducts which can be permanently installed into a building for the purpose of facilitating vacuum cleaning of the building.

- 25 The terms "dirt" and "waste" used herein are intended to mean the waste collected by a vacuum cleaner, which may include a wide range of matter commonly found on a floor, for example dust, fibres, bacteria, pollen, crumbs, dead skin, hairs, insects, etc.

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Throughout this specification the word "comprise" and variations of that word, such as "comprises" and "comprising", are not intended to exclude other additives, components, integers or steps.

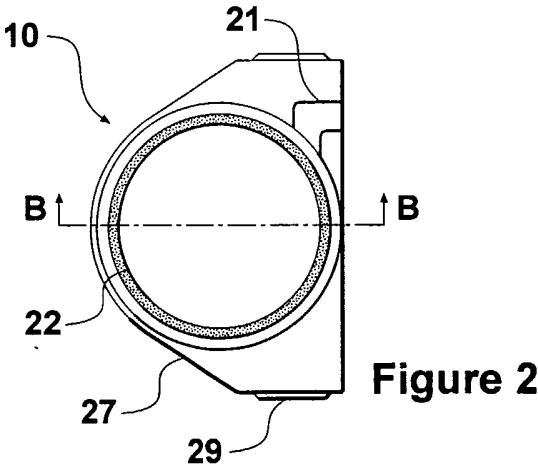
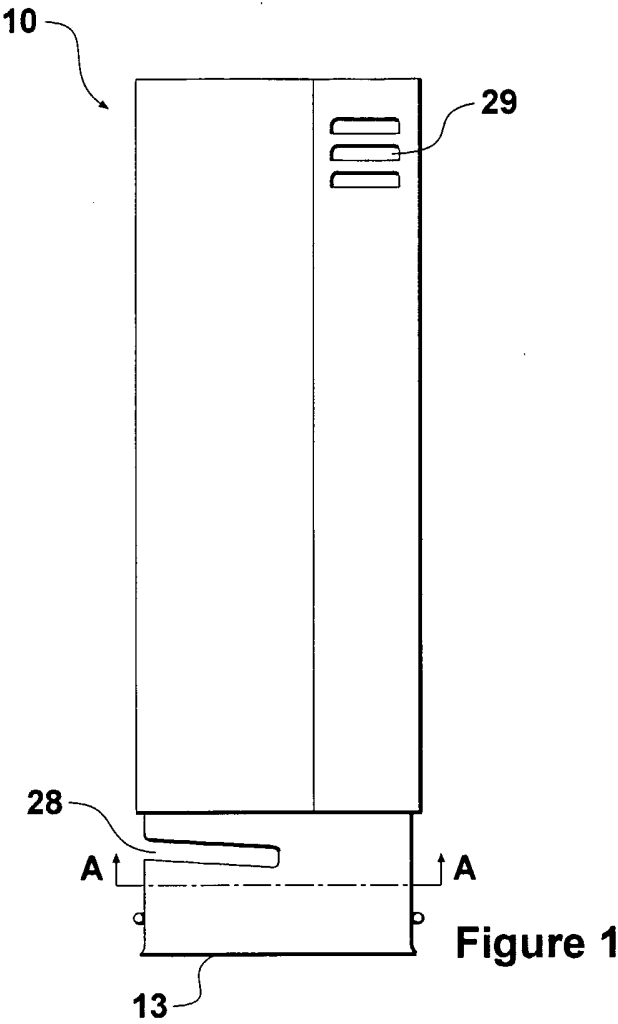
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CLAIMS

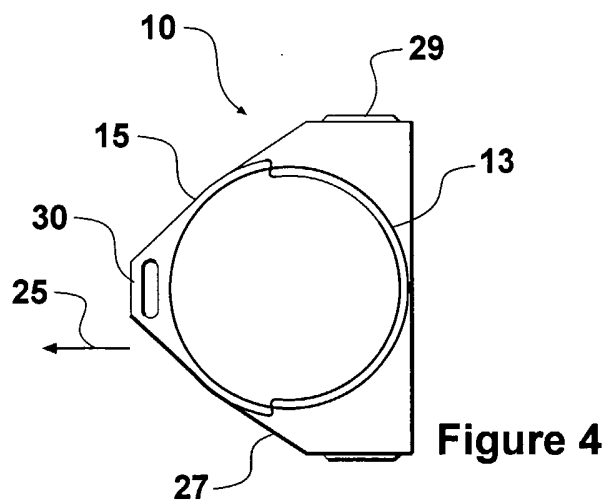
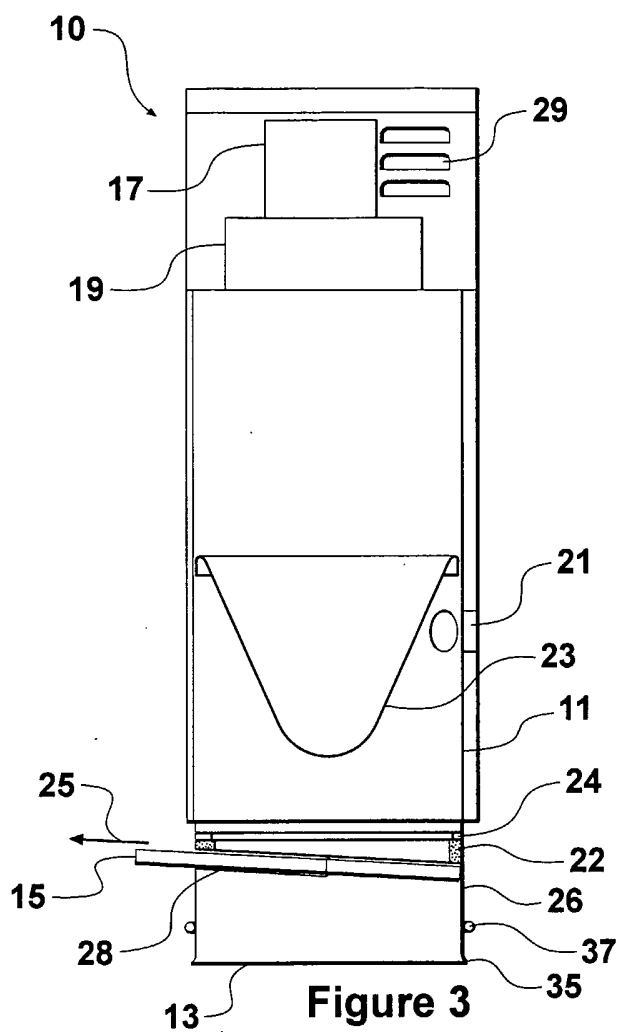
1. A vacuum cleaner waste receptacle for a vacuum cleaning system which includes a collection chamber adapted to receive waste matter collected by the vacuum cleaning system, the collection chamber having a waste inlet and a separate waste outlet controlled by a shut-off valve, wherein opening the shut-off valve allows collected waste to empty from the chamber by the force of gravity.
2. A vacuum cleaner waste receptacle as claimed in claim 1, wherein the valve is a slide valve.
3. A vacuum cleaner waste receptacle as claimed in any of the preceding claims, wherein the waste outlet includes a waste chute.
4. A vacuum cleaner waste receptacle as claimed in any of the claims 2 or 3, wherein the slide valve includes a sliding member in the form of a plate which is adapted to slide into and out of the waste chute.
5. A vacuum cleaner waste receptacle as claimed in claim 4, wherein the slide member of the slide valve is angled from the horizontal plane, with the lowest portion of the slide at or adjacent to the portion of the valve which is first to open, when the receptacle is in its normal attitude of operation.
6. A vacuum cleaner waste receptacle as claimed in any of the claims 2 to 5, wherein the slide valve forms at least a part of the base of the collection chamber.
7. A vacuum cleaner waste receptacle as claimed in any of the preceding claims, wherein the waste outlet has a similar cross sectional size and shape to that of the collection chamber in the horizontal plane, when the receptacle is in its normal attitude of operation.

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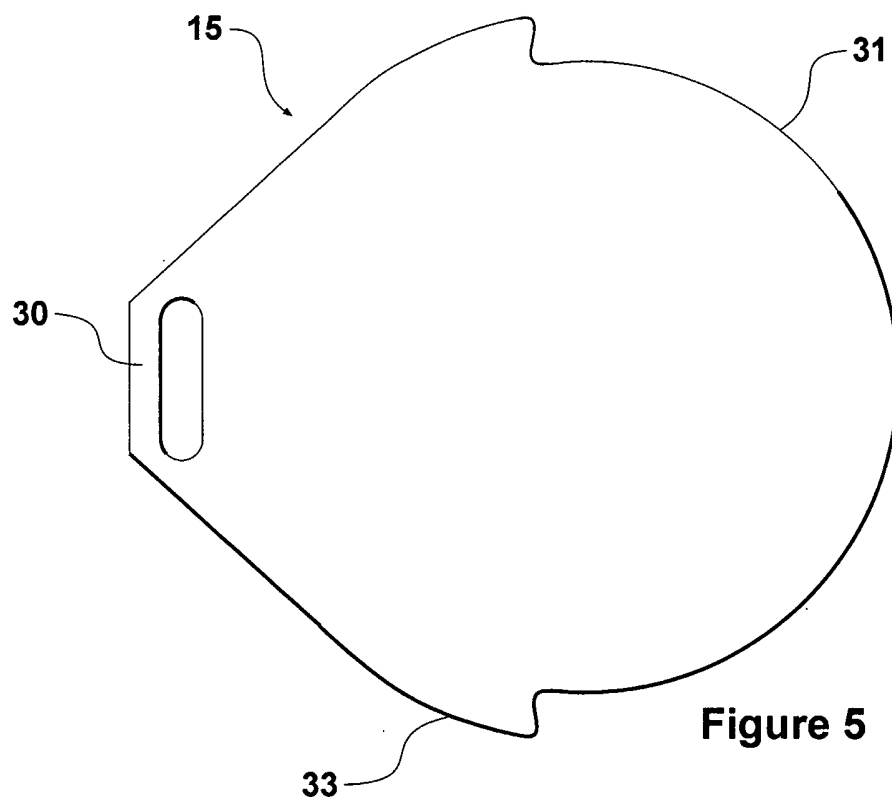
8. A vacuum cleaner waste receptacle as claimed in any of the claims 3 to 7, wherein the sidewalls of the waste chute include an opening or slot through which the valve member is able to slide.
- 5 9. A central vacuum cleaning system incorporating at least one vacuum cleaner waste receptacle substantially as claimed herein.
10. A method of emptying the waste collected in a vacuum cleaner waste receptacle including the steps of;
 - securing a secondary waste receptacle to a waste outlet on the vacuum cleaner waste receptacle,
 - 10 opening a valve associated with the vacuum cleaning waste receptacle to allow the waste to transfer into the secondary waste receptacle, and
 - removing the secondary waste receptacle from the waste outlet of the vacuum cleaner waste receptacle for disposal of the waste.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ2005/000029

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: A47L 5/38, 9/00; B65F 1/12

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)

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: IPV B65B 1/-, B65F 1/-, A47L 5/38, A47L 5/-, A47L 9/- & keywords : central, built-in, duct, container, receptacle, reservoir, vessel, chamber, enclosure, housing, compartment, collect, bin, canister, empty, rid, discharge, relieve, eject, drain, efflux, drop, valve, slide, gate, closure, chute, hopper, bin and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4108498 A (BENTSEN) 22 August 1978 Figure 1	1-10
X	CA 2052336 A (BETTER AGRICULTURAL GOALS CORPORATION) 27 June 1992 Whole document	1-10
A	US 20020178531 A (PLOMTEUX et al) 5 December 2002 Whole document	
A	WO 2002/069778 A1 (FORTUM OYJ) 12 September 2002 Whole document	



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents:			
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
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"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

7 June 2005

Date of mailing of the international search report

14 JUN 2005

Name and mailing address of the ISA/AU

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NZ2005/000029

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian 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				Patent Family Member			
WO	2002/069778	FI	20010270				
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		CA	2167437	CA	2167438	EP	0417675
		JP	3226402	US	5109893	US	5234037
		US	5244019	US	5275215	US	5279339
		US	5447183	US	5509451	US	5513682
		US	5518048	US	5531252	US	5538053
US	4108498	DE	2611537	DK	122475	ES	446246
		FR	2304546	GB	1512313	JP	51148986
		SE	7603438				
US	2002178531	CA	2332195	CA	2369179	US	6779228
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.							
END OF ANNEX							