actually positively clamps the cleaner 1 upwardly against the docking cradle 25, with the release lever 38 being used to pivot the catch 35 out of clamping alignment with the docking cradle 25, as desired. The docking cradle 25 may likewise be spring biased to clamp the cleaner securely against the catch 35.

The movement of one of the clamping members (e.g. the docking cradle 250) into and out of clamping alignment with the other clamping member (e.g. the bin support 350) need not be a pivoting movement. For example, the docking cradle 250 could be arranged to slide laterally out of clamping alignment with the bin support 350. The use of a pivoting clamping member does, however, help minimize the foot print of the docking station.

The use of a first clamping member which can be moved into and out of clamping alignment with an opposing clamping member is advantageous, but not essential for one-handed docking and release. For example, the docking cradle 250 could alternatively be fixed to the sliding carriage plate 390 so that it is maintained at all times in clamping alignment with the fixed bin support 350. A fixed docking cradle would inhibit insertion of the battery pack to a degree; this could be mitigated to a certain extent, if desired, by minimizing the length of the docking cradle so that the battery pack 17 can be inserted into the fixed docking cradle at a very shallow angle.

CLAIMS

1. An arrangement comprising a stick-vac cleaner, the stick-vac cleaner comprising a handheld suction unit which is connected to a floor tool by an elongate suction wand, the arrangement further comprising a wall-mountable docking station arranged for releasably locking the stick-vac cleaner on a wall in an upright, docked position when not in use.

2. An arrangement according to claim 1, wherein the docking station is arranged for engaging the handheld suction unit in order directly to support the hand held suction unit in an upright, docked position.

3. An arrangement according to claim 1 or 2, wherein the handheld suction unit is battery-powered and incorporates a set of exterior charging contacts connected to an onboard rechargeable battery, and the docking station comprises a respective set of charging contacts for connection to a mains supply, the charging contacts on the docking station being arranged for engagement with said exterior charging contacts on the handheld suction unit to form a battery-charging circuit when the stick vac cleaner is in the upright, docked position.

4. An arrangement according to claim 3, wherein the docking station comprises a catch for engaging the handheld suction unit to lock the stick vac cleaner in the upright, docked position, the catch being arranged to hold the charging contacts on the handheld suction unit in engagement with the charging contacts on the docking station.

5. An arrangement according to claim 4, wherein the catch is spring-loaded for urging the charging contacts on the handheld vacuum cleaner into engagement with the charging contacts on the docking station.

6. An arrangement according to any of claims 3 to 5, wherein the external charging contacts on the handheld suction unit are positioned so that they face upwards when the stick-vac cleaner is in the upright, docked position,

01 02 11

and the charging contacts on the docking station are spring-biased for urging the charging contacts downwardly into engagement with said upward-facing charging contacts on the handheld suction unit.

7. An arrangement according to any preceding claim, wherein the docking station comprises an opposing pair of clamping members, at least one of the clamping members being resiliently biased towards the other clamping member for resiliently clamping the stick-vac against the other clamping member to lock the stick-vac in the upright, docked position.

8. An arrangement according to claim 7, wherein said pair of clamping members consists of a lower clamping member arranged for clamping upwardly against a respective lower part of the handheld suction unit and an opposing, upper clamping member arranged for clamping downwardly against a respective upper part of the handheld suction unit.

9. An arrangement according to claim 8, wherein the lower clamping member is fixed in use, relative to the wall, and the upper clamping member is resiliently biased downwards towards the lower clamping member.

10. An arrangement according to any of claims 7 to 9, wherein the clamping members are arranged for relative sliding movement along a clamp axis to engage the stick vac, and at least one clamping member is additionally arranged for movement into and out of clamping alignment with the other clamping member.

11. An arrangement according to any of claims 7 to 9, wherein the clamping members are arranged for relative sliding movement along a clamp axis to engage the stick vac, and at least one clamping member is a pivotable clamping member arranged for pivoting movement into and out of clamping alignment with the other clamping member.

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12. An arrangement according to claim 11, wherein, in use with the docking station mounted on a wall, said pivotable clamping member is arranged for pivoting movement away from the wall.

13. An arrangement according to claim 8 or 9, wherein the upper clamping member is in the form of a docking cradle arranged to receive a first part of the handheld unit in a sliding fit, the docking cradle being slidable relative to the lower clamping member and resiliently biased towards the lower clamping member, the docking cradle additionally being pivotable away from the wall, in use, for movement out of clamping alignment with the lower clamping member in order to receive said first part of the handheld unit.

14. An arrangement according to claim 13, wherein the lower clamping member is a fixed clamping member comprising a locking element for engagement with a second part of the handheld unit to secure the stick vac against lateral movement relative to the lower clamping member.

15. A docking station for use as said docking station in the arrangement according to any of claims 1 to 14.

16. An arrangement substantially as herein described with reference to the accompanying drawings.

01 02 11

OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET
(TRADE MARKS AND DESIGNS)

Administration of Trade Marks and Designs Department
Register and related databases

Alicante, 11/09/2007

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Certificate of Registration[1]

Registration No.:	**000780341**
Your reference:	ECT/DC/44626
Applicant:	Hozelock Limited Midpoint Park Minworth Sutton Coldfield B76 1AB REINO UNIDO

Please find enclosed the certificate of registration for Community Design no. 000780341-0001 which was published in the Community Designs Bulletin no. 2007/120 on 11/09/2007 (see OHIM's website: http://oami.europa.eu).

This certificate contains information from the Community Designs Register at the date of entry into the Register (see code 15 on the certificate). If you have filed a request for modification of data on or after that date, no new certificate will be issued. You will be notified separately of the change after which an extract from our database may be requested to reflect the administrative status of the design.

For an explanation of the codes on the certificate please see consult the Vademecum on OHIM's website: http://oami.europa.eu/pdf/design/vademecum-rcd-en.pdf.

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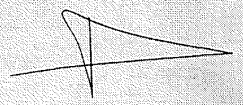
Catherine DOBSON

[1] in accordance with Article 17(1) of Commission Regulation (EC) No 2245/02 of 21 October 2002 implementing Council Regulation (EC) No 6/02 on the Community design (http://oami.europa.eu)

Registered / Enregistré 23/08/2007

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OHIM – OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET
TRADE MARKS AND DESIGNS

CERTIFICATE OF REGISTRATION

This Certificate of Registration is hereby issued for the Registered Community Design identified below. The corresponding entries have been recorded in the Register of Community Designs.

OHMI – OFFICE DE L'HARMONISATION DANS LE MARCHÉ INTÉRIEUR
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CERTIFICAT D'ENREGISTREMENT

Le présent Certificat d'Enregistrement est émis pour le Dessin ou Modèle Communautaire enregistré spécifié ci-dessous. Les inscriptions afférentes ont été portées au Registre des Dessins ou Modèles Communautaires.

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(54) BG - Ръчни прахосмукачки

ES - Aspiradoras portátiles

CS - Ruční vysavače

DA - Håndholdte støvsugere

DE - Handstaubsauger

ET - Käes hoitavad tolmuimejad

EL - Φορητές ηλεκτρικές σκούπες χειρός

EN - Hand-held vacuum cleaners

FR - Aspirateurs portables à main

IT - Aspirapolvere portatili manuali

LV - Rokas putekļsūcēji

LT - Nešiojami rankiniai siurbliai

HU - Kézi porszívók

MT - Vacuum Cleaners li jistgħu jinġarru

NL - Draagbare stofzuigers

PL - Odkurzacze podręczne

RO - Aspiratoare portabile

PT - Aspiradores portáteis manuais

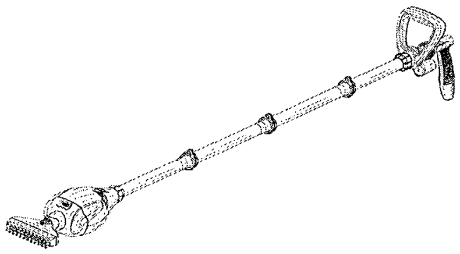
SK - Prenosné vysávače

SL - Prenosni ročni sesalniki

FI - Kädessä pidettävät pölynimurit oppaat

SV - Handhållna dammsugare

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0001.1



0001.2



0001.3



0001.4



0001.5



0001.6



0001.7

Japan Patent Office

Issued 14 September 1988

Design Gazette (S)

C3-410 E

743445 Design Application: 61-41931

Application date: 24 October 1986
Registered: 10 June 1988

Designer: TAKATSUKI Hiroaki, Design Centre, Hitachi Ltd., 1-280 Higashi-koigakubo, Kokubunji-shi, Tokyo

Design right holder: Hitachi Ltd, 4-6 Kanda Surugadai, Chiyoda-ku, Tokyo

Attorney: OGAWA Katsuo, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Description: The left side view is symmetrical with the right side view.

Front view

Plan view

Back view

Bottom view

Right side view

Sectional view A-A′
without internal mechanism

日本国特許庁

昭和63年(1988)9月14日発行　**意匠公報**（S）

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743445

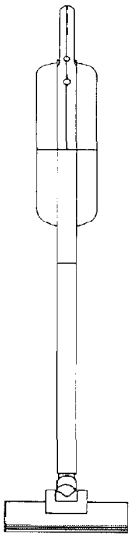
意願 昭61－41931　出願 昭61(1986)10月24日
登録 昭63(1988)6月10日

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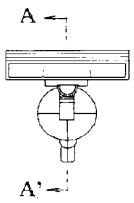
意匠に係る物品　電気掃除機

説明　左側面図は右側面図と対称にあらわれる。

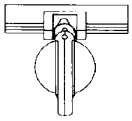
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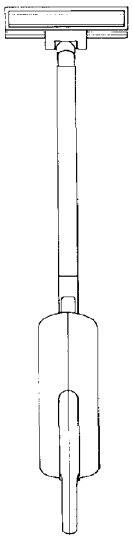
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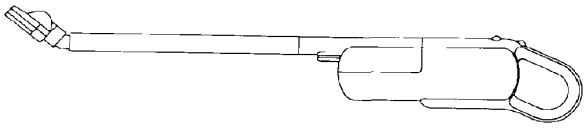
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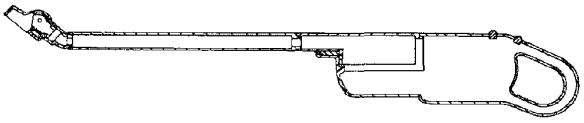
底面図



右側面図



内部機構を省略した
A －A′断面図



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Page 419

[Page 1]

19

Japanese Patent Office

11

Published patent application

S61-131720

12

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KOKAI June 19, 1986

Examination request

Unrequested

Number of Inventions

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Name of Invention

Electric Vacuum Cleaner

21

Patent application 1984-253296

22

Application November 30, 1984

72

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Details

1.

Name of Invention

Electric Vacuum Cleaner

2.

Scope of Patent Application

(1)

A handheld vacuum cleaner which has the characteristics of containing the suction opening on one end, as well as containing the electric air blower, as well as the component comprising the attachment part which enables the attachment and removal of this vacuum cleaner, and containing the extension hose attachment on one end of the said attachment part, which can be connected through to the suction opening of the said vacuum cleaner, and the support which is connected to the tip of the said extension hose, as well as containing the rechargeable battery which recharges by means of AC power which hooks up to the said support attached to the vacuum cleaner, and by switching between the DC power source and the AC power source, enables the said electric air blower to function on either a DC or AC power source, and to possess the electrical cord windup reel on the other side of the attachment side of the said support.

(2) The electric vacuum cleaner as outlined in the Scope of Patent Application (1) with the characteristics of the attachment part of the support being formed on one side of this support, and to possess the windup reel part for the electric cord on the back side of the attachment part.

(3) The electric vacuum cleaner as outlined in the Scope of Patent Application (2) with the characteristics of containing the hook part which is attached between the electric cord in the windup reel part, on the side of the windup reel, so that the hook part can be hooked to a support in order to support the vacuum cleaner.

3.

Detailed Explanation of the Invention

(Industrial applications)

This invention is with regard to the electric vacuum cleaner, namely the broomstick type electric vacuum cleaner.

(Conventional technology)
The conventional electric vacuum cleaner comprises of the extension hose attachment to a small-sized vacuum cleaner, and then attached the suction opening part at the tip of such extension hose.

(Issues which this Invention attempts to solve)
However, with such a structure, the cleaner is fit for cleaning the floor and other similar areas close to the floor, but either the tips were too long or too heavy to be used for walls, tables, etc. and other areas which were much higher than the floors.

On the other hand, the rechargeable vacuum cleaners were fit for cleaning walls and tables, etc., however, due to its size, weight, and operability, the capacity of the rechargeable battery was limited and therefore the vacuum cleaner was limited in its input and output power, making them unfit for cleaning large areas such as floors.
Therefore, in an attempt to invent an electric vacuum cleaner which contains the functions of both the broomstick type and the rechargeable vacuum cleaner, there is the proposal of an electric vacuum cleaner which can function on both DC and AC power sources by switching between the two, where the handheld vacuum cleaner having the suction opening on one end, and possessing the electric air blower and the rechargeable battery inside, as well as the attachment which can freely attach and remove this vacuum cleaner, and by connecting the extension cord onto one end of this attachment, which connects through to the suction opening of the said vacuum cleaner, as well as attaching a handle to the other side of this

connection, and possessing the support which connects the suction connection to the tip of the said extension hose (Patent 1984-197554)

However, such electric vacuum cleaners are freely attached and removed from the support attachment; therefore, if the electric cord is wrapped around the body of the vacuum cleaner or the support when the vacuum cleaner is not used, then, when the vacuum cleaner alone is to be used, even though the vacuum cleaner is to be powered by the rechargeable battery, the user must unwind the said electrical cord, and also because the unit is a broomstick type, depending on the structure of the winding reel, clothes may get caught in the reel structure.
This Invention attempts to solve such problems, with the above-mentioned handheld vacuum cleaner, and the broomstick-type electric vacuum cleaner which possesses a support structure which allows it to freely attach and remove said vacuum cleaner, which also avoids the electrical cord getting in way when attaching and removing the said cleaner, or clothes from getting caught in said reels during operation.

(Methods to solving the problem)
This Invention, comprised of a handheld vacuum cleaner which has the characteristics of containing the suction opening on one end, as well as containing the electric air blower, as well as the component comprising the attachment part which enables the attachment and removal of this vacuum cleaner, and containing the extension hose attachment on one end of the said attachment part, which can be connected through to the suction opening of the said vacuum cleaner, and the support which is connected to the tip of the said extension hose, as well as containing the rechargeable battery which recharges by means of AC power which hooks up to the said support attached to the vacuum cleaner, and by switching between a DC power source and an AC power source, enables the said electric air blower to function on either a DC or AC power source, and to possess the electrical cord windup reel on the other side of the attachment side of the said support.

(Action)

This Invention, while the electric vacuum cleaner is not in use, allows the user to wrap the electrical cord around the winding reel formed on another side of the side where the vacuum cleaner is attached to, and when the said electric vacuum cleaner alone is used, to not have the wound cord get in the way, and also to place the said attachment on the front of the support, and by placing the winding reel on the back of it, to avoid clothes getting caught in the said hook part when cleaning by unwinding the said electrical cord.

(Working example)

Below is one of the working examples of this Invention with the drawing.

1 is a handheld small—sized vacuum cleaner, and the vacuum cleaner is comprised of the body case, 3, which contains the electric air blower, 2, inside, as well as the dust collection case, 4, which can be freely attached and removed, which is attached to the front of the body case, 3, which is the suction body of the said electric air blower, 2.

On the back side of the said body case, 3, there is the exhaust opening, 11, which lets out the air blown by the said electric air blower, on top of which it has a dent for the latch, 12, as well as the handle, 13, on top of the body case, 3, and close to which is located the first switch button, 14.

Also, toward the bottom of the front of the body case, 3, the concave latch part, 15, is formed pointing to the back bottom edge of the said dust collecting case, 4, and the latch opening, 16, is formed on the front top edge of the said body case, 3, and the latch hook, 17, is formed on

the front top edge toward this latch hole, 16. Also, to the bottom of the body case, 3, is the second switch button, 19, projecting outward with the spring 18.
The said dust collecting case 4 possesses the suction opening 21 in the front, as well as the valve 22 within this opening 21, and the concave receiver for nozzle 24 to receive the nozzle 23 which will be connected to this suction opening 21; also the filter device 25 is attached to the rear end inside, as well as the latch projection 26 is formed to latch to the said latch hook part 15 in the body case 3, as well as the clamp 27 which freely swivels and inserted into the hole 16 then hooked to the latch hook, 17.

This vacuum cleaner, 1, can be used by itself, or can be attached to the support, 31. This support, 31, possesses a box-shaped attachment part, 32, which fits onto the front, the bottom, and the back of the said vacuum cleaner, 1, and there is a long extension hose, 33, extending on the front which connects to the suction opening of the said vacuum cleaner, 1, as well as forming the handle, 35, to the top back of the attachment part, 32.
Also, on the back wall of the said attachment part, 32, to the bottom of the said handle, 35, there is a vent opening, 36, which connects through to the exhaust opening, 11, of the said vacuum cleaner, 1, as well as the lever, 38, pushed onto the inside of the attachment, 32, with the spring, 37, which will be inserted into the latch, 12, to latch or remove.
Also, the first and the second hooks, 39 and 40, are attached as winding reel on the back side of the said attachment part, 32, on the front and the back of the bottom surface, and these first and second hooks, 39 and 40, are L-shaped, where the first hook, 39, is bent toward the front of the vacuum cleaner, 1, and the second hook, 40, can be swivelled to the desired position.

Also, at the bottom of the said attachment part, 32, aligned to the said first and second hooks, 39 and 40, lengthwise, a grooved dent, 41, is formed outward, so that the latch hook, 15, is guided and fitted to the groove, 41, when the vacuum cleaner, 1, is attached to the support, 31.
Also, the electrical cord, 44, is lead out from the front tip of the said handle, 35, and this electrical cord, 44, is normally wound onto the said first and second hooks, 39 and 40.

The electric circuit of this electric vacuum cleaner, as shown in the circuit schematic in drawing 6, is divided into the inner circuit, 51, within the vacuum cleaner, 1, as the inner circuit, 52, within the support, 31, and these two circuits, 51 and 52, are connected when the vacuum cleaner, 1, is attached to the attachment part, 32.

The said inner circuit, 51, possesses the alternating circuit, 53, which supplies the AC power to the air blower, 2, as well as the direct circuit, 54, which supplies the DC power to the air blower, 2.
The said alternating circuit, 53, is comprised of a pair of alternating terminals, 55, connected in tandem to the first button, 14, which connects to the first switch, 56, first coil, 57, the said electric air blower, 2, and the second coil, 58.
The said direct circuit, 54, is comprised of a pair of alternating terminals, 59, and the resistor, 60, and the rechargeable battery, 61, connected in tandem as the direct power source, with the (-) terminal pointing to the side of the resistor, 60, as well as connecting with the second switch, 62, activated by the said second switch button, 19, to this (-) terminal of this rechargeable battery, 61, to the middle of the said first coil, 57, as well as connecting the (+) terminal of the said rechargeable battery, 61, to the middle of the said second coil, 58.

Also, the internal circuit, 52, of the said support is comprised of the alternating circuit, 72, which passes the alternating current to the alternating circuit, 53, of the said internal circuit, 51, via said electrical cord, 44, from the external alternating power source, 71, as well as the recharging circuit, 73, which supplies the direct recharging current to the direct current circuit, 54, of the said internal circuit, 51, by receiving the alternating current supplied from the said alternating power source, 71.

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The said alternating electrical circuit, 72, possesses a pair of alternating electrical source terminals, 74, connected to a pair of alternating terminals, 55, of the said alternating circuit, 53, at the time of fitting the vacuum cleaner, 1, to the attachment, 32, and the said recharging circuit, 73, possesses the trace, 75, which will be connected to the alternating power source, 71, as well as two diodes, 77 and 78, attached on the opposite sides on both tips of the secondary coil, 76, of this trace, 75, and on these two diodes, 77 and 78, the (-) side of the recharging terminal, 79, is connected as well as the (+) side of the recharging terminal, 79, is attached to the middle of the said secondary coil.

Next, the function of this working example of the electric vacuum cleaner will be explained.

This electric vacuum cleaner is used with the vacuum cleaner, 1, attached to the attachment part, 32, of the support, 31, when cleaning low areas such as floors.
When the vacuum cleaner, 1, is attached to the attachment, 32, the pair of alternating terminals, 55, of the internal circuit, 51, within the vacuum cleaner, 1, as well as the pair of direct terminals, 59, are attached to the pair of direct current terminals, 74, as well as the pair of recharging terminals, 79, respectively in the internal circuit, 52.
Also, by attaching the vacuum cleaner, 1, to the attachment, 32, the second switch button, 19, is pressed, and the second switch, 62, is turned off, which opens the direct power source circuit, 54.
Therefore, the electric air blower, 2, does not function even when the first switch, 56, is inserted to the direct power source circuit, 54. On the other hand, when the first switch, 56, is inserted to the alternating circuit, 53, and the alternating power source, 71, is supplied, then, the electrical air blower functions, and it will operate as the cleaner.
On another note, when the vacuum cleaner, 1, is fitted to the attachment, 32, because the recharging circuit, 73, and the rechargeable battery, 61, of the direct power circuit, 54, are connected, the rechargeable battery, 61, will be charged. Then, because this recharge is

performed also while the electrical air blower is in operation with the alternating power circuit, 72, and the alternating circuit, 53, the recharge efficiency is superior.

Next, when cleaning tabletops and other higher areas, the extension cord, 33, of the support, 31, is too long and it makes the cleaning more difficult, the vacuum cleaner, 1, is removed from the attachment, 32, of the support, 31. When the vacuum cleaner, 1, is removed from the attachment, 32, of the support, 31, the second switch button, 19, projects and turns on the second switch, 62, enabling the use of the rechargeable battery, 61, as the direct power source, and the when the first switch, 56, is powered on to the direct power source circuit, 54, the rechargeable battery, 61, operates the electrical air blower, 2, and the cleaner can be used. The nozzle, 23, is removed from the nozzle storage dent, 24, and attached to the suction opening, 21.

On another note, the electrical circuit of the electrical vacuum cleaner can be divided into the internal circuit, 51, within the vacuum cleaner, 1, and the internal circuit, 52, within the support, 31, therefore, the weight of the vacuum cleaner, 1, is lessened, realizing improved operability and facilitates cleaning.

Also, the said nozzle, 23, is attached to the nozzle storage dent, 24, while the vacuum cleaner, 1, is used, attached to the support, 31, therefore the risk of misplacing the said nozzle, 23, and also when the vacuum cleaner, 1, is used on its own it can be immediately attached to the suction opening, 21, and there is no need to take the nozzle, 23, from another storage location.

Also, when the vacuum cleaner is not in use, the electrical cord, 44, will be wound around the first and the second hooks 39 and 40 for storage, and the vacuum cleaner, 1, will be attached to the attachment, 32, of the support, 31, then the vacuum cleaner will be hooked to the third hook, 42, which is installed to a wall, 43, inside a room, hooking the hook, 42, to the hook hole, 41a.

As the vacuum cleaner can be hooked to a wall, 43, the cleaner can be conveniently used, as well it does not take up much storage space. Also, the hook hole, 41a, hooked to the third hook, 42, is located inside the electrical cord, 44, wound on the back side of the attachment, 32, of the support, 31, the vacuum cleaner is supported at the heaviest locations such as the

vacuum cleaner, 1, and the electrical cord, 44, which hooks the vacuum cleaner in a stable manner.

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Also, because the hooks, 39 and 40, as well as the hook hole, 41a, which are at the winding area for the electrical cord, 44, are located at the back of the attachment, 32, of the support, 31, when the vacuum cleaner is hooked to a wall, the electrical cord, 44, is facing the wall, 44, making it look aesthetically pleasant, and also because the attachment, 32, is facing the front, when there is a need to use the vacuum cleaner, 1, alone, the vacuum cleaner, 1, can be removed from the attachment while the support, 31, is still hooked onto the wall, 43.
Also, the electrical cord, 44, can be plugged into an outlet while the vacuum cleaner is in use, the rechargeable battery can be charged during this time.
Also, when the electrical cord, 44, wound around the first and the second hooks, 39 and 40, for storage will be in use again, because the second hook can be swiveled, by swivelling the hook inwards, the electrical cord wound to the second hook, 40, can be removed at once, making it much easier than unwinding the cord.

Also, when the vacuum cleaner, 1, is used, attached to the support, 31, the first and the second hooks, 39 and 40, will be facing downwards, and there is no risk of clothes getting caught in the hooks.

In this working example, the second switch, 62, is installed so that this second switch, 62, will be turned off when the vacuum cleaner, 1, is attached to the attachment, 32, so that the rechargeable battery, 61, cannot be used; however, if this second switch, 62, is not installed, then when the vacuum cleaner, 1, is used, attached to the attachment, 32, of the support, 31, the selection can be made with the first switch, 56, to switch between direct and alternating

currents. Therefore, it can operate in areas where the length of the electrical cord, 44, is insufficient and in areas where the suction opening, 34, of the support, 31, cannot reach, by switching to direct current via the direct power source circuit, 54, the electrical cord, 44, can be unplugged and the vacuum cleaner can be moved to the desired location for cleaning.

(Advantageous effect of the Invention)

With this Invention, the broomstick-type electric vacuum cleaner which consists of a handheld vacuum cleaner and the support which contains the attachment part to attach such vacuum cleaner, by placing the winding reel of the electrical cord of the support on the opposite side of the attachment, simplified the storage and dismantling of the wound cords, as well as making it aesthetically pleasing. Also, when the vacuum cleaner alone is used, the electrical cord does not obstruct removal of the cleaner, and when the attachment is located in front of the support and the cord reel is attached to the back side, clothes do not get caught in the cord reel during operation.

4.

Simple explanation of the drawings

Drawing 1 illustrates a vertical section view of one working example of the Invention's electrical vacuum cleaner; Drawing 2 is a perspective view of the same; Drawing 3 is a vertical section view of the attachment part of the support and the vacuum cleaner; Drawing 4 is a vertical section view of the vacuum cleaner in use; Drawing 5 is an enlarged vertical section view of the second switch button; Drawing 6 is the circuit schematic which shows the electrical circuit of the electrical vacuum cleaner.

1 – vacuum cleaner

2 – electrical air blower

21 – suction opening

31 – support

32 – attachment part

33 – extension hose

34 – suction opening

35 – handle

39 – first hook as part of the winding reel

40 – second hook as part of the winding reel

41a – hook hole for hooking

42 – third hook to hook on the cleaner

43 – wall

44 – electrical cord

61 – rechargeable battery

71 – AC power source.

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Drawing 1

35 – handle

61 – rechargeable battery

2 – electrical air blower

1 – vacuum cleaner

21 – suction opening

33 – extension hose

34 – suction opening

40 – second hook as part of the winding reel

44 – electrical cord

42 – third hook to hook on the cleaner

41a – hook hole for hooking

32 – attachment part

39 – first hook as part of the winding reel

31 – support

43 – wall

Drawing 2

Drawing 3

Drawing 4

Drawing 5

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Drawing 6

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⑤4発明の名称　電気掃除機

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⑵2出　願　昭59(1984)11月30日

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明　細　書

1．発明の名称

電気掃除機

2．特許請求の範囲

（1）　一側に吸込口を有するとともに、内部に電動送風機を有するハンディタイプの掃除機本体と、この掃除機本体を着脱自在に取付ける取付部を有し、この取付部の一端に前記掃除機本体の吸込口に連通する延長管を接続するとともに、該合部の他端に把手を取付け、前記延長管の先端に吸込口体を接続した支持体とを備え、前記掃除機本体に前記支持体を中継した交流電源により充電される充電式電池を設けるとともに、この直流電源と前記交流電源との切替えによって前記電動送風機を交流電源および直流電源のいずれでも作動可能とし、前記支持体の取付部とは別の面に、前記支持体に設けられ交流電源を供給する電気コードの巻着部を設けたことを特徴とする電気掃除機。

（2）　支持体の取付部はこの支持体の一面側に形成し、取付部の背面に電気コードの巻着部を設けたことを特徴とする特許請求の範囲第1項記載の電気掃除機。

（3）　支持体の電気コードが巻回される面で、かつこの巻回される電気コードの間の位置に、前記支持体を支持する掛着具に係合される掛着部を設けたことを特徴とする特許請求の範囲第2項記載の電気掃除機。

3．発明の詳細な説明

〔産業上の利用分野〕

本発明は電気掃除機に係り、いわゆるステッキタイプの電気掃除機に関するものである。

〔従来の技術〕

従来のステッキタイプの電気掃除機では、小形の掃除機本体に延長管を取付けるとともに、この延長管の先端に吸込口体を取付けた構造をしている。

〔発明が解決しようとする問題点〕

しかし、このような構造のものでは、床面やそれに近い低い所の掃除には適しているが、壁やテーブル上等の床面よりかなり高い所の掃除には先

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端が長すぎたりまた、重すぎたりして適していない。

一方、充電式の掃除機では、壁やテーブル等の掃除には適しているが、大きさ、重量など操作性の観点から、充電式電池として容量の大きなものを使えないため、低入力かつ小出力の掃除機しか得られず、広い面積を有する床面などの掃除には適していない。

そこで、ステッキタイプの掃除機及び充電式の掃除機の両者の機能を有する電気掃除機として、一側に吸込口を有するとともに、内部に電動送風機と充電式電池とを有するハンディタイプの掃除機本体と、この掃除機本体を着脱自在に取付ける取付部を有し、この取付部の一端に前記掃除機本体の吸込口に連通する延長管を接続するとともに、嵌合部の他端に把手を取付け、前記延長管の先端に吸込口体を接続した支持体とを備え、前記電動送風機は切替えにより、交流電源および直流電源のいずれでも作動可能とした電気掃除機が提案されている（特願昭５９－１９７５５４号）。

しかし、このような電気掃除機は掃除機本体を支持体の取付部に着脱自在に取着、抜脱するので、例えば、掃除機の不使用時に電気コードを掃除機本体および支持体の周囲に巻回する構造を採ると、掃除機本体のみを使用する場合でも、このとき、この掃除機本体が充電式電池によって駆動されるにもかかわらず、前記電気コードを解かなくてはならず、また、ステッキタイプであるため、電気コード巻着用の巻着部としての突起などの設定位置によっては、操作時にこの突起が衣服に引掛るなどの問題がある。

本発明はこのような問題点を解決するためになされたもので、上記のようなハンディタイプの掃除機本体と、この掃除機本体を着脱自在に嵌合する支持体とを備えたステッキタイプの電気掃除機において、支持体の電気コードが掃除機本体の着脱の際に障害になったり、或いは操作時に前記電気コードの巻着部が衣服に引掛ったりしないようにすることを目的とするものである。

〔問題点を解決するための手段〕

本発明は、一側に吸込口を有するとともに、内部に電動送風機を有するハンディタイプの掃除機本体と、この掃除機本体を着脱自在に取付ける取付部を有し、この取付部の一端に前記掃除機本体の吸込口に連通する延長管を接続するとともに、嵌合部の他端に把手を取付け、前記延長管の先端に吸込口体を接続した支持体とを備え、前記掃除機本体に前記支持体を中継した交流電源により充電される充電式電池を設けるとともに、この直流電源と前記交流電源との切替えによって前記電動送風機を交流電源および直流電源のいずれでも作動可能とし、前記支持体の取付部とは別の面に、前記支持体に設けられ交流電源を供給する電気コードの巻着部を設けたことを特徴とするものである。

〔作用〕

本発明は、電気掃除機の不使用時には、支持体の電気コードを、この支持体に設けられた掃除機本体の取付部とは別の面に形成した巻着部に巻回し、前記掃除機本体のみを用いて掃除を行なう際に、この掃除機本体の着脱に巻回されたコードが障害にならないようにし、また例えば、前記取付部を支持体の前面に設けかつ巻着部をその背面に設けることで、掃除機本体を支持体の取付部に取付け、前記電気コードを解いて掃除を行なう際に、前記掛着部が衣服などに引掛らないようにするものである。

〔実施例〕

以下、本発明の一実施例を図面に基づいて説明する。

１はハンディタイプの小型の掃除機本体で、この掃除機本体１は電動送風機２を内蔵した本体ケース３と、前記電動送風機２の吸込み側となる本体ケース３の前側に着脱自在に取付けられる集塵ケース４とで形成されている。

そして、前記本体ケース３の後側に前記電動送風機２からの排気を排出する排気口11が形成されているとともに、その上方に係止凹部12が形成されており、また、本体ケース３の上部に取手13が形成されているとともに、その近傍に第１のスイ

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ッチ釦14が設けられている。さらに、本体ケース3の前側下縁に、前記集塵ケース4の後側下縁に向かって突出した凹状の係合受部15が設けられ、また、本体ケース3の前側上縁部分に係合孔16が設けられ、本体ケース3の前側上縁からこの係合孔16側に向かって係合爪17が突設されている。また、本体ケース3の下面にばね18で付勢されて突出した第2のスイッチ釦19が設けられている。

そして、前記集塵ケース4は前側に吸込口21を有しているとともにこの吸込口21の内部に開閉弁22を有し、また、上面にこの吸込口21に接続されるノズル23を収納するノズル収納凹部24が設けられ、かつ、内部の後縁にフィルタ装置25を嵌合してあり、また、後側下縁に前記本体ケース3の係合受部15に係合する係合突起26が突設されているとともに後側上縁に前記本体ケース3の係合孔16に挿入されて係合爪17に係脱するクランプ27が回動自在に設けられている。

そして、この掃除機本体1は単独で使用される場合と、支持体31に取付けて使用する場合とがある。

また、前記取付部32の底面に、前記第1及び第2のフック39，40と同一直線上で前後方向に延びる溝状の係合凹部41が外方に突出して形成され、掃除機本体1の支持体31への取着時には、この係合凹部41に掃除機本体1の係合受部15が嵌合され、この係合受部15が案内されるようになっている。そして、前記係合凹部41の底面に掛着部としてのフック孔41aが形成され、このフック孔41aに係合する掛着具としての第3のフック42が例えば室内の壁面43等に取付けられている。

さらに、前記把手35の前端部から電気コード44が導出され、この電気コード44は、通常、前記第1及び第2のフック39，40に巻回されている。

そして、この電気掃除機の電気回路は、第6図に示す回路図のように、掃除機本体1内に設けられる本体内回路部51と、支持体31内に設けられる支持体内回路部52とに分けられ、この両回路51，52は掃除機本体1の取付部32への取付けにより接続されるようになっている。

り、この支持体31は前記掃除機本体1の前面、底面、後面を嵌合保持する箱体状の取付部32を有し、この取付部32の前側壁を貫通して、前記掃除機本体1の吸込口21に基端が接続する細長い延長管33を前方に延出して設けるとともに、この延長管33の先端に吸込口体34を着脱自在に接続し、さらに、取付部32の後側上部に把手35を後方に向けて突設したものである。

さらに、前記取付部32の後側壁に、前記把手35の下方部分に前記掃除機本体1の排気口11に連通する通風口36が形成されているとともに、後側壁の上部に取付部32の内側に向かってばね37で付勢され前記掃除機本体1の係止凹部12内に挿入されて係脱する係合杆38が設けられている。

さらに、前記取付部32の背面に巻着部としての第1及び第2のフック39，40が底面の前側と後側とにそれぞれ突設され、この第1及び第2のフック39，40はそれぞれ略L字状に形成され、第1のフック39は掃除機本体1の前方に向いて折曲形成され、第2のフック40は回転自在に取付けられて

前記本体内回路51は前記電動送風機2に交流電流を供給する交流回路53と、前記電動送風機2に直流電流を供給する直流電源回路54とを有している。

そして、前記交流回路53は、一対の交流端子55間に第1のスイッチ釦14で切替えられる第1の切替スイッチ56、第1のコイル57、前記電動送風機2及び第2のコイル58を直列に接続して形成されている。

また、前記直流電源回路54は、一対の直流端子59間に抵抗60及びこの抵抗60側に（－）端を向けた直流電源としての充電式電池61を直列に接続し、さらに、この充電式電池61の（－）端を前記第2のスイッチ釦19で開閉される第2の切替スイッチ62と前記第1の切替スイッチ56とを介して前記第1のコイル57の中間部に接続するとともに、前記充電式電池61の（＋）端を前記第2のコイル58の中間部に接続している。

また、前記支持体内回路部52は外部の交流電源71から前記電気コード44を介して前記本体内回路

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51の交流回路53に交流電流を通電する交流電源回路72と、前記交流電源71からの交流電流を受けて前記本体内回路51の直流電源回路54に直流充電電流を供給する充電回路73とで形成されている。

前記交流電源回路72は掃除機本体1の取付部32への嵌合時に前記交流回路53の一対の交流端子55に接続される一対の交流電源端子74を有しており、前記充電回路73は交流電源71に接続されるトランス75を有するとともに、このトランス75の2次側コイル76の両端にそれぞれ2つのダイオード77,78が逆方向に接続され、この2つのダイオード77,78に(−)側の充電端子79が接続されているとともに前記2次側コイルの中間位置に(+)側の充電端子79が接続されている。

次に、この実施例の電気掃除機の作用について説明する。

この電気掃除機を使用して床面等の低い所を掃除する時は、支持体31の取付部32に掃除機本体1を嵌合して取付けた状態で使用する。

取付部32に掃除機本体1を取付けると、掃除機本体1内に設けた本体内回路部51の各一対の交流端子55、及び一対の直流端子59が支持体31に設けた支持体内回路部52の一対の直流電源端子74、及び一対の充電端子79にそれぞれ対応して接続し、交流回路53と交流電源回路72とが接続するとともに、直流電源回路54と充電回路73とが接続する。

また、取付部32に掃除機本体1を取付けることにより第2のスイッチ釦19が押されて第2の切替スイッチ62がオフし、直流電源回路54が開かれる。

従って、第1の切替スイッチ56を直流電源回路54側に入れても電動送風機2は作動しない。一方、第1の切替スイッチ56を交流回路53側に入れ、交流電源71を投入すると電動送風機2が作動するので、この状態で掃除をする。

ところで、掃除機本体1を取付部32に嵌合している時、充電回路73と直流電源回路54の充電式電池61が接続されるので、充電式電池61への充電が行われる。そして、この充電は、交流電源回路72と交流回路53からの交流電流で電動送風機2を作動している間にも行われているので充電効率がよい。

次に、テーブルの上等やや高い所を掃除する場合、支持体31の延長管33が長すぎて掃除しにくいので、掃除機本体1を支持体31の取付部32から外す。支持体31の取付部32から掃除機本体1を外すと第2のスイッチ釦19が突出して第2の切替スイッチ62がオンするので、直流電源としての充電式電池61の使用が可能になり、第1の切替スイッチ56を直流電源回路54側に入れると、充電式電池61により電動送風機2が作動するのでこの状態で掃除をする。この場合ノズル収納凹部24からノズル23を外して吸込口21に挿入しておく。

ところで、電気掃除機の電気回路は、掃除機本体1側の本体内回路部51と支持体31内の支持体内回路部52とに分けられ掃除機本体1内に充電用のトランス75等がないので、掃除機本体1自体の重量が軽くなり、掃除機本体1を持ち易く、掃除が容易にできる。

また、前記ノズル23は、掃除機本体1を支持体31に取着して掃除を行なうときには、ノズル収納凹部24に嵌着されているので、前記ノズル23を紛失するようなことがなく、また、掃除機本体1のみで掃除を行なうときには、ノズル23を収納凹部24から外して、すぐに吸込口21に取付けることができ、ノズル23を別の収納場所から持ってくるような手間がいらない。

また、掃除機の不使用時には、電気コード44を第1及び第2のフック39,40に巻回して収納し、掃除機本体1を支持体31の取付部32に嵌合して室内の壁面43に設けた第3のフック42にフック孔41aを係合して支持体31と掃除機本体1と一体になったこの電気掃除機を掛けておく。

このようにして、掃除機を壁面43などに掛けておくことができるので、掃除機の置き場所に広いスペースを必要としないとともに、手軽にこの掃除機を使用することができる。そして、第3のフック42に係合されるフック孔41aが、支持体31の取付部32の背面に、巻回された電気コード44の内側に位置するように設けてあるので、掃除機は掃除機本体1及び電気コード44などのもっとも重量

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のある部分で支持されることになり、掃除機は安定して掛着される。

また、電気コード44の巻着部であるフック39，40及びフック孔41aは、支持体31の取付部32の背面に設けてあるので、掃除機を掛着した状態で、電気コード44が壁面43側に位置しているから外観上の体裁が良く、また、取付部32は外面側に位置することになるから、掃除機本体1のみを使って掃除を行なうときには、支持体31を壁面43に掛けたまま、掃除機本体1を着脱することができる。さらに、電気コード44のプラグをコンセントに差込んだまま掃除機をかければ、この状態で充電式電池61の充電を行なうことできる。

そして、第1及び第2のフック39，40に巻回されて収納された電気コード44を再び使用するときは、第2のフック40が回動自在になっているので、回動によりL字形の折曲方向を内側に向けると、この第2のフック40に引掛かっていた電気コードが一度に外れるので、巻回を解くより素早く外すことができる。

また、掃除機本体1を支持体31に取着して掃除を行なう場合には、第1及び第2のフック39，40が下面側に位置することになるので、操作中にこれらフック39，40が衣服などに引掛ることがない。

なお、この実施例では第2の切替スイッチ62を設け、掃除機本体1を取付部32に取付けたときにはこの第2の切替スイッチ62がオフとなり、充電式電池61が使用できないようになっているが、この第2の切替スイッチ62を設けなければ、掃除機本体1を支持体31の取付部32に取付けて使用する場合、第1の切替スイッチ56による選択により、交流・直流いずれでも使用可能となる。従って、電気コード44の長さが足りず、支持体31の吸込口体34の届かない場所でも直流電源回路54からの直流電流で作動するようにすれば、電気コード44を室内のコンセントから外して、届かない場所まで行くことにより掃除をすることができる。

（発明の効果）

本発明によれば、ハンディタイプの掃除機本体と、この掃除機本体が取付けられる取付部を有する支持体とを備えたステッキタイプの電気掃除機において、支持体の電気コードを、この支持体の取付部とは別の面に形成した巻着部に巻回して収納する構造としたので、前記コードの収納、取外しが容易であるとともに体裁良く収納することができ、また、掃除機本体のみを使用する際にこの掃除機本体の着脱に前記コードが障害となることがなく、さらに、例えば取付部を支持体の前面に設けかつ巻着部をその背面に設ければ、掃除機本体を支持体の取付部に取着して使用する際、前記巻着部が衣服などに引掛ることがないものである。

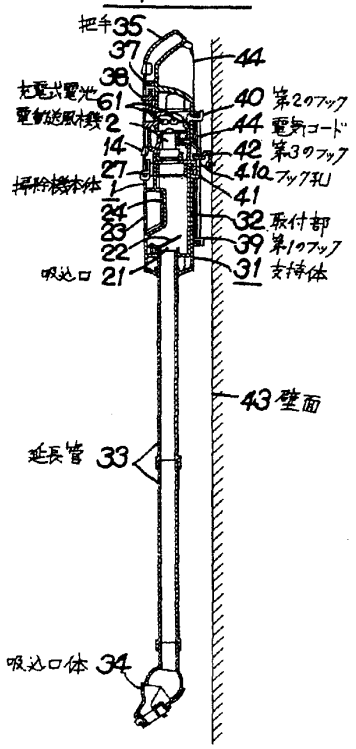
4．図面の簡単な説明

第1図は本発明の電気掃除機の一実施例を示す縦断面図、第2図はその斜視図、第3図は支持体の取付部部分と掃除機本体の縦断面図、第4図は掃除機本体の使用状態を示す縦断面図、第5図は第2のスイッチ釦部分の拡大縦断面図、第6図は電気掃除機の電気回路を示す回路図である。

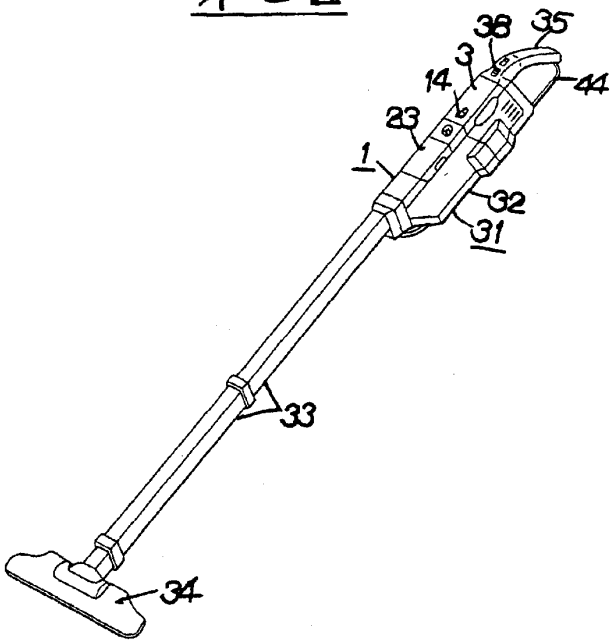
1・・掃除機本体、2・・電動送風機、21・・吸込口、31・・支持体、32・・取付部、33・・延長管、34・・吸込口体、35・・把手、39・・巻着部としての第1のフック、40・・巻着部としての第2のフック、41a・・掛着部としてのフック孔、42・・掛着具としての第3のフック、43・・壁面、44・・電気コード、61・・充電式電池、71・・交流電源。

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Page 438

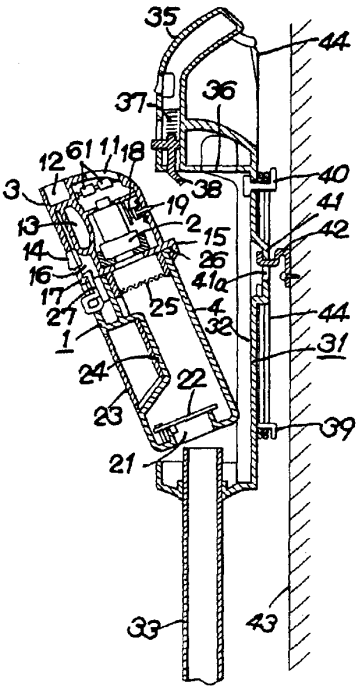
第1図



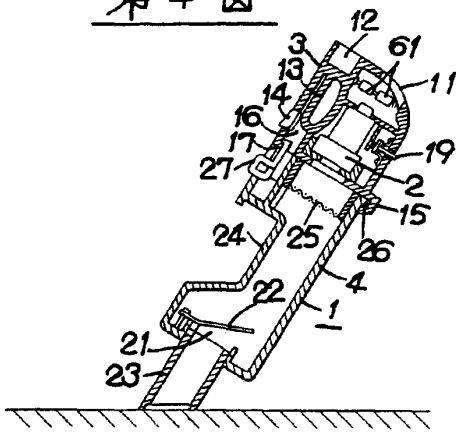
第2図



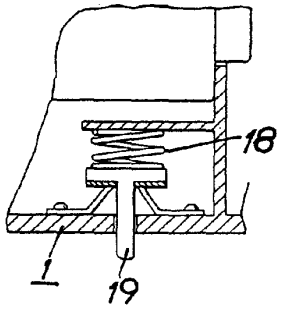
第3図



第4図

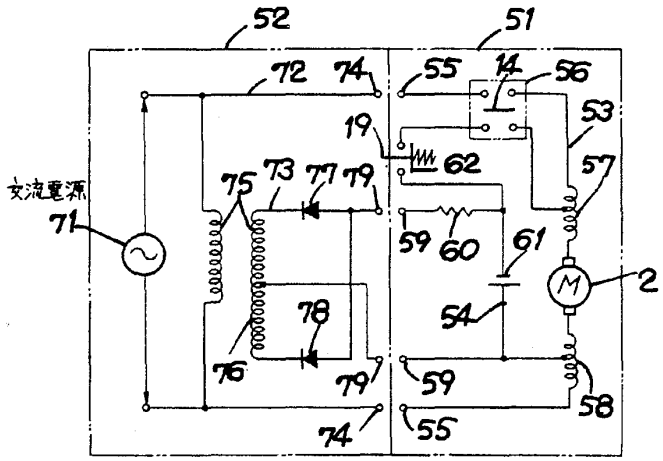


第5図



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Page 439

第6図



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Page 440

Japan Patent Office

Issued 22 March 1988

Design Gazette (S)

C3-410 D Analog

679426 Analog-1 Design Application: 59-26464 Application date: 27 June 1984
Registered: 17 November 1987

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: MORIYAMA Toshiya, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

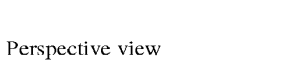
Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Left side view Front view Back view Right side view

679390 (2) C3-410D

Plan view Bottom view



Perspective view

日本国特許庁

昭和63年(1988)3月22日発行　**意匠公報**　(S)

C3-410 D類似

679426の類似1　意願 昭59－26464　出願 昭59(1984)6月27日
登録 昭62(1987)11月17日

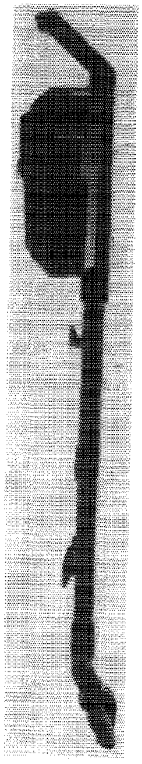
意匠法第4条第2項適用

創作者	宮本一伸	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	長松康男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
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意匠権者	松下電器産業株式会社	大阪府門真市大字門真1006番地
代理人	弁理士 中尾敏男	外1名
審査官	鍋田和宣	

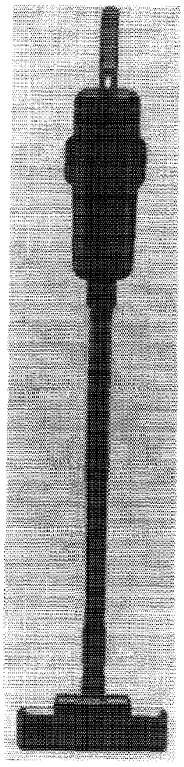
意匠に係る物品　電気掃除機

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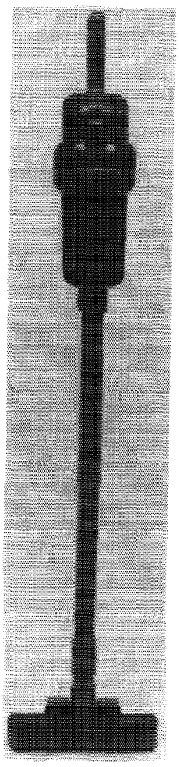
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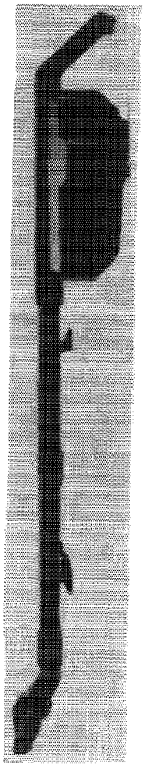
正面図



背面図

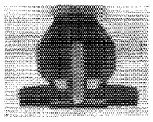


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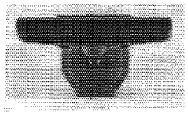


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Page 443

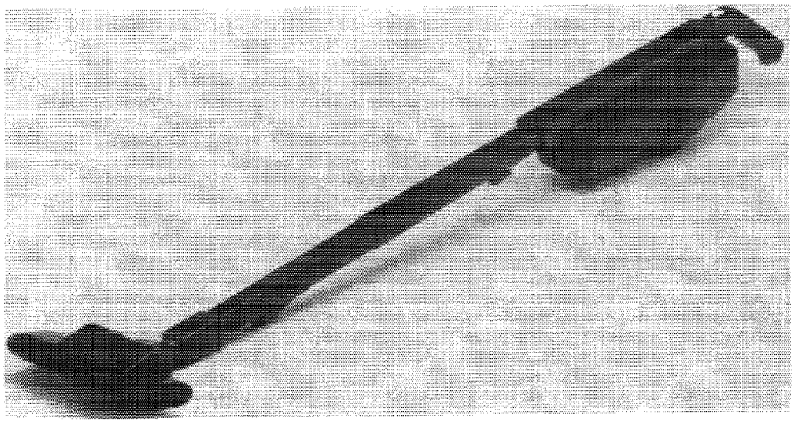
平 面 図



底 面 図



斜 視 図



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Intellectual Property Office

Designs Full Details

REGISTER ENTRY FOR DESIGN NUMBER 1038414

Date of Application. 28th November 1986

Priority date claimed 17th June 1986

Date as of which design registered 17th June 1986

View Image(s)

Certificate of registration issued 13th August 1987

Design Expired 17th June 2001

Product in respect of which design registered:
'a vacuum cleaner.'

Edition	Pri. Class'n	First Duplicate	Second Duplicate	Third Duplicate
06 At Issue	15-05 01B	15-05 01A		

Name(s) and Address(es) of Proprietor(s):
ADP NUMBER: 00000286003

Black & Decker Inc.
Incorporated in state of Delaware
Drummond Plaza Office Park
1423 Kirkwood Highway
Newark
Delaware 19711
UNITED STATES OF AMERICA

Address for Service
ADP NUMBER: 00003529002

Brian R Lucas
Lucas George & Co
135 Westhall Road
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CR3 9HJ

10th June 1991
In pursuance of an application filed on 16th May 1991, period of protection extended for second period of five years ending 17th Jun 1996.

13th June 1991
Address for Service changed to / continues as
ADP NUMBER: 00006369004

Emhart Patents Department
Attn: Diana C Stagg
Emhart International Ltd
177 Walsall Road
Birmingham
B42 1BP
by notification received on 19th April 1991

13th June 1994
In pursuance of an application received on the 17th May 1994 the Address
of the registered SERVICE ADDRESS/AGT altered to
ADP NUMBER: 00006369004

Emhart Patents Department
Attn: Diana C Stagg
Emhart International Ltd
177 Walsall Road
Birmingham
B42 1BP

21st May 1996
In pursuance of an application filed on 16th May 1996, period of protection
extended for third period of five years ending 17th Jun 2001.

22nd December 1998
LOCARNO AMENDED

16th May 2001
Address for Service changed to / continues as
ADP NUMBER: 00028939002

Black & Decker Europe
The Patent Department
210 Bath Road
Slough
Berkshire
SL1 3YD
by notification received on 24th June 1999

17th June 2001
Period of Protection Expired.

** END OF REGISTER DETAILS **

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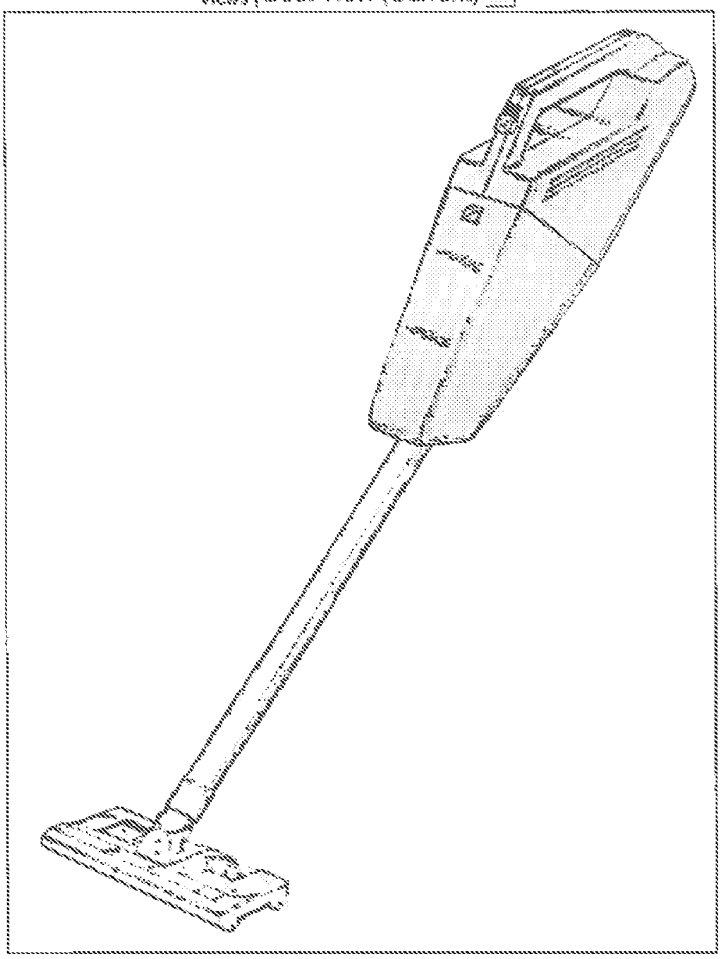
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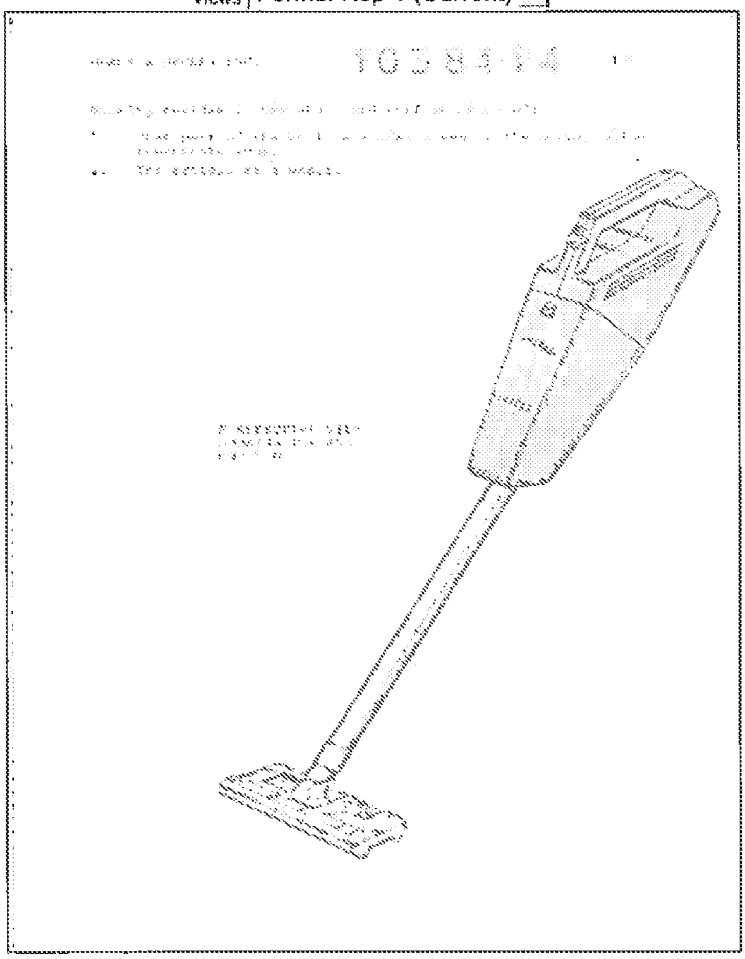


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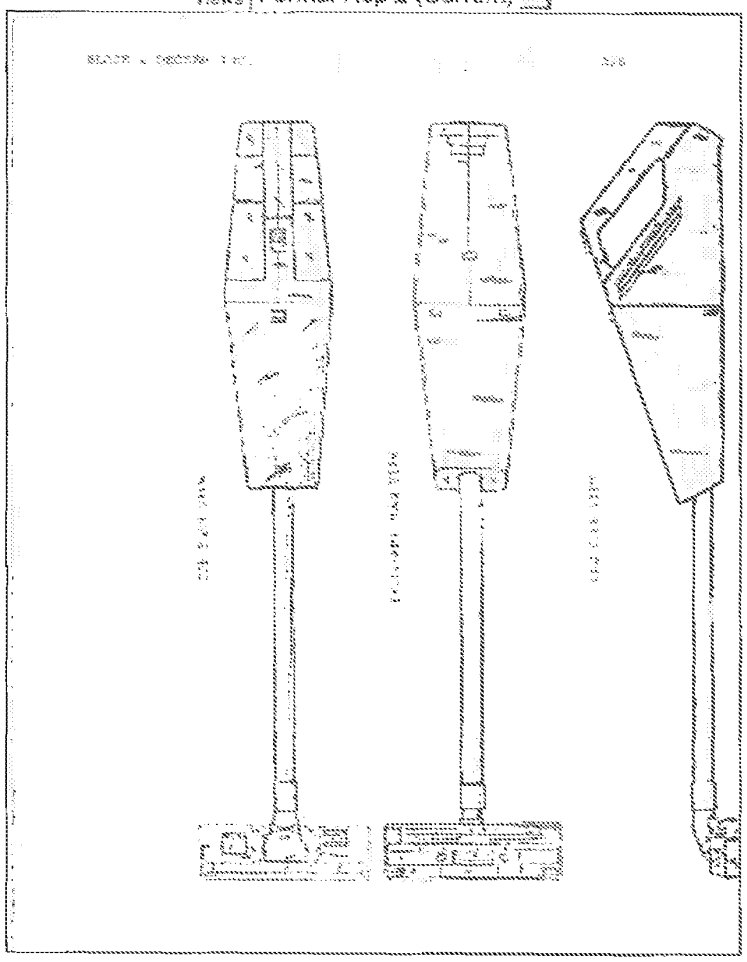


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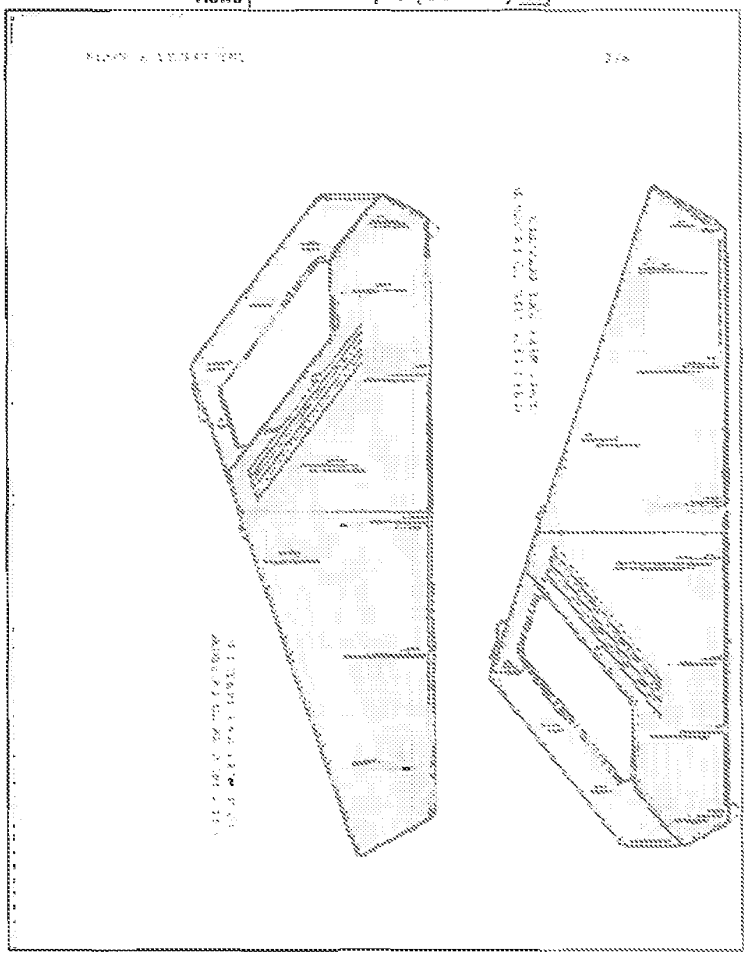


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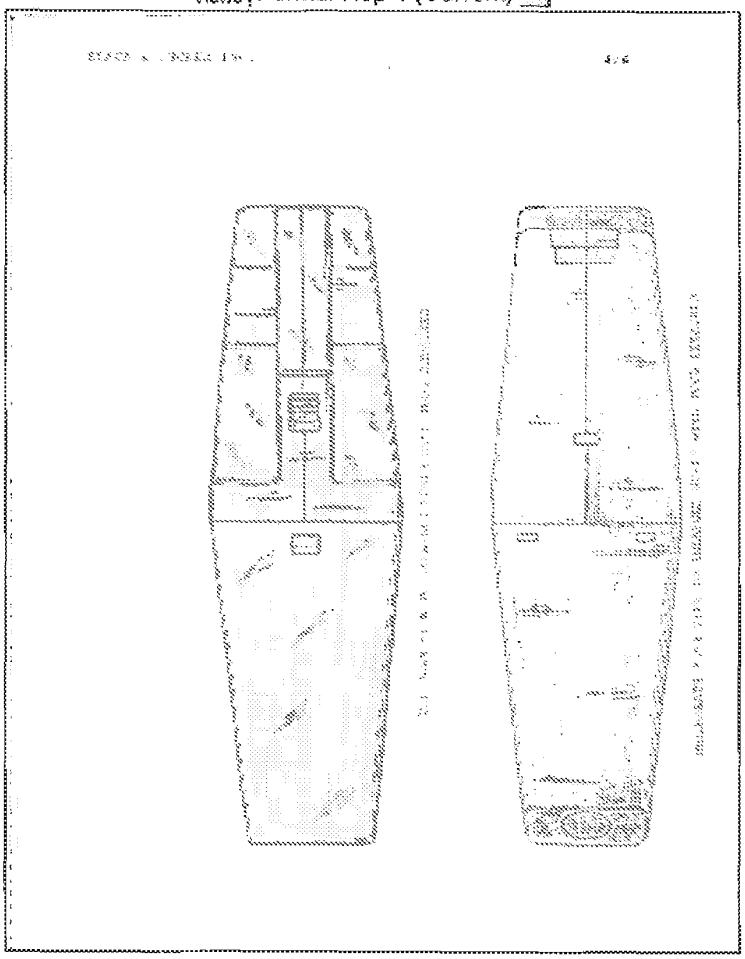


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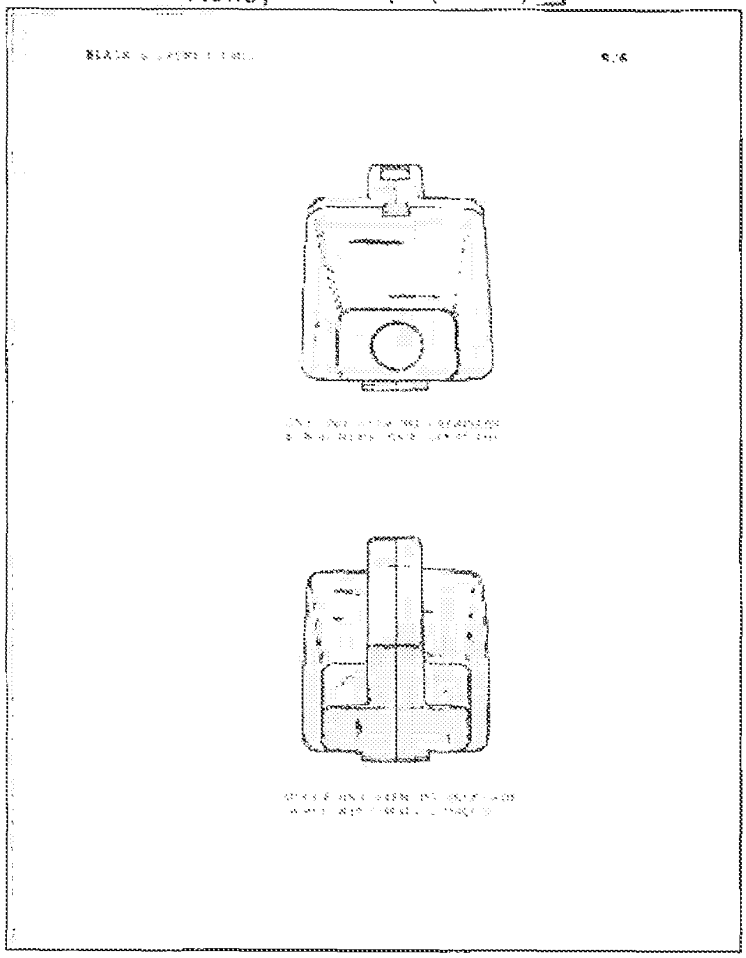


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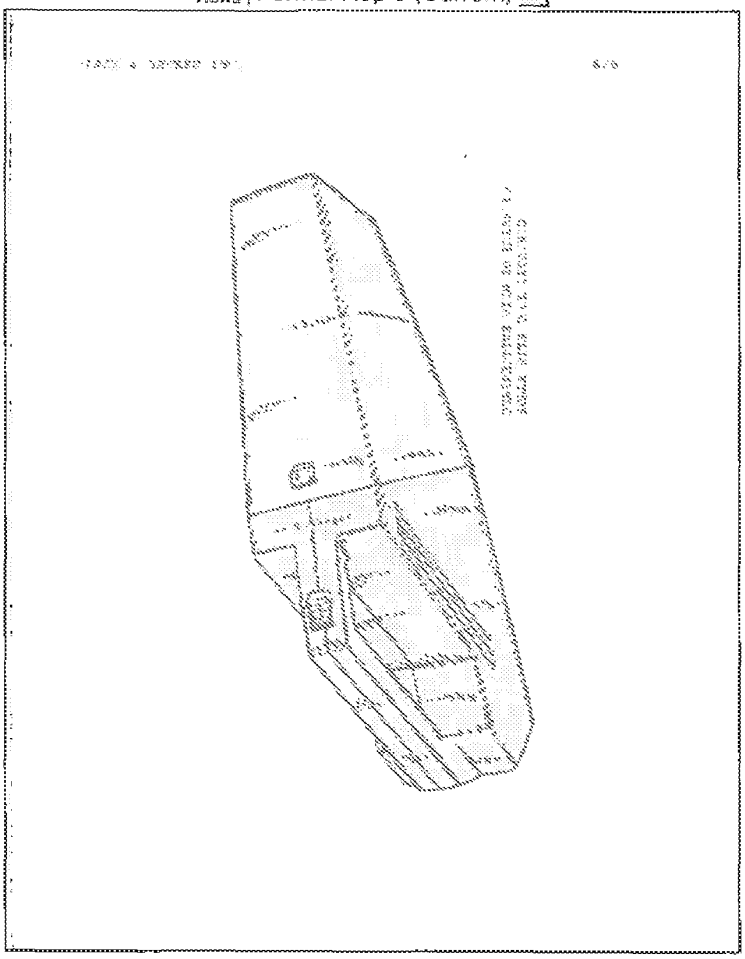


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Design # 1038414

Hint: Press Ctrl-P to Print

Views: Formal Rep 6 (Current)



ELECTRIC VACUUM CLEANER AND SUCTION PORT THEREFOR

Publication number: JP-8289861-A

Country: JP

Document Number: 8289861

Document Kind: A

Date of Publication: 19961105

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Publication reference:

Publication number: JP-8289861-A

Country	Document number	Kind	Date	DText	Language	Format
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Application Reference

Publication number: JP-9648995-A

Country	Document number	Kind	Date	DText	Language	Format
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Priority Claims

Publication number	Kind	Document ID	Office of filling
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Terms of grant

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Technical data

Classification IPC

Edition:

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A47L 9/02 Further classifications:

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Classification IPCR

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Invention titles

Title : EN
ELECTRIC VACUUM CLEANER AND SUCTION PORT THEREFOR

Related documents

This document contains no related documents.

Parties

Applicants

Application, format: epo

Name: HITACHI LTD

Application, format: intermediate

Name: HITACHI LTD

Application, format: original

Last name: HITACHI LTD

Inventors

Inventor, format: epo

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Name: OZAWA MORIO

Inventor, format: intermediate

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Inventor, format: intermediate

Name: OZAWA MORIO

Inventor, format: original

Last name: NAGAI GEN

Inventor, format: original

Last name: OZAWA MORIO

International convention data

This document contains no international convention data.

Designated states

This document contains no designated states.

Abstracts:

Abstract EN - Source:

PURPOSE: To move s suction port part in various directions without an unnatural posture by providing a communication part for communicating an electric vacuum cleaner main body with the suction port part and a hinge part for connecting the suction port to a handle part rotatably at least in a horizontal direction and a vertical direction. CONSTITUTION: The suction port part 1 for cleaning a floor surface attached to an extension pipe 10 connected to the handle part is constituted by providing a main body case 2 provided with a dust suction port, a communicating joint 3 for communicating the main body case 2 with the extension pipe 10 and the hinge part 4 composed of a hinge female part 17 and a hinge male part 18 for connecting the main body case 2 to the connection joint 3 rotatably at least in the horizontal and vertical directions. Also, on the installation surface of the main body case 2 in contact with the floor surface, universal wheels 9a and 9b are provided. The connection joint 3 is constituted by providing the connection part 5 attached to the extension pipe 10, a supporting body 6 for connecting the connection part 5 to the hinge part 4 and a flexible hose 7 for communicating the connection part 5 with the main body case 2.COPYRIGHT: (C)1996,JPO

Description:

This document contains no description.

Claims:

This document contains no claims.

Legal Status:

This document contains no legal status.

Revision History:

This document contains no revision history.

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特開平8－289861

(43)公開日　平成８年(1996)11月５日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ		技術表示箇所
Ａ４７Ｌ　9/02			Ａ４７Ｌ　9/02	Ｚ	

審査請求　未請求　請求項の数26　ＯＬ　（全 13 頁）

(21)出願番号　特願平7－96489

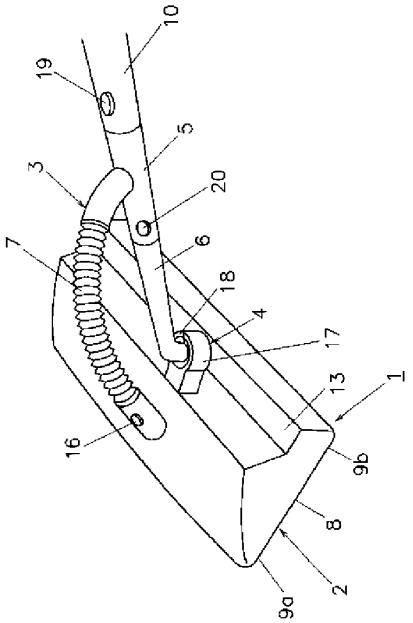
(22)出願日　平成７年(1995)４月21日

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株式会社日立製作所デザイン研究所内
(74)代理人　弁理士　小川　勝男

(54)【発明の名称】　電気掃除機及び電気掃除機用吸口部

(57)【要約】
【目的】　無理な姿勢を強いることなく、吸口部を多様に動かすことができる電気掃除機を提供する。
【構成】　塵埃を吸い込むための送風機を備えた電気掃除機本体１０１と、塵埃吸引口８を備えた吸口部１と、前記吸口部１を移動するためのハンドル部１０３と、前記電気掃除機本体１００と吸口部１を連通する連通部（吸引ホース１０２、接続管１０、連結ホース７）と、前記吸口部１と前記ハンドル部１０３に少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部４を電気掃除機１００に備える。
【効果】　手や腕にかかる負担を軽減して良好な作業姿勢を得ることができるとともに、直進走行性や横方向への移動及び方向転換もスムースに行うことができる。

図１



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1

【特許請求の範囲】

【請求項１】塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記吸口部を移動するためのハンドル部と、前記電気掃除機本体と吸口部を連通する連通部と、前記吸口部を前記ハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するためのヒンジ部とを設けたことを特徴とする電気掃除機。

【請求項２】塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、一端を前記掃除機本体と取付けられて連通する柔軟性のある吸引ホースと、前記吸引ホースの他の一端に取付けられて連通する接続管と、前記接続管と前記吸口部を連通する柔軟性のある連結ホースと、前記接続管と前記吸口部を少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部と、前記接続管に設けられ、前記接続管を介して前記吸口部を動かすためのハンドル部とを設けたことを特徴とする電気掃除機。

【請求項３】塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記掃除機本体と吸口部を連通する連通部と、前記掃除機本体に吸口部を少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部と、前記掃除機本体に設けられるハンドル部とを設けたことを特徴とする電気掃除機。

【請求項４】ヒンジ部の動作範囲は、少なくとも水平方向に１８０度、垂直方向に４５度であることを特徴とする請求項１～３の電気掃除機。

【請求項５】ヒンジ部は動作範囲の所定の位置で動作を固定するロック手段を備えていることを特徴とする請求項１～４の電気掃除機。

【請求項６】ヒンジ部はボールジョントであることを特徴とする請求項１～５の電気掃除機。

【請求項７】塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記吸口部を移動するためのハンドル部と、前記電気掃除機本体と吸口部を連通するとともに、前記吸口部を前記ハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するための連通ヒンジ部とを設けたことを特徴とする電気掃除機。

【請求項８】塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、一端を前記掃除機本体と取付けられて連通する柔軟性のある吸引ホースと、前記吸引ホースの他の一端に取付けられて連通する接続管と、前記接続管と前記吸口部を連通するとともに、少なくとも水平方向と垂直方向に回転可能に連結する連通ヒンジ部と、前記接続管に設けられ、前記接続管を介して前記吸口部を動かすためのハンドル部とを設けたことを特徴とする電気掃除機。

【請求項９】塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記掃除

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機本体と吸口部を連通し、少なくとも水平方向と垂直方向に回転自在に連結する連通ヒンジ部と、前記掃除機本体に設けられるハンドル部とを設けたことを特徴とする電気掃除機。

【請求項１０】連通ヒンジ部の動作範囲は、少なくとも水平方向に１８０度、垂直方向に４５度であることを特徴とする請求項７～９の電気掃除機。

【請求項１１】連通ヒンジ部は動作範囲の所定の位置で動作を固定するロック手段を備えていることを特徴とする請求項７～１０の電気掃除機。

【請求項１２】連通ヒンジ部は連通する開口部を備えたボールジョントであることを特徴とする請求項７～１１の電気掃除機。

【請求項１３】吸口部は水平方向に回転自在な自在車輪を備えていることを特徴とする請求項１～１２の電気掃除機。

【請求項１４】自在車輪はボール車輪であることを特徴とする請求項１３の電気掃除機。

【請求項１５】自在車輪は吸口部に出没自在に取付けられていることを特徴とする請求項１３、１４の電気掃除機。

【請求項１６】塵埃吸引口を備えた吸口部本体と、塵埃を吸い込むための送風機を備えた電気掃除機本体と前記吸口部本体とを連通する連通部と、前記吸口部本体を移動するためのハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するためのヒンジ部とを設けたことを特徴とする電気掃除機用吸口部。

【請求項１７】ヒンジ部の動作範囲は、少なくとも水平方向に１８０度、垂直方向に４５度であることを特徴とする請求項１６の電気掃除機用吸口部。

【請求項１８】ヒンジ部は動作範囲の所定の位置で動作を固定するロック手段を備えていることを特徴とする請求項１６、１７の電気掃除機用吸口部。

【請求項１９】ヒンジ部はボールジョントであることを特徴とする請求項１６～１８の電気掃除機用吸口部。

【請求項２０】塵埃吸引口を備えた吸口部本体と、塵埃を吸い込むための送風機を備えた電気掃除機本体と前記吸口部本体とを連通するとともに、前記吸口部本体を移動するためのハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するための連通ヒンジ部とを設けたことを特徴とする電気掃除機用吸口部。

【請求項２１】連通ヒンジ部の動作範囲は、少なくとも水平方向に１８０度、垂直方向に４５度であることを特徴とする請求項２０の電気掃除機用吸口部。

【請求項２２】連通ヒンジ部は動作範囲の所定の位置で動作を固定するロック手段を備えていることを特徴とする請求項２０、２１の電気掃除機用吸口部。

【請求項２３】連通ヒンジ部は連通する開口部を備えたボールジョントであることを特徴とする請求項２０～２２の電気掃除機用吸口部。

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【請求項２４】水平方向に回転自在な自在車輪を備えていることを特徴とする請求項１６～２３の電気掃除機用吸口部。

【請求項２５】自在車輪はボール車輪であることを特徴とする請求項２４の電気掃除機用吸口部。

【請求項２６】自在車輪は吸口部に出没自在に取付けられていることを特徴とする請求項２４、２５の電気掃除機用吸口部。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、手や腕にかかる負担を軽減して良好な作業姿勢を得ることができるとともに、直進走行性や横方向への移動及び方向転換もスムースに行うことができる電気掃除機及び電気掃除機用吸口部に関するものである。

【０００２】

【従来の技術】従来の床用吸口部においては、特開昭５９－２１１４２１号の公開公報に示されているように、吸口部本体の後方部に取付けられる吸気通路を形成するパイプを上下方向に回転可能に連結したものが提案されている。また、特開平２－８４９１９号の公開公報では、吸口部本体の上部に取付けられる吸気通路を形成するパイプを水平方向に回転可能に連結する吸口部が提案されている。

【０００３】

【発明が解決しようとする課題】前記第１の従来例では、吸口部本体と、この吸口部本体の後方部に取付けられるパイプとが、上下方向に回転可能に取付けられるため、パイプの上下方向への動き（角度）が良好と成り、進行方向に対して前後の動きには対応できる。しかし、この従来例では、吸口部を方向転換する際、例えば、吸口部が壁面に当って回転しようとするときには吸口部を持ち上げたりしなければならず、連続した清掃作業が困難であった。

【０００４】一方、前記第２の従来例では、吸口部本体と、この吸口部本体の上部中央に取付けられるパイプとが、水平方向に回転可能に取付けられるため、パイプの水平方向への回転の動き（角度）が良好と成り、吸口部が壁面に当って回転しようとするときの方向転換が容易となる。しかし、この従来例では、吸い込み口と床面を密着させるためには、常に床面とパイプの角度を一定にしなければならないため、無理な姿勢を強いられたり、清掃範囲を狭くしていた。

【０００５】本発明は、前記の問題点を解決するためになされたものであり、その目的は無理な姿勢を強いることなく、吸口部を多様に動かすことができる電気掃除機を提供することにある。

【０００６】

【課題を解決するための手段】前記目的を達成するために、第１の発明では、塵埃を吸い込むための送風機を備

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えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記吸口部を移動するためのハンドル部と、前記電気掃除機本体と吸口部を連通する連通部と、前記吸口部を前記ハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するためのヒンジ部とを設ける。

【０００７】また、他の発明では、塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、一端を前記掃除機本体と取付けられて連通する柔軟性のある吸引ホースと、前記吸引ホースの他の一端に取付けられて連通する接続管と、前記接続管と前記吸口部を連通する柔軟性のある連結ホースと、前記接続管と前記吸口部を少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部と、前記接続管に設けられ、前記接続管を介して前記吸口部を動かすためのハンドル部とを設ける。

【０００８】また、他の発明では、塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記掃除機本体と吸口部を連通する連通部と、前記掃除機本体に吸口部を少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部と、前記掃除機本体に取付けられるハンドル部を設ける。

【０００９】また、他の発明では、塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記吸口部を移動するためのハンドル部と、前記電気掃除機本体と吸口部を連通するとともに、前記吸口部を前記ハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するための連通ヒンジ部とを設ける。

【００１０】また、他の発明では、塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、一端を前記掃除機本体と取付けられて連通する柔軟性のある吸引ホースと、前記吸引ホースの他の一端に取付けられて連通する接続管と、前記接続管と前記吸口部を連通するとともに、少なくとも水平方向と垂直方向に回転可能に連結する連通ヒンジ部と、前記接続管に設けられ、前記接続管を介して前記吸口部を動かすためのハンドル部とを設ける。

【００１１】また、他の発明では、塵埃を吸い込むための送風機を備えた電気掃除機本体と、塵埃吸引口を備えた吸口部と、前記掃除機本体と吸口部を連通し、少なくとも水平方向と垂直方向に回転自在に連結する連通ヒンジ部と、前記掃除機本体に取付けられるハンドル部とを設ける。

【００１２】また、他の発明では、塵埃吸引口を備えた吸口部本体と、塵埃を吸い込むための送風機を備えた電気掃除機本体と前記吸口部本体とを連通する連通部と、前記吸口部本体を移動するためのハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するためのヒンジ部とを設ける。

【００１３】また、他の発明では、塵埃吸引口を備えた

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吸口部本体と、塵埃を吸い込むための送風機を備えた電気掃除機本体と前記吸口部本体とを連通するとともに、前記吸口部本体を移動するためのハンドル部に少なくとも水平方向と垂直方向に回転可能に連結するための連通ヒンジ部とを設ける。

【００１４】

【作用】第１の発明によれば、塵埃は塵埃吸引口を備えた吸口部から連通部を介して電気掃除機本体に収集され、前記吸口部はヒンジ部を介して前記ハンドル部に少なくとも水平方向と垂直方向に回転可能に連結されるので、前記ハンドル部を介して前記吸口部を水平方向と垂直方向に自在に動かすことができる。

【００１５】また、他の発明によれば、塵埃は吸口部から連結ホース、接続管、吸引ホースを介して電気掃除機本体に収集され、前記吸口部はヒンジ部を介して前記接続管に少なくとも水平方向と垂直方向に回転可能に連結されるので、前記接続管に設けた前記ハンドル部を介して前記吸口部を水平方向と垂直方向に自在に動かすことができる。

【００１６】また、他の発明によれば、塵埃は吸口部から連通部を介して電気掃除機本体に収集され、前記吸口部はヒンジ部を介して前記掃除機本体に少なくとも水平方向と垂直方向に回転可能に連結されるので、前記掃除機本体に設けた前記ハンドル部を介して前記吸口部を水平方向と垂直方向に自在に動かすことができる。

【００１７】また、他の発明によれば、塵埃は塵埃吸引口を備えた吸口部から連通ヒンジ部を介して電気掃除機本体に収集され、連通ヒンジ部は、前記吸口部とハンドル部を少なくとも水平方向と垂直方向に回転可能に連結するので、前記ハンドル部を介して前記吸口部を水平方向と垂直方向に自在に動かすことができる。

【００１８】また、他の発明によれば、塵埃は吸口部から連通ヒンジ部、接続管、吸引ホースを介して電気掃除機本体に収集され、前記吸口部は連通ヒンジ部を介して前記接続管に少なくとも水平方向と垂直方向に回転可能に連結されるので、前記接続管に設けた前記ハンドル部を介して前記吸口部を水平方向と垂直方向に自在に動かすことができる。

【００１９】また、他の発明によれば、塵埃は吸口部から連通ヒンジ部を介して電気掃除機本体に収集され、前記吸口部は連通ヒンジ部を介して前記掃除機本体に少なくとも水平方向と垂直方向に回転可能に連結されるので、前記掃除機本体に設けた前記ハンドル部を介して前記吸口部を水平方向と垂直方向に自在に動かすことができる。

【００２０】また、他の発明によれば、塵埃は吸口部本体から連通部を介して電気掃除機本体に収集され、前記吸口部本体は、ヒンジ部を介して、少なくとも水平方向と垂直方向に回転可能に連結されるので、前記ハンドル部を介して吸口部を水平方向と垂直方向に自在に動かす

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ことができる。

【００２１】また、他の発明によれば、吸口部本体から連通ヒンジ部を介して電気掃除機本体に収集され、前記連通ヒンジ部は、前記吸口部本体とハンドル部を少なくとも水平方向と垂直方向に回転可能に連結するので、前記ハンドル部を介して吸口部を水平方向と垂直方向に自在に動かすことができる。

【００２２】

【実施例】以下本発明の実施例を図１～図１７を参照して説明する。なお、同一の部材、部位、矢印等は同一符号を持って示し、重複した説明は省略する。

【００２３】〔第１の実施例〕図１～図８は本発明に係る第１の実施例を示す電気掃除機であり、図１は背面方向から見た吸口部の外観図、図２は吸口部の中央縦断面図、図３は吸口部のヒンジ部要部外観図、図４は吸口部のヒンジ部の断面図、図５は吸口部の自在車輪の説明図、図６～図８は使用状態図である。

【００２４】先ず、図６において、本実施例に係る電気掃除機１００は、図示しない電動送風機を備えた電気掃除機本体１０１と、該電気掃除機本体１０１に連通する柔軟性のある吸引ホース１０２と、該吸引ホース１０２の先端に取付けられるハンドル部１０３と、該ハンドル部１０３に連結される延長管１０と、該延長管１０に取付けられるで床面清掃用の吸口部１とから構成される。前記吸口部１は、延長管１０に対して水平方向と垂直方向に回転可能に連結される構造を備えている。以下、この吸口部１を図１～図８を参照して詳細に説明する。

【００２５】先ず、図１において、本実施例に係る吸口部１の概略構造を説明する。図において、符号１で総括的に示すのは吸口部であり、塵埃吸引口８（図２で図示）を備えた本体ケース２と、前記本体ケース２と延長管１０とを連通させる接続継手３と、前記本体ケース２と接続継手３を少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部４とから構成される。前記本体ケース２は、横長扁平な形態を備え、塵埃吸引口８を備えた床面との設置面に自在車輪９ａ、９ｂが配置されている。接続継手３は延長管１０に取付けられる接続部５と、該接続部５とヒンジ部４を接続する支持体６と、前記接続部５と本体ケース２とを連通する伸縮ホース７とから構成される。ヒンジ部４は、本体ケース２の後方に形成される段差部１３の長手方向の中央に配置され、段差部１３の壁面に取付けられるヒンジ雌部１７と、支持体６の先端に形成される鍵型のヒンジ雄部１８とから構成される。鍵型のヒンジ雄部１８は先端部にボール２１が形成され、該ボール２１がヒンジ雌部１７で保持されることにより、ヒンジ部４が水平方向と垂直方向に動作する。

【００２６】次に、図２において、本体ケース２の詳細構造を説明する。本体ケース２は、上部をカバーする合成樹脂性の上ケース１１と、下部をカバーする合成樹脂

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性の下ケース１２とから構成される。本体ケース２は側面からみて、前方が先細りのくさび形状としており、後部上方にはヒンジ部４が取付けられる段差部１３が形成されている。本体ケース２の内部にはタービンブラシ１４が配置される。このタービンブラシ１４は、同軸上に設けられた図示しないタービン羽により、電気掃除機本体１０１の吸引力により回転し、下方の下ケース１２に開口される塵埃吸引口８から露出する床面をブラッシングして吸引効率を向上する。上ケース１１には、伸縮ホース７の一端が着脱自在に取付けられる開口部１５が形成される。１６は伸縮ホース７の着脱を可能にするロックスイッチである。下ケース１２の前後両側には大小一対の回転軸を自在に変えることができる自在車輪９ａ、９ｂが配置されている。後方に取付けられる自在車輪９ｂは大車輪であり、主に吸口部１や延長管１０及び使用者の負荷加重を支持する。一方、前方に取付けられる自在車輪９ａは、主に吸口部１の回転性能を向上させる。

【００２７】接続部５は、一端５ａを延長管１０と着脱自在に取付けられ、他端は２股に形成される。２股に形成される接続部５の一端５ｂは支持体６と着脱自在に取付けられ、延長管１０と本体ケース２を構造的に連結支持する。一方、２股に形成される接続部５の一端５ｃは伸縮ホース７が一体に形成され、本体ケース２と延長管１０を連通する吸引通路２２を形成する。矢印Ａに示すように、床面にある塵埃は本体ケース２の底面に設けられた塵埃吸引口８から吸い込まれ、伸縮ホース７、接続部５、延長管１０を介して電気掃除機本体１０１に吸引される。また、前記接続部５と支持体６は延長管１０の管軸上に取付けられ、ハンドル部を介して延長管１０を支持する使用者に吸口部１が中心位置にくるようにしている。また、支持体６を先細り形状に形成することにより、ヒンジ部４の動作範囲を確保するとともに、吸口部１の大形の印象を軽減している。更に、伸縮ホース７と支持体６を上下（前後）に配置しているため、ハンドル部を介して延長管１０を支持する使用者からみて、延長管１０と接続部５と伸縮ホース７が一直線となり、支持体６を伸縮ホース７により隠すことができるから、吸口部１の大形の印象をより軽減することができる。この際、支持体６は先細り形状であるため、本体ケース２が多少傾いても支持体６を隠蔽することができる。１９は接続部５の一端５ａと延長管１０を、２０（図１にて図示）は接続部５の一端５ｂと支持体６との着脱を可能にするロックスイッチである。

【００２８】次に、図３、図４において、ヒンジ部４の構造を詳細に説明する。図３中、図ａはヒンジ部４の要部上面図、図ｂはヒンジ部４の要部側面図、図４中、図ａは図３のＡ－Ａ’断面図、図ｂは同Ｂ－Ｂ’断面図である。ヒンジ雄部１８は、先端部を直角に屈折させた支持体６の先端にボール２１が形成されている。一方、ヒンジ雌部１７は、ボール２１を支持する球体支持面２３

と、該球体支持面２３と連続して本体ケース２側に形成される連結棒摺動面２４とからなる鍵穴型のヒンジ受部２５が形成されている。球体支持面２３の上部は３０°に開いたすり鉢状の傾斜面２６を備えている。また、連結棒摺動面２４は長手方向を本体ケース２の長手方向と直行する姿勢で形成される縦長穴であり、その大きさは、横幅を支持体６の先端と同じ横幅とし、奥行きは支持体６の屈折部からボールまでの長さとほぼ同じになるように形成している。この構造をとるヒンジ部４の動きを図４で説明する。先ず、図ａにおいて、支持体６は、球体支持面２３とボール２１の摺動により、水平方向の回転動作と、ボール２１の中心を回転軸とする垂直方向の揺動動作を単独または同時に行うことができる。本実施例では、球体支持面２３の上部の傾斜面２６を３０°に設定しているので、支持体６を垂直位置から３０°ずつ合計６０°の揺動範囲で動かすことができる。また、図ｂに示すように、ヒンジ部４は、支持体６を矢印Ｂ方向、つまり本体ケース２の長手方向に直行する位置で支持体６を引き上げることにより、連結棒を水平の位置から垂直の位置までボール２１の中心を回転軸として９０°回転させることができる。この際、支持体６は、水平位置から３０°まではすり鉢状の傾斜面２６により回転と揺動が自在であるが、３０°から垂直位置までの間は連結棒摺動面２４により、回転が抑制され、矢印Ｂ方向の一方向のみ動作させることができる。

【００２９】また、本実施例では、回転ロック機構２７によりヒンジ部４を４５°と９０°の位置で動作を固定することができる。回転ロック機構２７は、支持体６の屈折部近傍に配置される凹部２７ａと、凹部２７ａの回転軌道の４５°と９０°の連結棒摺動面２４に設けたリブ２７ｂ、２７ｃにより構成される。前記リブ２７ｂ、２７ｃは連結棒摺動面２４を切り欠いて形成される板バネ２７ｂａ、２７ｃａの先端に設けられている。この構造により、支持体６は４５°と９０°の位置で板バネ２７ｂａ、２７ｃａの弾性によりリブ２７ｂ、２７ｃと凹部２７ａが勘合して、ヒンジ部４の動作が固定される。なお、前記ヒンジ部４の固定の強さは、ヒンジ部４に連結されるハンドル部１０３で矢印Ｃ方向にやや強めに動かすと固定が解除されるように、板バネ２７ｂａ、２７ｃａの弾性及びリブ２７ｂ、２７ｃと凹部２７ａの大きさを設定するようにする。

【００３０】次に、図５において、大小一対の自在車輪９ａ、９ｂの構造を説明する。図中、図ａは自在車輪９ａ、９ｂの外観図、図ｂは断面図を示している。自在車輪９ａ、９ｂは、ソフト材でできたゴムローラー２８と、ゴムローラー２８を支持するシャフト２９と、シャフト２９を両側から支持する支持体３０と、支持体３０を固定する円形のベース部３１と、ベース部３１を支持する回転軸部３２とから構成される。そして自在車輪９ａ、９ｂは、下ケース１２の所定の位置に形成される円

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形の凹部３３に回転軸部を介して３６０°回転自在に取り付けられる。この際、凹部３３の深さはゴムローラー２８が下ケース１２から露出するような大きさとする。また、下ケース１２と支持体３０及びベース部３１の接する面には、潤滑性の良いプレート３４が設けられ、円滑に回転できるようにしている。

【００３１】次に、図６をもとに本実施例に係る電気掃除機１００の操作を説明する。先ず、本実施例に係る電気掃除機１００では、使用者は立ち姿勢でハンドル部１０３を保持することにより、延長管１０を介して吸口部１を操作して床面の掃除を行うことができる。この際、ホース１０２を介してハンドル部１０３に連結される電気掃除機本体１０１には一対の大車輪と１個の自在車輪が備えられているので、移動しながら清掃を行うことができる。一般に、日本女性の平均身長は１５７センチであるが、この使用者が自然にハンドル部１０３を持った状態で、延長管１０を介し吸口部１を前後させて掃除をしようとした場合には、ハンドル部１０３と床面との垂直方向の距離が７８センチ以下であれば手や腕に負担をかけることなく掃除をすることができる。その角度は垂直方向に４５°とする使用者の最も操作される動作範囲に設定され、４５°以上であれば逆に手や腕に負担をかけることになる。そこで、本実施例では、延長管１０の角度が４５°となるように延長管１０の長さを設定している。

【００３２】さて、本実施例では、延長管１０の角度が４５°の状態で、ヒンジ部４が回転ロック機構２７により固定されるので、延長管１０を介して吸口部１を前後させる広い床面の清掃作業が楽な姿勢で行える。一方、床面のコーナや隅の掃除やテーブル等の狭い空間を清掃する場合には、ハンドル部１０３を軽く矢印Ｃ方向に下げることでヒンジ部４のロックを解除して本体ケース２を回転自在にすることができる。つまり、ハンドル部１０３を軽く下げることにより、ハンドル部１０３に連結される延長管１０を介して支持体６を固定していた回転ロック機構２７が解除される。更に、支持体６の回転角度をすり鉢状の傾斜面２６の傾斜角度３０°より小さくなるまでハンドル部１０３を矢印Ｃ方向に下げると、支持体６は連結棒摺動面２４の一方向の抑制が解除されるので、図３の矢印Ｅに示すように、少なくとも水平方向に１８０度の範囲で本体ケース２の回転を自由に行うことができる。このため、図７図ａに示すように、使用者は、作業姿勢を大きく変えることなく、ハンドル部１０３を軽く下げるだけで本体ケース２を壁面に沿って回転させながら移動させることができる。この際、本体ケース２の下面に設けた自在車輪９ａ、９ｂは、本体ケース２の姿勢に関係なく、ハンドル部１０３の動きに対応して車軸方向を変更するから、本体ケース２の動きをスムーズにすることができる。また、一般に、使用者はテーブル下方や狭い空間の清掃作業では作業姿勢を低くくして行っている。したがって、狭い空間の清掃作業に先立ってハンドル部１０３を下げる操作は清掃作業のスムーズな動きに合った操作である。更に、図７図ｂに示すように、本実施例では、すり鉢状の傾斜面２６を設けたことにより、左右方向に３０°の範囲でハンドル部１０３を傾けることもできる。このため、狭い空間等の清掃作業でハンドル部１０３をひねりながら清掃操作を行うことができるので、ハンドル部１０３の保持姿勢を良好にすることができる。このように、本実施例によれば、通常の床面での清掃では、床面のコーナや隅の掃除やテーブル等の狭い空間の清掃性を向上させることができる。

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【００３３】また、図６において、本実施例では、４５°の姿勢からハンドル部１０３を矢印Ｄ方向に引き上げることでもヒンジ部４のロック状態を解除することができる。この状態では、支持体６が連結棒摺動面２４により一方向だけの動きに制限されるため、ハンドル部１０３を前後方向に移動させる操作では、本体ケース２の長手方向を左右に固定したまま、本体ケース２の底面を床面に常に接触させることができる。また、本実施例では、ハンドル部１０３を更に引き上げて支持体６の回転角度を直角にした位置でヒンジ部４をロック状態にできる。このため、収納時に、本体ケース２と延長管１０とハンドル部１０３を上下に配置した立ち姿勢で安定させることができるから、収納性を向上させることができる。

【００３４】また、図８に示すように、本実施例の吸口部１は、ロックスイッチ１６、２０を介して、支持体６とヒンジ部４を備えた本体ケース２と、伸縮ホース７を備えた接続部５に２分割することができる。このため分解しての収納や梱包が容易となる。

【００３５】以上述べたように、本実施例によれば、最も頻繁に使用される延長管１０が床面と４５°の角度をなす姿勢では直進走行性に優れ、かつ安定した清掃姿勢がとれる一方、ロック状態を解除してハンドル部１０３を下方にした姿勢では、横方向への移動及び方向転換もスムースに容易に動かすことができるから、掃除作業を連続して行なうことができる。更に、ハンドル部１０３を本体ケース２の上方においた姿勢で収納時の安定姿勢を得ることができる。

【００３６】〔第１の実施例の応用例〕図９～図１１は前記第１の実施例の応用例を示したものであり、図９はヒンジ部の他の応用例の断面図、図１０はヒンジ部の他の応用例の平面図と断面図、図１１はヒンジ部の他の応用例の断面図である。

【００３７】図９において、前記実施例では、球体支持面２３の上部に３０°に開いたすり鉢状の傾斜面２６を備えたが、この実施例に係るヒンジ部３５は傾斜面２６を傾斜角度をなくして、球体支持面２３の上部に更に連結棒摺動面２４を連続形成したものである。この実施例によれば、図４で説明した支持体６の垂直方向の揺動動

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作が前記球体支持面２３の上部に設けた連結棒摺動面２４によって抑制される。このため、支持体６は、水平状態では回転のみ可能であり、水平状態から垂直状態では図４で示した矢印Ｂ方向の一方向だけ支持体６を動かすことができる。図１０において、前記図３、４で示したヒンジ部４では、本体ケース２を回転させた状態で支持体６を引き上げると傾斜面２６に支持体６の屈折部がぶつかり３０°以上引き上げることができないが、この実施例に係るヒンジ部３６は連結棒摺動面２４側の傾斜面２６をゆるやかに連結棒摺動面２４に連続させたものである。この実施例のヒンジ部３６によれば、傾斜面２６にぶつかった屈折部は連結棒摺動面２４に連続する傾斜面２６により連結棒摺動面２４に導かれるので、回転した本体ケース２をもとの水平状態に戻しやすくすることができる。

【００３８】図１１において、前記図３、４で示したヒンジ部４では、支持体６を下方に引き下げる動作で回転と揺動の動きを得る構造としたが、この実施例に係るヒンジ部３７では、例えば、本体ケース２が壁面にあたる等して得られる力を利用して回転と揺動の動きを得るものである。

【００３９】図において、先端部を直角に屈折させた支持体６の先端にボール２１が形成されている。一方、ヒンジ受部２５は、トラック状の球体支持面３８と、球体支持面３８の上方の本体ケース２側に形成される傾斜角３０°の傾斜面３９と、球体支持面３８の上方の本体ケース２と反対側に形成される連結棒摺動面４０とから構成される。そして、本体ケース２側の球体支持面３８には、ボール２１を常に本体ケース２と反対側に押し出そうとするバネ４１を備えた支持棒４２が配置されている。さて、本実施例では、図ａに示すように、前記支持棒４２によりボール２１が常に球体支持面３８の本体ケース２と反対側に位置している。この状態では、支持体６は、連結棒摺動面４０により、回転が阻止され、矢印Ｂ方向で示す引き上げ、または引き下げる方向にしか動作することができない。一方、本体ケース２が壁面にあたり、ハンドル部１０３を介して支持体６を押すと、支持体６に取付けられたボール２１は支持棒４２を押して、図ａの状態から図ｂに示すように、ボール２１が球体支持面３８の本体ケース２側に移動する。この状態では、支持体６は連結棒摺動面４０からの制約を受けないので回転及び垂直方向の揺動動作を行うことができる。なお、この実施例では、傾斜面３９を３０°とし、更に支持体６を１５°上方に屈折させることにより、延長管１０と床面との角度を良好な４５°にしている。また、回転と揺動を得る力の度合いは、バネ４１の力を調節して任意に設定する。ここで、図ｂで示す状態は、本体ケース２が受ける力を取り除き、本体ケース２の長手方向を左右にすることにより、図ａに示す状態にすることができる。このように、本実施例によれば、通常の床面の

掃除においては、常に本体ケース２を左右にする姿勢に固定され、ハンドル部１０３を上下しても、本体ケースの下面を床面に接触させることができるので直進性に優れた清掃姿勢を得ることができる。一方、本体ケース２に力が加えられると、本体ケース２の回転が可能となり、更にハンドル部１０３のひねり動作や上下動も可能となるので、横方向への移動及び方向転換もスムースに容易に動かすことができ、しかも、掃除作業を連続して行なうことができる。

【００４０】〔第２の実施例〕図１２～図１６は本発明に係る第２の実施例を示す吸口部を示すものであり、図１２は吸口部の中央縦断面図、図１３はヒンジ部の外観図、図１４はヒンジ部の水平断面図、図１５はヒンジ部の縦断面図、図１６は自在車輪の動作概念図である。

【００４１】先ず、図１２において、本実施例に係る吸口部の概略構造を説明する。なお、本実施例に係る吸口部は図６で説明した掃除機１００に使用される。

【００４２】図において、先ず、符号４３で総括的に示すのは吸口部であり、塵埃吸引口８を備えた本体ケース４４と、前記本体ケース４４と延長管１０とを連通させる接続継手４５と、前記本体ケース４４と接続継手４５を少なくとも水平方向と垂直方向に回転可能に連結するヒンジ部４６とから構成される。前記本体ケース４４は、横長扁平な形態を備え、塵埃吸引口８を備えた床面との設置面に昇降機構５９（図１６で図示）を備えた自在車輪４７ａ、４７ｂが配置されている。ヒンジ部４６は、連通部４８と、該連通部４８の上下に配置される第１の可動部４９と第２の可動部５０とから構成される。第１の可動部４９は、連通部４８と本体ケース４４の水平方向の回転を可能とし、第２の可動部５０は連通部４８と接続継手４５の垂直方向の回転を可能にする。そして、前記ヒンジ部４６は、本体ケース４４と接続継手４５を連通させ吸引通路２２を形成する。このため、矢印Ａに示すように、床面にある塵埃は本体ケース４４の底面に設けられた塵埃吸引口８から吸い込まれ、タービンブラシ１４、エアータービン５１、第１の可動部４９、連通部４８、第２の可動部５０、接続継手４５、延長管１０を介して電気掃除機本体１０１に吸引される。また、前記ヒンジ部４６は、本体ケース４４と接続継手４５を少なくとも水平方向と垂直方向の回転を可能にする。

【００４３】次に、図１３～図１５を参照してヒンジ部４６を詳細に説明する。図１３、図１４において、連通部４８は筒状の形態をしており、その下部周囲に形成される凸リング５２ａ、５２ｂで本体ケース４４の段差部１３に形成される円形の接続穴５３を挟むことで連通部４８が本体ケース４４に回転可能に取付けられる。つまり、前記凸リング５２ａ、５２ｂと接続穴５３で第１の可動部４９を構成する。また、連通部４８の上部は、両側に回転軸穴５４を備えた支持体５５が形成され、該支

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持体５５の間に回転軸５６を備えた接続継手４５の一端が前記回転軸５４、５６を中心に回転自在に取付けられる。つまり、回転軸穴５４と回転軸５６と支持体５５で第２の可動部５０を構成する。また、本実施例では、図示しないが、支持体５５と接続継手４５が接する摺動面５７に、図４で説明した回転ロック機構２７と同様なものを設け、接続継手４５が水平状態から４５°と９０°に引き上げた状態で第２の可動部５０の回転を固定するようにしている。

【００４４】さて、本実施例では、第１の可動部４９により、本体ケース４４の長手方向に直行する位置を基準に左右９０°ずつ合計１８０°回転可能にしている。また、第２の可動部５０により、接続継手４５と延長管１０を介して取付けられる図示しないハンドル部１０３を水平位置から垂直位置までの９０°の動作範囲で引き上げたり引き下したりすることができる。更に、ハンドル部１０３は４５°と９０°の位置で回転を固定することができる。

【００４５】また、図１５において、接続継手４５の第２の可動部５０の端部には開口部５８が形成され、該開口部５８は接続継手４５が水平な位置から直角の位置までの範囲で連通部４８と接続継手４５を連通するように形成している。図ａは接続継手４５が４５°の状態を示し、図ｂは接続継手４５が水平な状態を示している。なお、本実施例では、最も使用頻度のある接続継手４５が４５°の状態で連通部４８と接続継手４５を連通の程度（開口率）を最大になるようにしている。

【００４６】次に、図１６において、昇降機構５９を備えた自在車輪４７ａ、４７ｂを詳細に説明する。図において、自在車輪４７ａ、４７ｂは、ゴムローラー２８と、ゴムローラー２８を支持するシャフト２９と、シャフト２９を両側から支持する支持体３０と、支持体３０を固定する円形のベース部３１と、ベース部３１を支持する回転軸部３２とから構成される。そして自在車輪４７ａ、４７ｂは、下ケース１２の所定の位置に形成される円形の凹部３３に回転軸部３２を介して３６０°回転自在に取り付けられる。６０はベース部３１と凹部３３の間に配置されるコイルバネであり、常に自在車輪４７ａを凹部３３から押し出そうとする応力が働いている。６１は回転軸部３２の端部に設けられ、自在車輪４７ａの飛び出しを防止する止め具である。６２は、前記止め具６１と下ケース１２の間に出し入れされるくさび型の可動ブロックである。前記可動ブロック６２は連結棒６３を介して上ケース１１の上面に配置される可動レバー６４に連結される。

【００４７】さて、本実施例の自在車輪４７ａ、４７ｂによれば、図ａに示すように、可動レバー６４を操作して可動ブロック６２を前記止め具６１と下ケース１２に挿入すると、自在車輪４７ａ、４７ｂを凹部３３内に収納して、自在車輪４７ａ、４７ｂの下ケース１２からの

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突出量を小さくすることができる。一方、図ｂに示すように、可動レバー６４を操作して可動ブロック６２を前記止め具６１と下ケース１２の間から引き出せば、コイルバネ６０により自在車輪４７ａ、４７ｂを下ケース１２から突出させることができる。このように、本自在車輪４７ａ、４７ｂによれば、例えば、畳や床面では自在車輪４７ａ、４７ｂの突出量を少なく、毛脚の長い絨毯等は突出量を多くすることで使用者の負荷加重を軽減することができる。更に、可動レバー６４を絨毯と畳の切り替えレバーと兼用すれば、１つの操作で床面に適した自在車輪４７ａ、４７ｂに変化させることができる。

【００４８】以上述べたように、本実施例の吸口部４３によれば、ヒンジ部４６を介して、吸込通路２２と回転動作（水平方向と垂直方向）を行うことができるので、部品点数を少なくして構造を簡単にすることができる。しかも、ヒンジ部４６は、本体ケース４４と接続継手４５を、水平方向に１８０°の動作範囲で常に回転自在に動かすことができ、垂直方向については、接続継手４５を水平状態から直角状態の９０°の動作範囲で回転自在に動かすことができる。しかも、前記垂直方向では、最も使用者が利用する４５°の状態で、垂直方向の回転を固定することができるので安定した清掃姿勢が得られる。また、垂直方向が９０°でも回転を固定することができるので、収納性を向上させることができる。また、垂直方向と水平方向の回転は単独方向または同時に動作させることができるので、ハンドル部１０３のねじり動作でも対応させることができる。更に、本実施例では、床面に対応して自在車輪４７ａ、４７ｂを突出量を調整することができるから、床面によって発生する回転性能の低下を軽減することができる。

【００４９】なお、本実施例では、収納性を考慮して垂直方向の動作範囲を９０°としたが、清掃を主体にすれば少なくとも水平状態から４５°の動作範囲に設定すればよい。　また、前記第２の実施例では、ヒンジ部４６を、連通部４８と、該連通部４８の上下に配置される第１の可動部４９と第２の可動部５０とから構成したが、本発明では、水平方向と垂直方向に動作可能なヒンジ部であればよく、例えば、球体部と該球体受部とでヒンジ部を構成し、球体部と球体受部の連結動作状態で両部を連通する開口部を備えることでもよい。

【００５０】また、前記実施例では、吸口部の自在車輪をシャフトを回転するローラで説明したが、ボール状の回転車輪でもよい。

【００５１】〔第３の実施例〕図１７は本発明に係る第３の実施例を示す吸口部を示す側面図である。前記第１の実施例と第２の実施例では、電気掃除機１００を電気掃除機本体１０１と吸引ホース１０２とハンドル部１０３と接続管１０と吸口部１とで構成したが、本発明ではこれに限るものではなく、前記吸口部１と前記ハンドル部１０３を実質的に連結させて、前記ハンドル部１０３

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を動かすことにより吸口部１、または吸口部４３を少なくとも水平方向と垂直方向に回転可能に動かすことができればよい。

【００５２】例えば、図１７は、スティク型と呼ばれる電気掃除機に吸口部１、または吸口部４３を採用したものである。図ａは、内部に塵埃を吸い込むための送風機を備えた断面が円形の縦長の電気掃除機本体６５と、該電気掃除機本体６５の長手方向の上部に設けられるハンドル部６６と、電気掃除機本体６５の長手方向の下部に着脱自在に取付けられる吸口部１とから構成したものであり、図ｂは前記電気掃除機本体６５とハンドル部６６と吸口部４３とから構成したものである。図において、電気掃除機本体６５は、吸口部１側の内部に図示しない送風機を設け、ハンドル部６６側の内部に図示しない集塵部を設けている。６７は、電気掃除機本体６５の正面に設けた第２のハンドル部で、該第２のハンドル部６７で本体を手で持って持ち運ぶことができる。６８は、前記第２のハンドル部６７の周囲に取付けられる柔軟性のある連通ホースで、該連通ホース６８の一端は前記集塵部に連通して取付けられ、他の一端は、電気掃除機本体６５の最下端部の連結口６９ａに着脱自在に取付けられる。電気掃除機本体６５の底面部には、吸口部１または吸口部４３が取付けられ連結口６９ｂが設けられ、該連結口６９ｂと連結口６９ａは内部で連通されている。この実施例では、塵埃は、吸口部１または吸口部４３から連結口６９ｂ、連結口６９ａ、連通ホース６８を介して集塵室に取り込まれ、図示しない使い捨ての紙フイルタに収集され、空気流は排気口７０から排気される。また、電気掃除機本体６５と吸口部１または吸口部４３は、水平方向と垂直方向に回転可能に連結しているので、操作スイッチを備えたハンドル部６６を支持／操作しながら吸口部１または吸口部４３を自在に動かすことができるから、手や腕にかかる負担を軽減して良好な作業姿勢を得ることができるとともに、直進走行性や横方向への移動及び方向転換もスムースに行うことができる。特に、この実施例では、重い送風機を下部に配置した電気掃除機本体６５の殆どの重量を吸口部１または吸口部４３で支持するするので、手にかかる負担を軽減できる。また、連通ホース６８の一端を取り外してテーブル上の掃除を行うこともできる。

【００５３】更に、前記スティク型の他の例として、ハンディー型の掃除機において、前記吸口部を少なくとも水平方向と垂直方向に可動自在なヒンジ部で連結してもよい。更に、吸引ホースを建物に埋設したセントラルクリーナーと呼ばれる電気掃除機において、図６に示す吸引ホース１０２の一端を電気掃除機本体１０１の替わりに建物の吸引口に取付けてもよい。

【００５４】また、前記吸口部１は床用吸口部で説明したが、これに限るものではなく、例えば、ブラシを備えた円形状の補助吸口部としてもよい。

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【００５５】

【発明の効果】本発明によれば、ハンドル部を介して吸口部を少なくとも水平方向と垂直方向に回転可能に動かすことができるから、手や腕にかかる負担を軽減して良好な作業姿勢を得ることができるとともに、直進走行性や横方向への移動及び方向転換もスムースに行うことができる。

【００５６】

【図面の簡単な説明】

【図１】本発明に係る第１の実施例の背面方向から見た吸口部の外観図。

【図２】本発明に係る第１の実施例の吸口部の中央縦断面図。

【図３】本発明に係る第１の実施例の吸口部のヒンジ部要部外観図。

【図４】本発明に係る第１の実施例の吸口部のヒンジ部の断面図。

【図５】本発明に係る第１の実施例の吸口部の自在車輪の説明図。

【図６】本発明に係る第１の実施例の使用状態の説明図。

【図７】本発明に係る第１の実施例の使用状態の説明図。

【図８】本発明に係る第１の実施例の使用状態の説明図。

【図９】本発明に係る第１の実施例の他の応用例を示す断面図。

【図１０】本発明に係る第１の実施例の他の応用例を示す平面図と断面図。

【図１１】本発明に係る第１の実施例の他の応用例を示す断面図。

【図１２】本発明に係る第２の実施例の吸口部の中央縦断面図。

【図１３】本発明に係る第２の実施例のヒンジ部の外観図。

【図１４】本発明に係る第２の実施例のヒンジ部の水平断面図。

【図１５】本発明に係る第２の実施例のヒンジ部の縦断面図。

【図１６】本発明に係る第２の実施例の自在車輪の動作概念図。

【図１７】本発明に係る第３の実施例の側面図。

【符号の説明】

１…吸口部、２…本体ケース、３…接続継手、４…ヒンジ部、５…接続部、５ａ、５ｂ、５ｃ…接続部の一端、６…支持体、７…伸縮ホース、８…塵埃吸引口、９ａ、９ｂ…自在車輪、１０…延長管、１１…上ケース、１２…下ケース、１３…段差部、１４…タービンブラシ、１５…開口部、１６…ロックスイッチ、１７…ヒンジ雌部、１８…ヒンジ雄部、１９、２０…ロックスイッチ、

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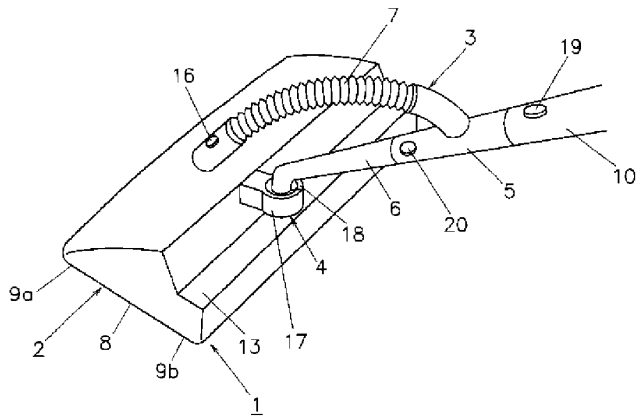
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２１…ボール、２２…吸引通路、２３…球体支持面、２４…連結棒摺動面、２５…ヒンジ受部、２６…傾斜面、２７…回転ロック機構、２７ａ…凹部、２７ｂ、２７ｃ

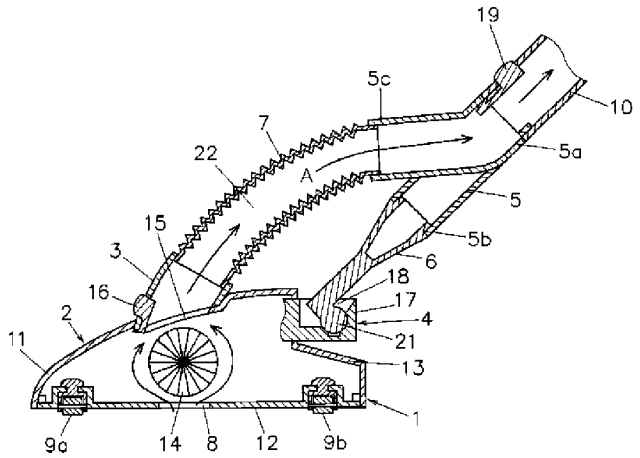
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…リブ、２７ｂａ、２７ｃａ…板バネ、１００…電気掃除機、１０１…電気掃除機本体、１０２…吸引ホース、１０３…ハンドル部。

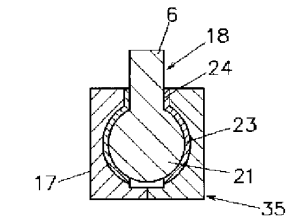
【図１】



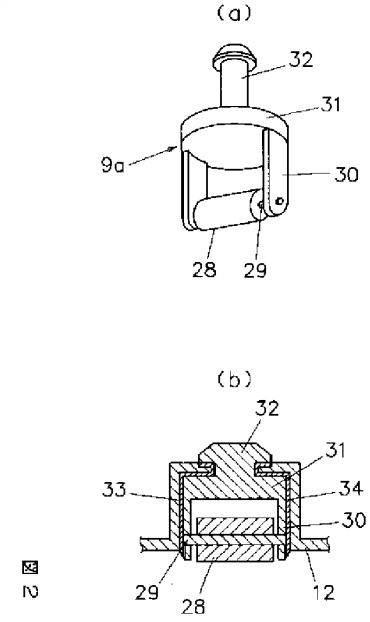
【図２】



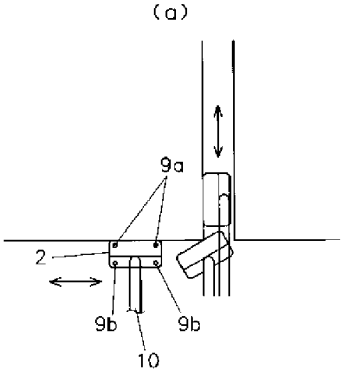
【図９】



【図５】



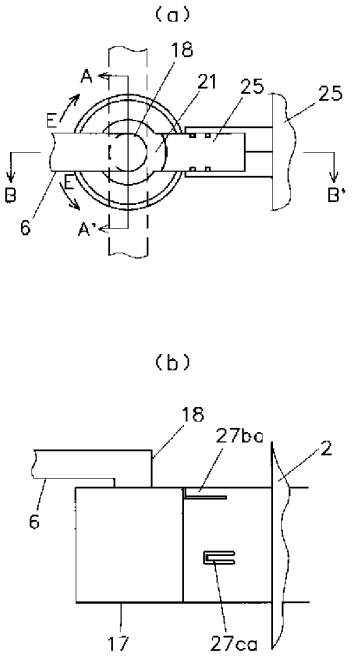
【図７】



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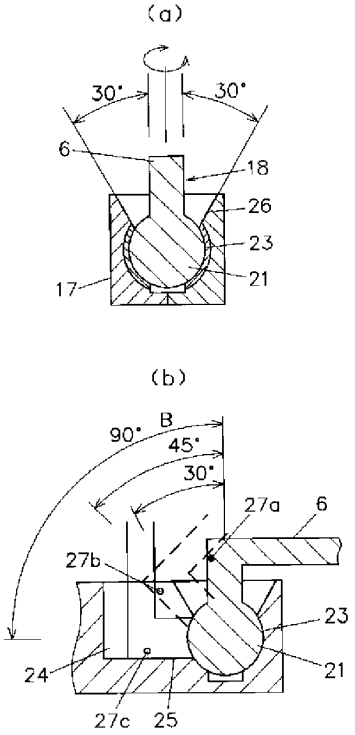
【図３】

図３

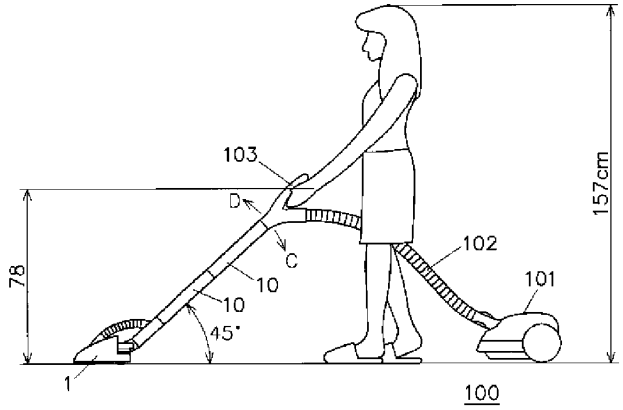


【図４】

図４

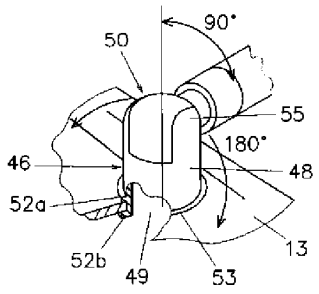


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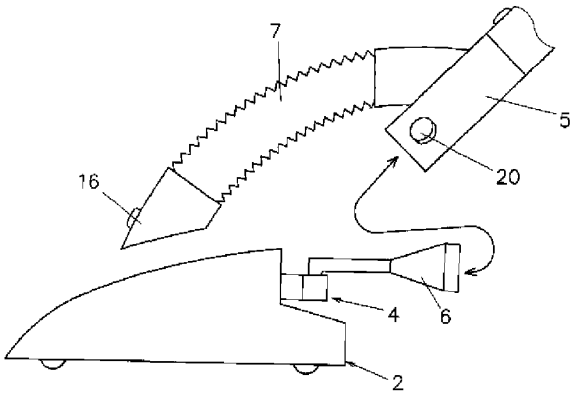
【図１３】

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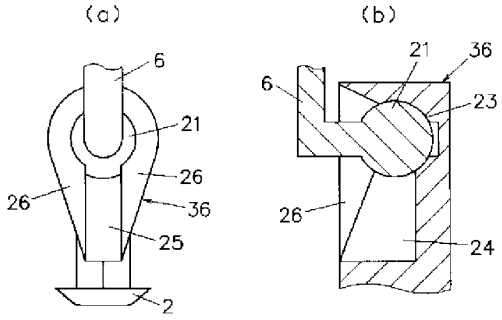
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【図８】



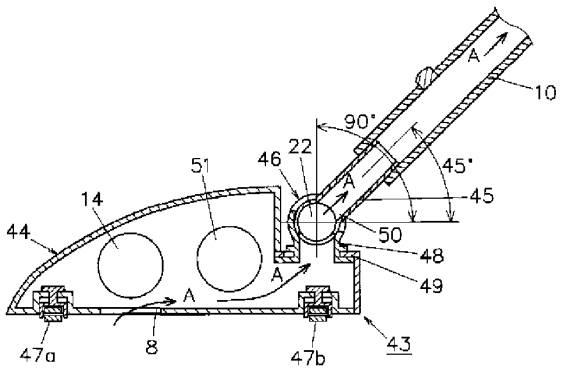
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図１０



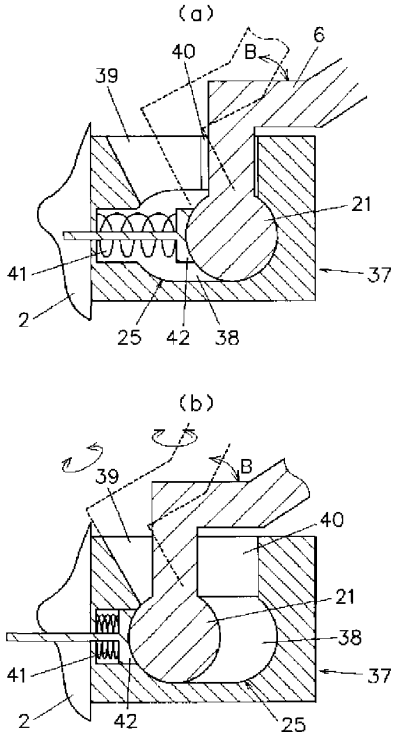
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図１２



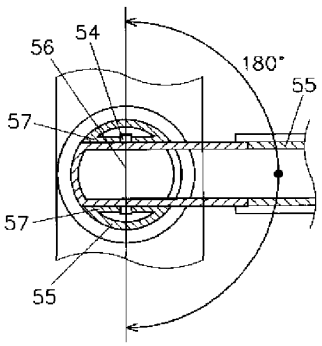
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図１１



【図１４】

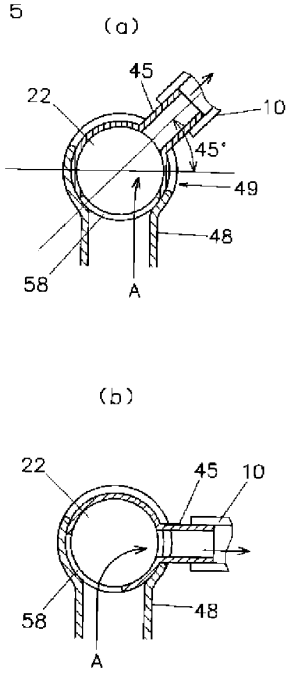
図１４



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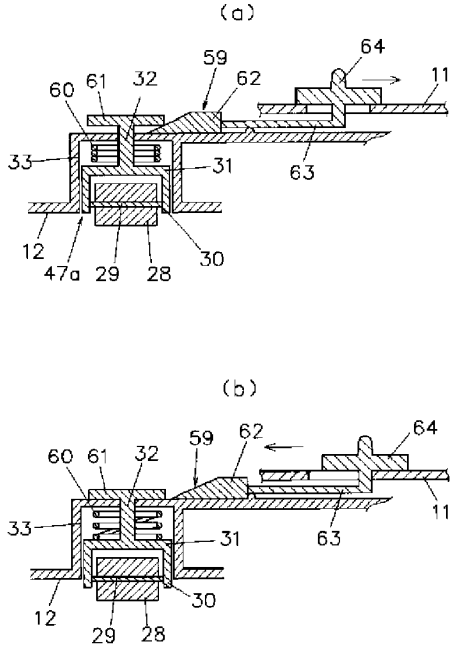
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図１５



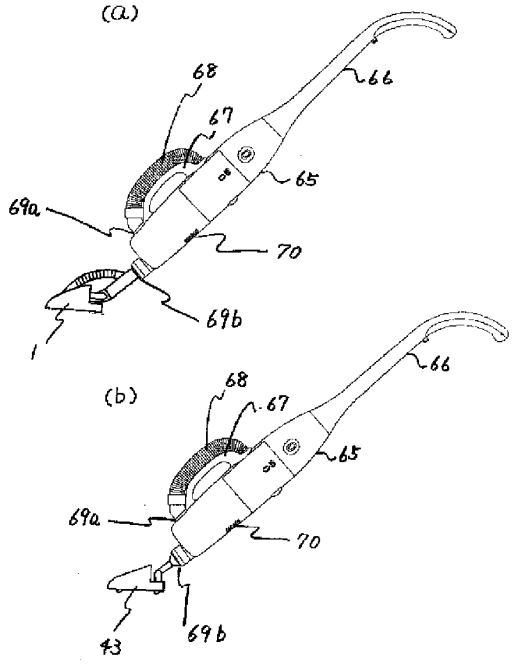
【図１６】

図１６



【図１７】

図17



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Japan Patent Office

Issued 15 May 1990

Design Gazette (S)

C3-410 D

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Registered: 16 February 1990

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Design right holder: Tokyo Electric Industry Co. Ltd., 2-6-13 Nakameguro, Meguro-ku, Tokyo

Attorney: NORICHIKA Kensuke, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner

Front view

Back view

Plan view

Bottom view

Left side view

Right side view

Reduced perspective view

Enlarged sectional view A-A′
without internal mechanism

Enlarged sectional view B-B′

日本国特許庁

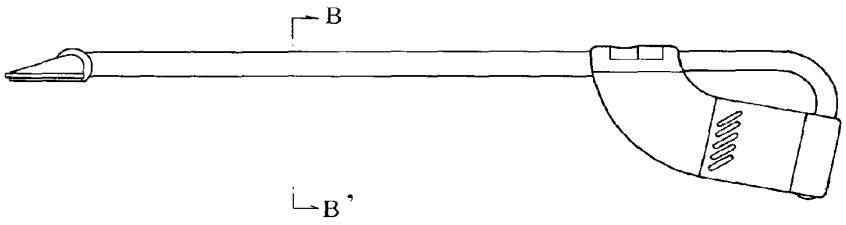
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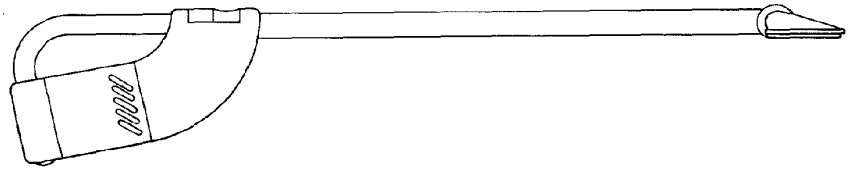
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審査官　鍋田和宣

意匠に係る物品　電気掃除機

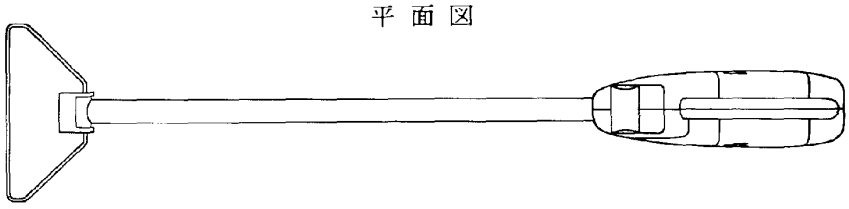
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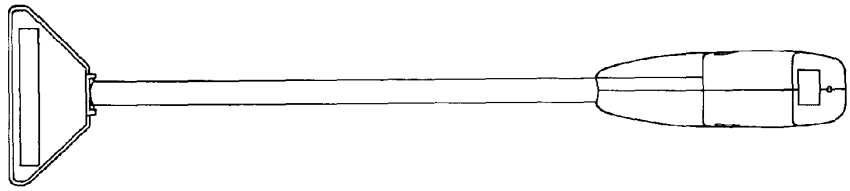
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平面図

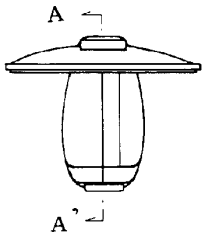


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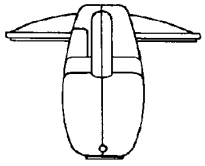


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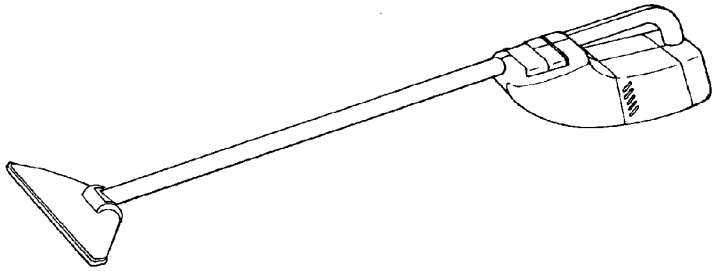
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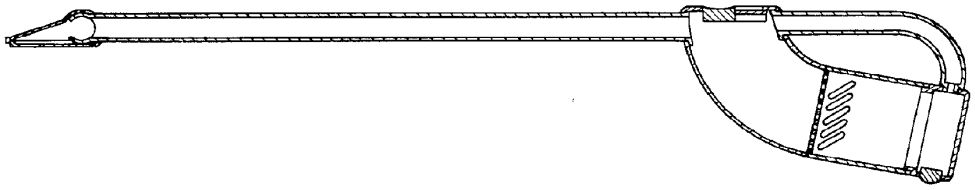
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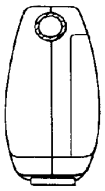
縮小斜視図



内部機構を省略した
A − A'拡大断面図



B − B'拡大断面図



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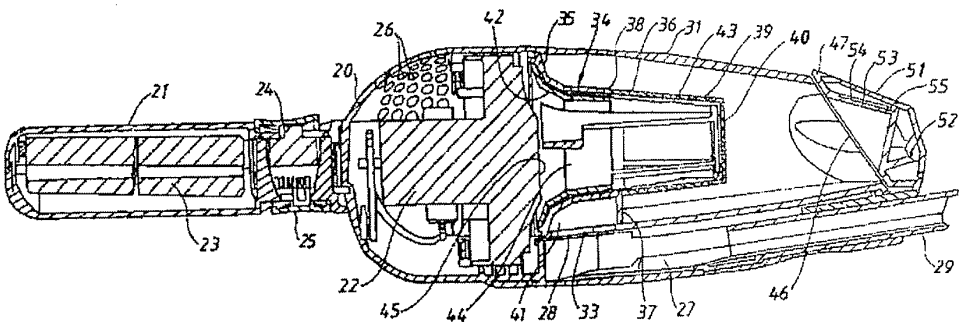
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(54) Title: HAND HELD VACUUM CLEANER



(57) Abstract: This invention relates to a hand held vacuum cleaner comprising a housing (20) supporting a motor-fan unit (22), a dust container (31) and an air passage (27) opening into the dust container through which dust laden air is directed into the dust container. The vacuum cleaner also comprises at least one filter (39) arranged after the dust container as seen in the flow direction. The dust container (31) is provided with a first emptying opening (46) normally being covered by a lid (47) the opening having such a size that it, when the lid is opened, allows the dust collected in the dust container to fall out through the opening. The dust container constitutes a part of a cyclone separator arranged between the air passage (27) and the filter (39).

WO 2004/069021 A1

Hand held vacuum cleaner

This invention relates to a hand held vacuum cleaner comprising a housing supporting a motor-fan unit, a dust container and an air passage ending in the dust container through which dust laden air is directed into the dust container, the vacuum cleaner also comprising at least one filter arranged after the dust container as seen in the flow direction, the dust container constituting a part of a cyclone separator arranged between the air passage and the filter.

Hand held vacuum cleaners which are battery powered as well as powered by mains supply, are previously known, see for instance US 4967443, and are used for fast cleaning of small surfaces. It is important that such vacuum cleaners are easily accessible and user friendly designed. These vacuum cleaners are usually designed such that the dust container together with the filter can be removed from the remaining part of the vacuum cleaner housing that contains the fan unit. In order to empty the vacuum cleaner also the filter has to be removed from the dust container before the content can be emptied through the opening which is established when the filter has been taken away. Removal of the dust from the dust container is hence troublesome, dirty and time consuming. It should in this connection be mentioned that the volume of the dust container for this type of vacuum cleaners is very limited and that the filter is rapidly clogged which means lost suction efficency and that emptying has to be done with short intervals.

It is further known, see EP 914795, to provide a hand held vacuum cleaner of the type mentioned above with a large opening covered by a pivotable lid in order to facilitate emptying but since the dust usually get stuck to the filter the dust can not be easily poured out of the opening. Moreover since the conventional filter system is quickly clogged the suction efficiency is still not sufficient.

It is also previously known to use the type of hand held vacuum cleaner described above in combination with a shaft part whose lower portion supports a nozzle (so called stick cleaner), see for instance SE 9701543-2. The shaft part is provided with a tube connection by means of which dust laden air is transferred from the nozzle to the air inlet of the hand held vacuum cleaner which is removably secured to the shaft part. This means that the combined stick cleaner in a comfortable way can be used for floor cleaning purpose. Of course this type of vacuum cleaners also has the same disadvantages as the hand held vacuum cleaner described above with respect to filter clogging and handling when being emptied.

The purpose of this invention is to create an arrangement which eliminates a too fast clogging of the filter and which fascilitates emptying of the vacuum cleaner at the vacuum cleaner types described above. This is achieved by means of a device having the characteristics mentioned in the claims.

An embodiment of the invention will now be described with reference to the accompanying drawings on which Fig. 1 is a perspective view of the vacuum cleaner in question together with a shaft part, Fig. 2 is a schematic sectional view through the shaft part shown in Fig. 1, Fig. 3 is a perspective view of the vacuum cleaner being removed, Fig. 4 is a sectional view through the vacuum cleaner, Fig. 5 is an exploded view showing the vacuum cleaner being separated and at the emptying procedure, Fig. 6 is a perspective view of the vacuum cleaner showing a different method for emptying the vacuum cleaner whereas Fig. 7 in a perspective view shows a further method for emptying the vacuum cleaner.

As appears from Fig. 1 the shown vacuum cleaner comprises an elongated shaft part 10 in which a hand held vacuum cleaner 11 is removably arranged. The lower end of the shaft part supports a floor nozzle 12 enclosing an electrically driven brush roll 13, not described in detail, and which is turnably secured to the shaft part 10. The nozzle has an elongated suction opening 14 extending in the length direction of the nozzle and the suction opening is via a flexible tube passage 15 connected to the hand held vacuum cleaner 11 in a manner which will be described below. The upper portion of the shaft part 10 is shaped as a handle 16 and has an operating knob 17 that via an electric circuit, not shown in detail, is connected to the hand held vacuum cleaner when it is secured to the shaft part. The shaft part might also enclose one or several batteries 18 which are connected to the electric circuit.

The nozzle 12 is provided with a supporting part 12a having one end that via a shaft is pivotally arranged about a first axis A extending mainly horizontally and mainly parallel to the suction opening 14. The other end of the supporting part 12a is pivotally secured to the lower portion of the shaft part 10 about a second axis B that is mainly perpendicular to the length direction of the shaft part 10 and to the first axis A. This means that there is a double link arrangement between the shaft part 10 and the nozzle 11which gives an excellent manoeuvrability of the vacuum cleaner when being used as a stick cleaner. This arrangement also makes it possible to easily hide the electric wires between the shaft part 10 and the nozzle within the support arm 12a. In order to create a reliable nozzle link the

shaft ends defining the axis A are supported by two shaft supports comprising separate units that are removably inserted into pockets in the nozzle.

The hand held vacuum cleaner 11 comprises a housing 20 with a handle 21 and the housing encloses a motor-fan unit 22 driven by one or several batteries 23 placed in the handle 21. The motor-fan unit is controlled by means of a control knob 24 placed at the handle and the part of the electric circuit which is placed in the hand held vacuum cleaner is via a connection 25 connected to the part of the circuit which is placed in the shaft part 10 when the hand held vacuum cleaner is fixed to the shaft part 10. The housing is provided with several openings 26 through which the air flowing through the fan unit leaves the housing. The housing also has an inlet channel 27 extending from the front part of the housing to an outlet opening 28 arranged at the middle part of the housing. In the channel 27 a tube part 29 is slidably arranged the outer end of the tube part being shaped as a nozzle. When the hand held vacuum cleaner is fastened to the shaft part the tube part 29 is pushed into the channel 27 and is thereby a direct continuation of the tube passage 15 of the shaft part. The tube part can also be pulled out to an extended position and by means of a retaining mechanism, not shown, be locked temporarely in the extended position.

The housing is provided with a recess 30 in which a dust container 31 is removably arranged the dust container being removed by means of locking knobs 32 arranged at each side of the container. The dust container 31 is shaped as an elongated body with an open end and is partly made of transparent material. Close to the open end of the dust container there is an inlet 33 that is coaxially to the outlet opening 28 of the channel 27. The open end is partly covered by a filter liner 34 that follows the dust container when it is removed from the housing but which is removably arranged with respect to the dust container. The filter liner comprises a collar shaped portion 35 resting against a seat arranged at the wall of the dust container the collar shaped portion continuing into a sleeve shaped portion 36 centrally arranged in the dust container. The sleeve shaped portion has a flange 37 overbridging the distance between the sleeve shaped portion 36 and the surrounding container wall and extends around a part of the circumference of the sleeve shaped portion. The part 38 of the sleeve shaped portion which is placed at one side of the flange 37 is together with the collar shaped portion 35 made by homogenous material whereas the part which is placed at the other side of the flange comprises a grating structure which is covered by a coarse filter 39 that also extends over the end 40 of the sleeve shaped portion. The coarse filter 39 preferably comprises a washable fine meshed plastic net. Further the filter liner 34 is provided with a radially extending wall 41 that streches between the flange

37 and the collar shaped portion 35 close to the inlet 33. The wall 41 prevents the dust in the dust container from falling out through the inlet 33 if the vacuum cleaner should be turned up-side-down and also limits an annular flow channel around a part of the circumference of the filter liner 34. When dust laden air flows through this channel it contributes to the creation of a vortex in the dust container which will thus operate as a cyclone separator in which larger particles are separated from the air flow at the same time as the process is visualized through the transparent container wall. Thus, the cyclone prevents the filter from being clogged by means of larger dust particles and dirt. By means of the transparent container wall it is also possible to see the dust level in the container and hence also to establish when it is time to empty the container.

The filter liner 34 encloses a removable support body 42 for a fine filter 43 for instance a flat circular paper filter that can be clamped between the support body 42 and the filter liner 34. The support body 42 mainly has the same sleeve shape as the filter liner 34 but is somewhat smaller and forms a flow passage 44 for the air which flows through the coarse filter 39 and the fine filter 43 to the inlet opening 45 of the fan unit. Alternatively the fine filter can be replaced by a body of foamed plastic or the like to separate finer particles after the coarse filter whereby the body is secured in a suitable way in the filter liner.

The dust container has a large emptying opening 46 extending over the entire bottom part of the dust container and the opening is normally covered by a lid 47 supported by a yoke 48 turnably secured at each side of the dust conatiner the yoke being acted on by two springs 49 normally pressing the lid against a sealing 50 surrounding the opening 46.

The lid 47 supports a flap 51, that is turnably fastened to the lid 47 by means of dowels 52, and is normally hiding a small, circular emptying opening 53 which is connected to the inside of the dust container. This opening might be covered by a tongue 54 of elastic material which is fastened at one of its sides and rests against a seat 55 surrounding the opening 53 the tongue serving as a check valve that opens when a tube 56 connected to an outer vacuum source is pressed against the seat 55 or is inserted into the opening 53. Instead of using an elastic tongue it is of course possible to provide the seat 55 or the flap 51 with a sealing that prevents air from flowing through the emptying opening 53 into the dust container when the flap is closed.

The hand held vacuum cleaner is used and operates in the following manner. At normal use the hand held vacuum cleaner 11 is removed from the shaft part 10 after which the tube part 29 is pulled out to the outer position. Then the motor fan unit is started by

acting on the operating knob 24. This means that air together with dirt particles are sucked in through the tube part 29 and the inlet channel 27. The dust laden air flows through the outlet opening 28 and the inlet 33 of the dust container 31 after which the dust laden air flows into the channel which is limited by the filter liner 34, the flange 37 and the wall of the dust container and extending around the sleeve sheped portion 36. Thereby a vortex is created in the dust container the vortex separating heavier particles from the air flow such that they can be collected at the bottom of the container. The air then flows further through the coarse filter 39 and the fine filter 43 to the flow passage 44 from which the cleaned air leaves to the inlet opening 45 of the fan unit. After having passed the fan unit the air then leaves to atmosphere via the openings 26.

In order to empty the hand held vacuum cleaner there are three different alternatives. By manually opening the lid 46 against the action of the springs 49 the operator can uncover the emptying opening 46 and the collected dust is allowed to fall freely out of the opening or to be shaken out through it. This means a quick emptying function whithout the need for removing the dust container from the hand held vacuum cleaner. A second quick emptying alternative is, when the operator uses a lager type of vacuum cleaner during a conventional vacuum cleaning operation, to open the flap 51 and press the inlet opening of the tube handle 56 of the larger vacuum cleaner against the seat 55. This means that the tongue 54 beacause of the vacuum created by the larger vacuum cleaner will uncover the opening 53 and the content in the dust container 31 will be sucked over to the dust container of the larger vacuum cleaner. Thereby also the coarse filter 39 and the fine filter 43 will be cleaned by the air that flows backwards through the hand held vacuum cleaner. A further emptying alternative is to remove the dust container 31 from the housing 20 by acting on the locking knobs 32. Thereby the dust container is removed together with the filter liner 34, the fine filter 43 and the support body 42. By removing the lastmentioned three parts from the dust container it can be emptied and the dust container 31, the filter liner 34 with the coarse filter 39 and the support body 42 can be cleaned separately and a new fine filter 43 can then be applied on the support body 43 before it is again inserted into the filter liner 34. The flat fine filter will then be folded such that it achieves a large filter area. The filter liner 34 can then again be inserted into the dust container 31 before the dust container is locked in the housing 20.

The hand held vacuum cleaner 11 can, if the operator so desires, be fixed to the shaft part 10 whereby the tube part 29 is moved to its retracted position at the same time as the electrical circuit of the hand held vacuum cleaner via the connection 25 is connected to

the electrical circuit in the shaft part. This means that the motor fan unit of the hand held vacuum cleaner and the electric motor of the brush roll 13 now can be cativated by means of the operating knob 17 whereby additional energy is supplied by means of the batteries 18 in the shaft part. The shaft part can then be used as a normal so called stick cleaner for cleaning larger surfaces such as a floor whereby dust laden air is sucke in through the nozzle 12. This air via the flexible tube passage 15 passes to the inlet channel 27 of the hand held vacuum cleaner after which the dust particles are separated in the dust container 31 in a manner described above.

It should be stressed that the hand held vacuum cleaner and/or the shaft part in a conventional manner is provided with a connection, not shown, for an electrical charger to charge the batteries which are placed in the shaft part and/ or the hand held vacuum cleaner. The vacuum cleaner might of course also be mains supplied.

Claims

1. Hand held vacuum cleaner having a housing (20) comprising a motor-fan unit (22), a dust container (31) and an air passage (27) opening into the dust container through which dust laden air is directed into the dust container, the vacuum cleaner also comprising at least one filter (39) arranged after the dust container as seen in the flow direction, the dust container (31) being provided with a first emptying opening (46) normally being covered by a lid (47) and having such a size that the opening, allows the dust collected in the dust container to fall out through the opening when the lid is opened **characterized in** that the dust container constitutes a part of or communicates with a cyclone separator arranged between the air passage (27) and the filter (39).
2. Vacuum cleaner according to claim 1 **characterized in** that the dust container (31) is provided with a second emptying opening (53) that is adapted to be connected to an external vacuum source via a connection (56).
3. Vacuum cleaner according to claim 1 or 2 **characterized in** that the dust container (31) i removably arranged in the housing.
4. Vacuum cleaner according to any of claims 1-3 **characterized in** that the dust container (31) is provided with a removable filter liner (34) comprising an end wall part (35) continuing into a sleeve shaped portion (36) extending into the dust container and through which the air leaving the dust container flows towards the motor fan unit (22).
5. Vacuum cleaner according to claim 4 **characterized in** that the filter liner (34) supports a coarse filter (39).
6. Vacuum cleaner according to claim 4 or 5 **characterized in** that the filter liner (34) encloses a foamed plastic body serving as a separator of finer particles.
7. Vacuum cleaner according to claim 4 or 5 **characterized in** that the filter liner (34) encloses a coaxially arranged, removable support body (42) for a fine filter (43) arranged between the filter liner (34) and the support body (42).
8. Vacuum cleaner according to claim 7 **characterized in** that the fine filter (43) comprises a thin, flat filter blank which is applied on the filter body (42) such that it, when the filter body is inserted into the filter liner (34) becomes a folded shape.

9. Vacuum cleaner according to any of claims 4-8 **characterized in** that the filter liner (34) at its outside supports a flange (37) to overbridge the distance between the filter liner (34) and the surrounding dust container wall the flange extending around a part of the circumference of the liner.

10. Vacuum cleaner according to any of the preceding claims **characterized in** that the dust container (31), at least partly, is made of transparent material.

11. Vacuum cleaner according to any of the preceding claims **characterized in** that it is removably secured to a shaft part (10) supporting a floor nozzle (12) having an elongated suction opening (14) extending in the length direction of the nozzle, the floor nozzle via a tube connection (15) being connected to the air passage (27) of the vacuum cleaner.

12. Vacuum cleaner according to claim 11 **characterized in** that the floor nozzle (12) and the shaft part (10) are connected to one another via a double link arrangement comprising a first pivot axis (A) that is arranged mainly horizontally and parallel to the suction opening of the floor nozzle and a second pivot axis (B) that is perpendicular to a longitudinal axis of the shaft part as well as to said first pivot axis (A).

13. Vacuum cleaner according to claim 11 or 12 **characterized in** that the tube connection (15) at least partly comprises a flexible hose.

14. Vacuum cleaner according to any of claims 12-13 **characterized in** that the floor nozzle (12) comprises an electrically driven brush roll (13) that via an electric circuit is connected to one or several batteries.

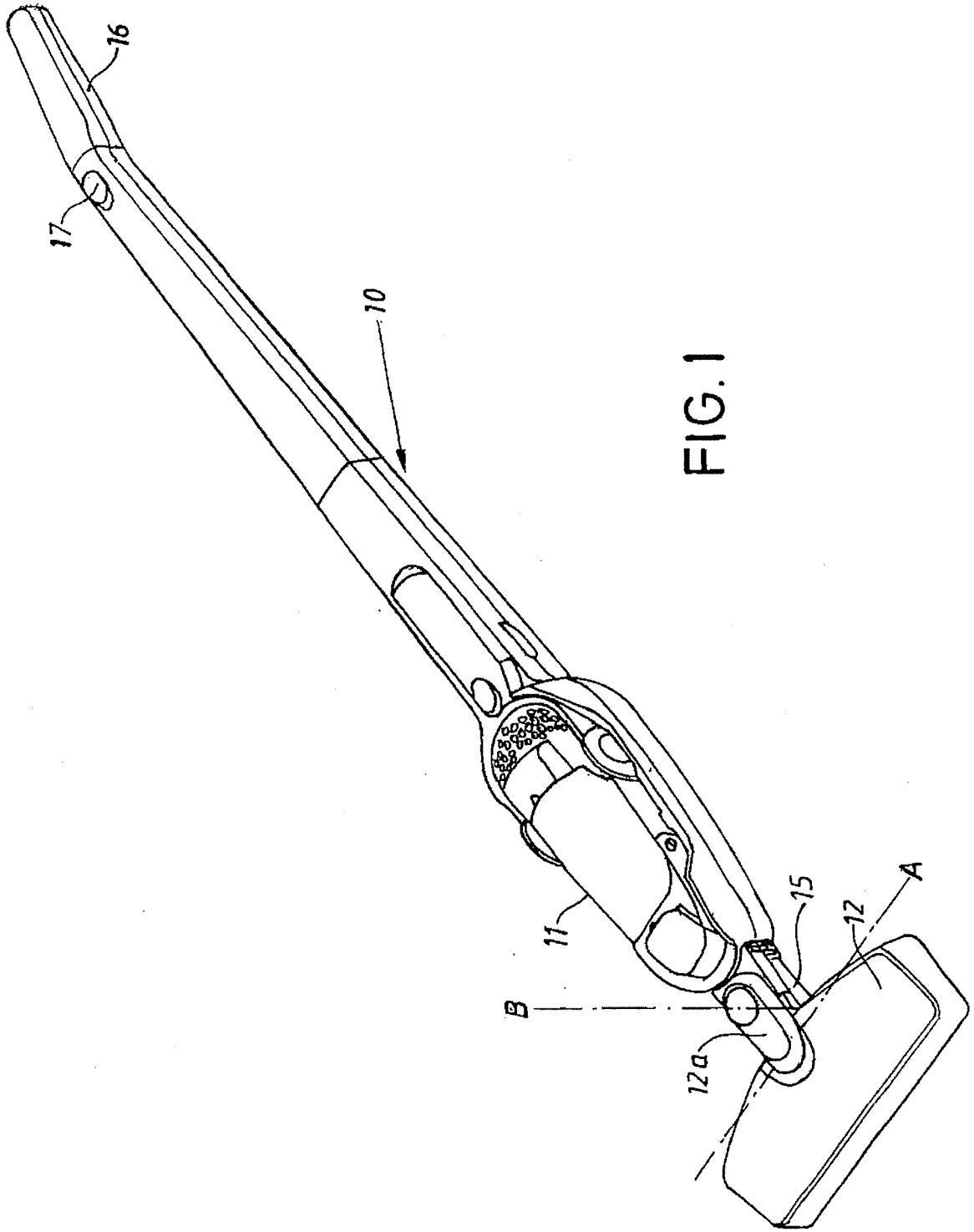


FIG. 1

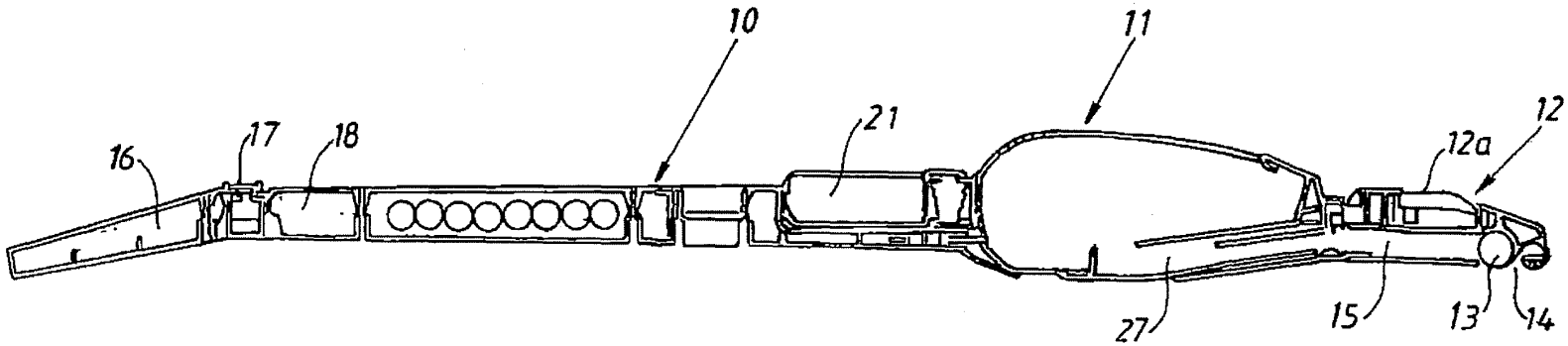


FIG. 2

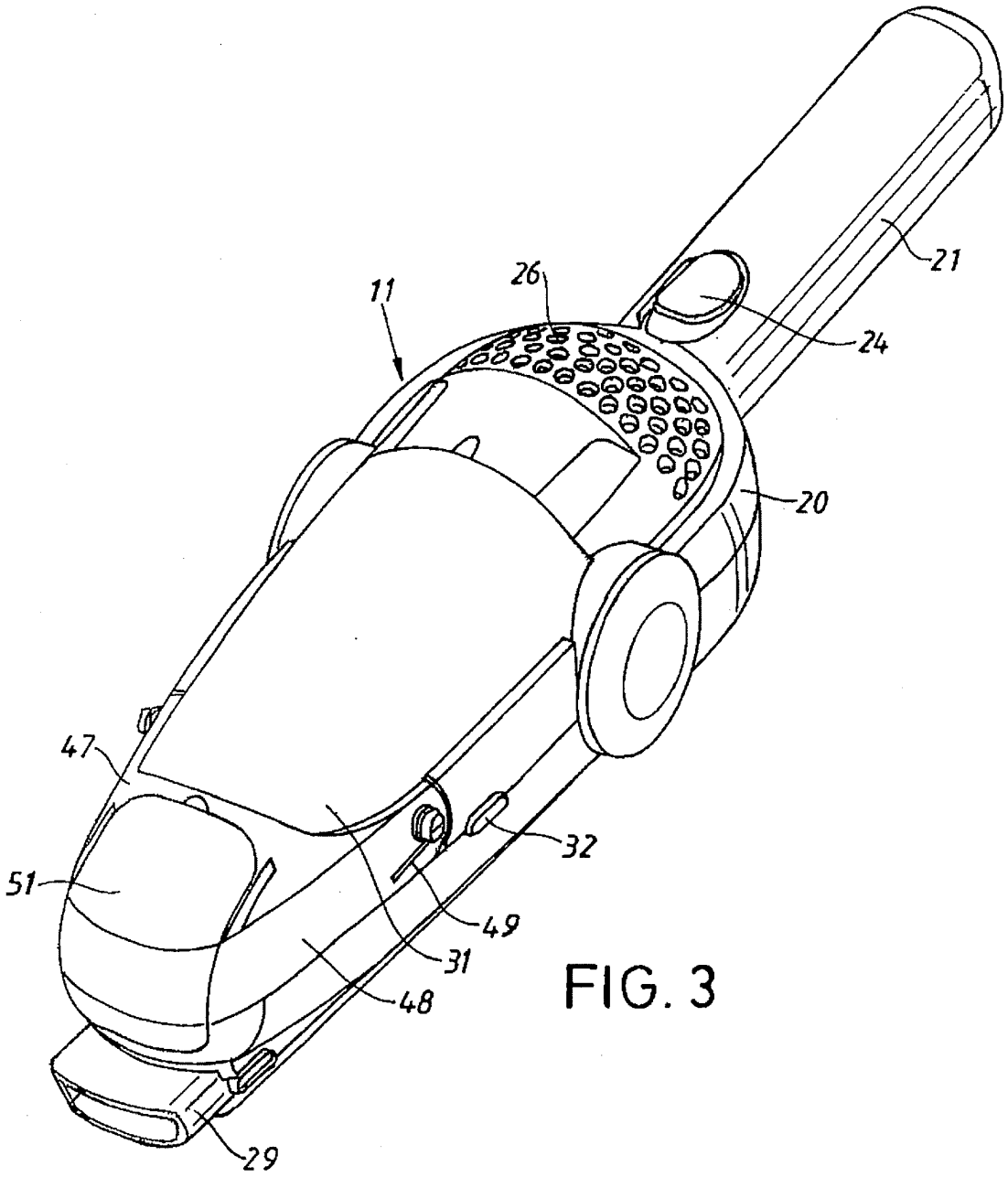


FIG. 3

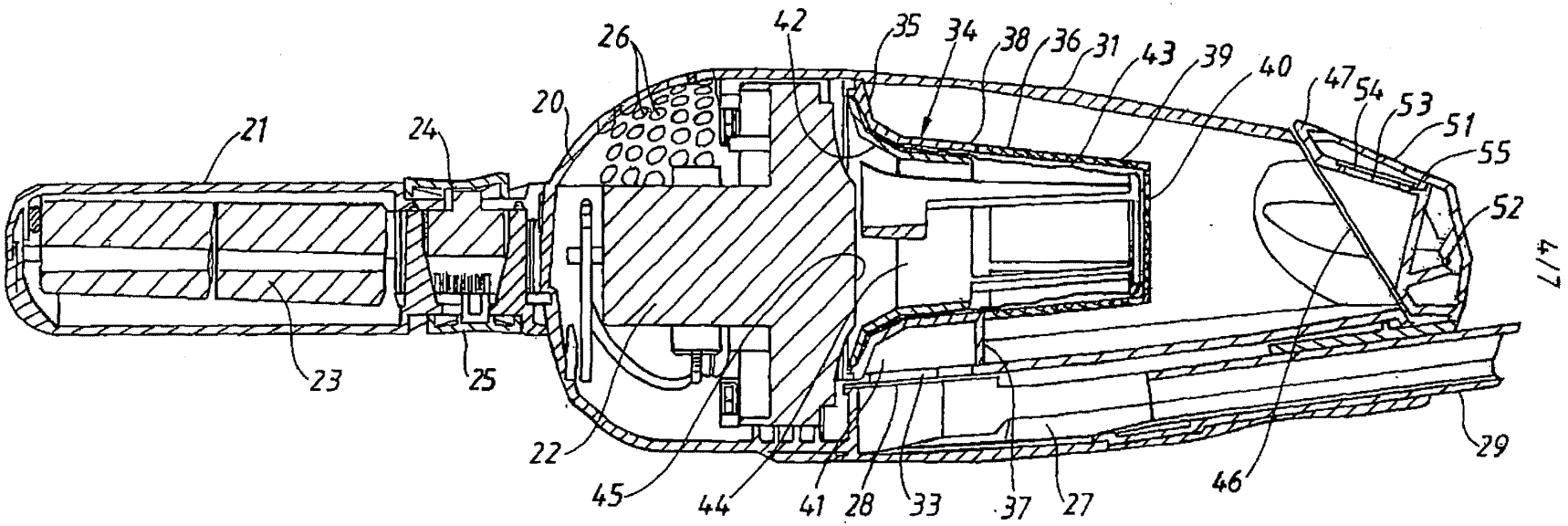

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FIG. 4

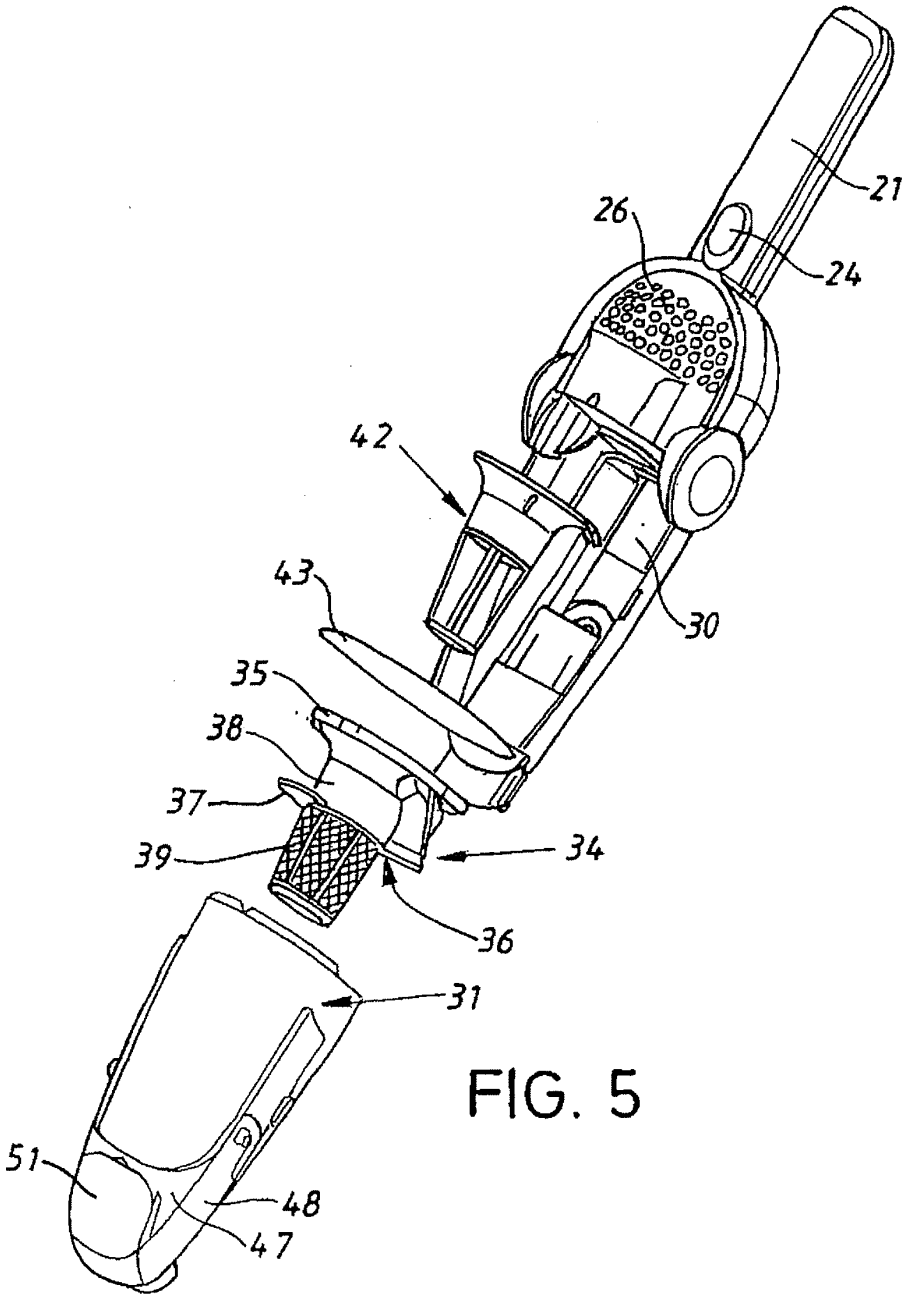


FIG. 5

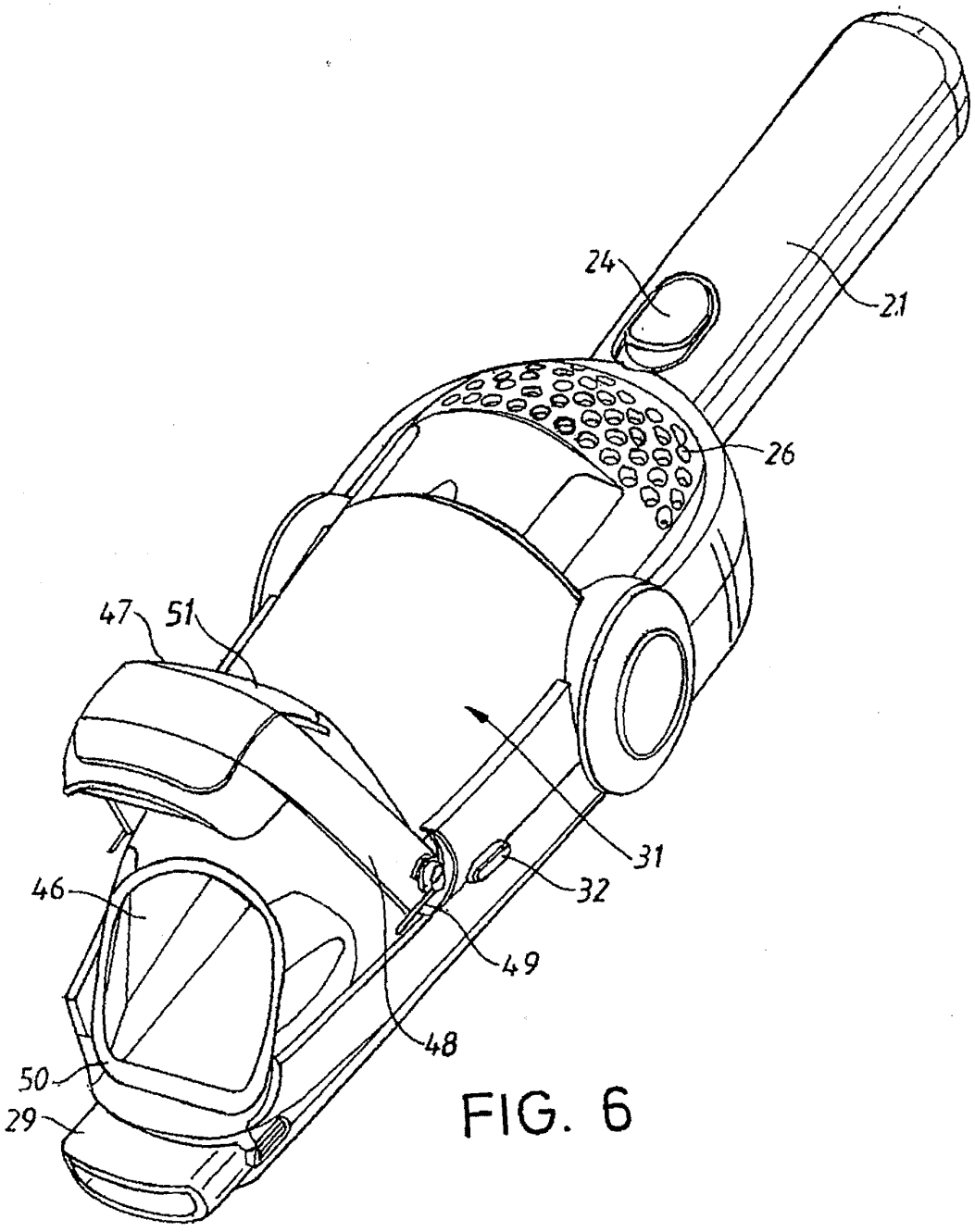


FIG. 6

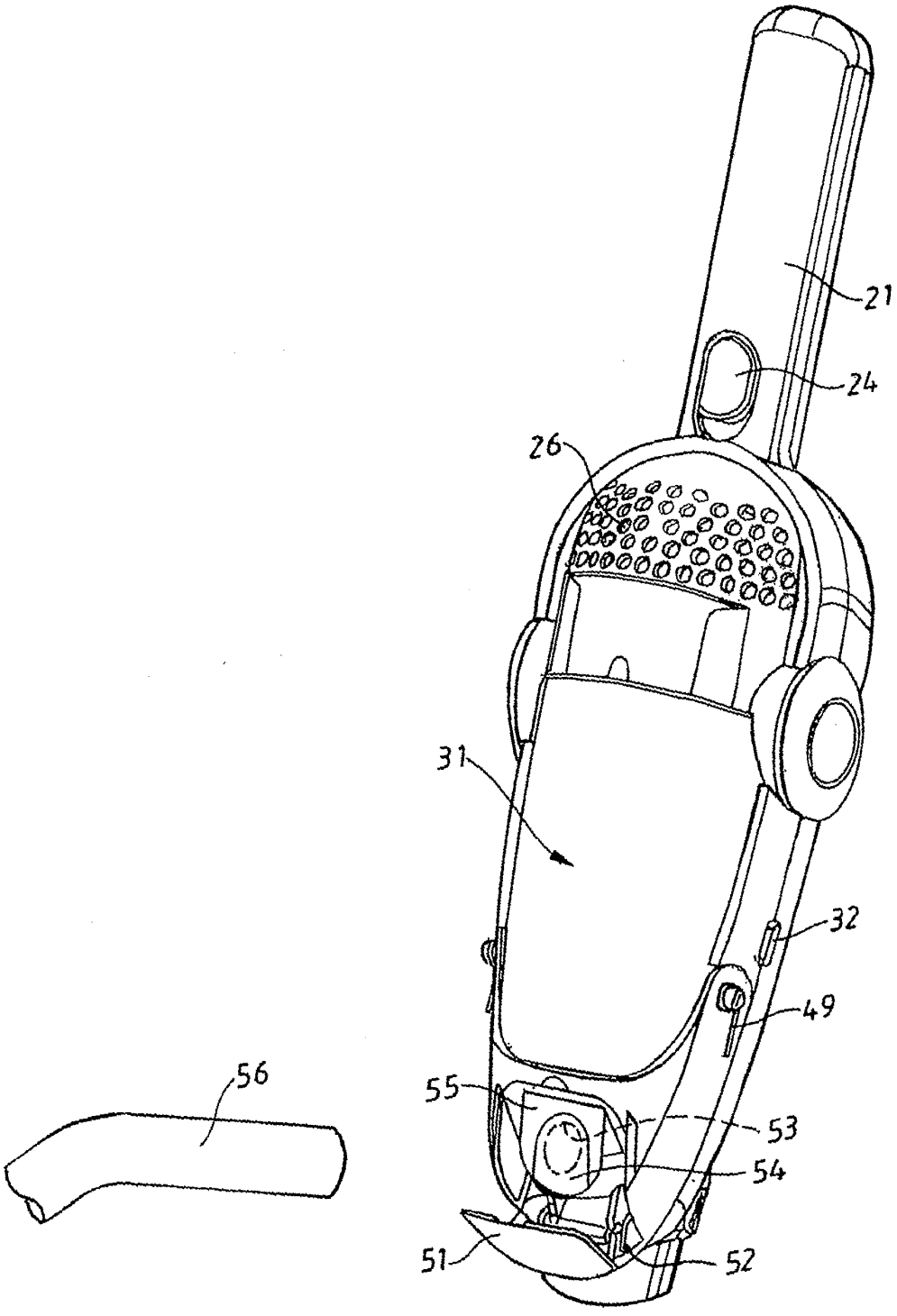


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2004/000136

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A47L 5/24, A47L 9/16
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)

IPC7: A47L

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0914795 A2 (BLACK & DECKER INC.), 12 May 1999 (12.05.1999), figures 1,2, abstract ---	1-14
Y	GB 2035787 A (L & H DESIGNS LIMITED ET AL), 25 June 1980 (25.06.1980), figure 3, details 2,5 ---	1-14
Y	SE 514314 C2 (AB ELECTROLUX), 12 February 2001 (12.02.2001), details 20,22 --- ---	2

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"E" earlier application or patent 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
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"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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"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

Date of the actual completion of the international search	Date of mailing of the international search report
19 April 2004	28 -04- 2004
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jan-Axel Ylivainio / JA A Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (January 2004)

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				CA	2239503	A 12/06/1997
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				US	6122796	A 26/09/2000
				WO	9720492	A 12/06/1997

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(43) Date of A Publication 26.01.1994

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(22) Date of Filing 10.06.1993

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07944875 14.09.1992

(51) INT CL[5]
A47L 5/24

(52) UK CL (Edition M)
A4F FD11 FEBA FEB11 FEB19 FEF11 FFB203 FHA FHC13

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(58) Field of Search
UK CL (Edition L) A4F
INT CL[5] A47L 5/24
ONLINE DATABASE : WPI

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(54) Vacuum cleaner

(57) A vacuum cleaner, which is convertible between a hand-held vacuum and a stick-type vacuum, includes a housing (12) having a rondure first end (22) and narrowing to a generally oblate, low profile nozzle (166) at a second end, includes a dirt cup (14) mounted telescopically within the opening in the second end and adapted to move between a retracted position within the housing and an extended position. The free end of the dirt cup (14) may receive a cleaning tool (16) having a pivoting head (222), while the inner end is adapted to receive a filter assembly (146, Figures 8A-8D). The housing (12) contains a suction fan (24). The dirt cup is cleaned by withdrawing it from the end of the nozzle and removing the spun-bonded filter assembly (146).

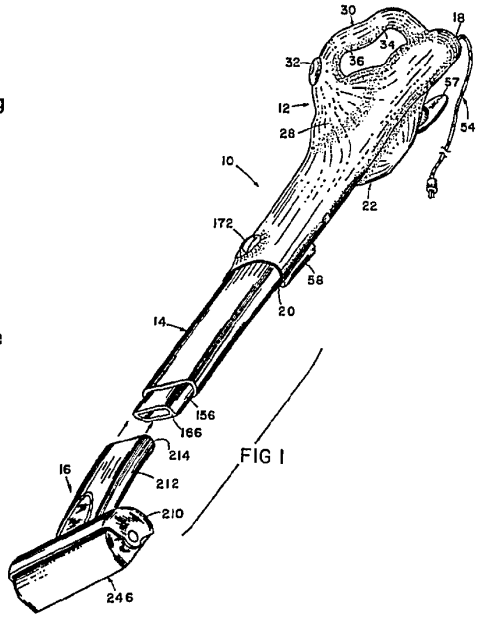


FIG 1

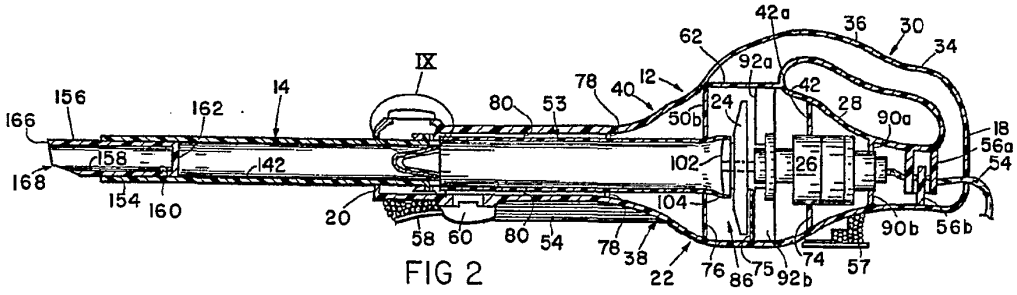


FIG 2

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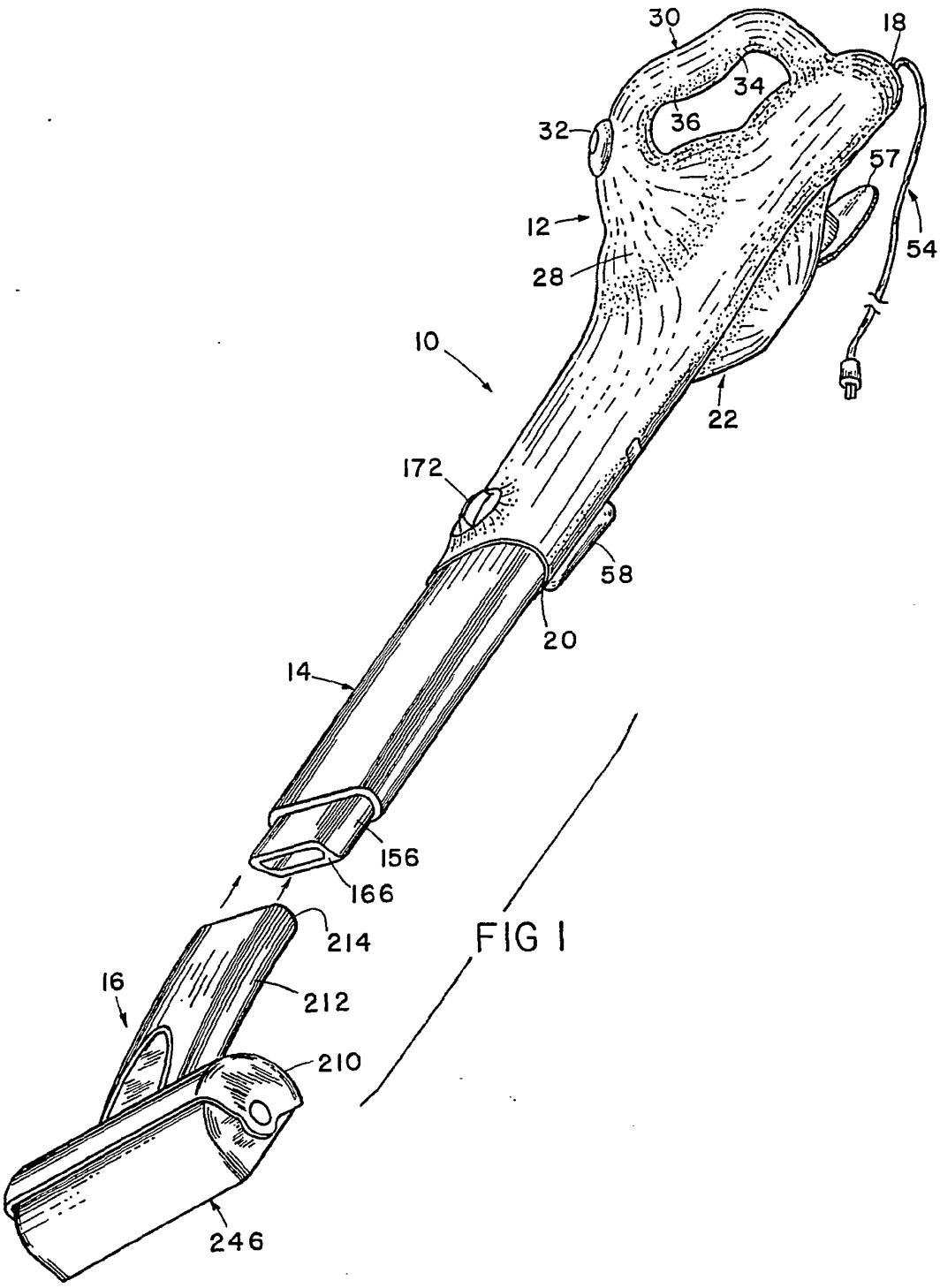

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FIG 1

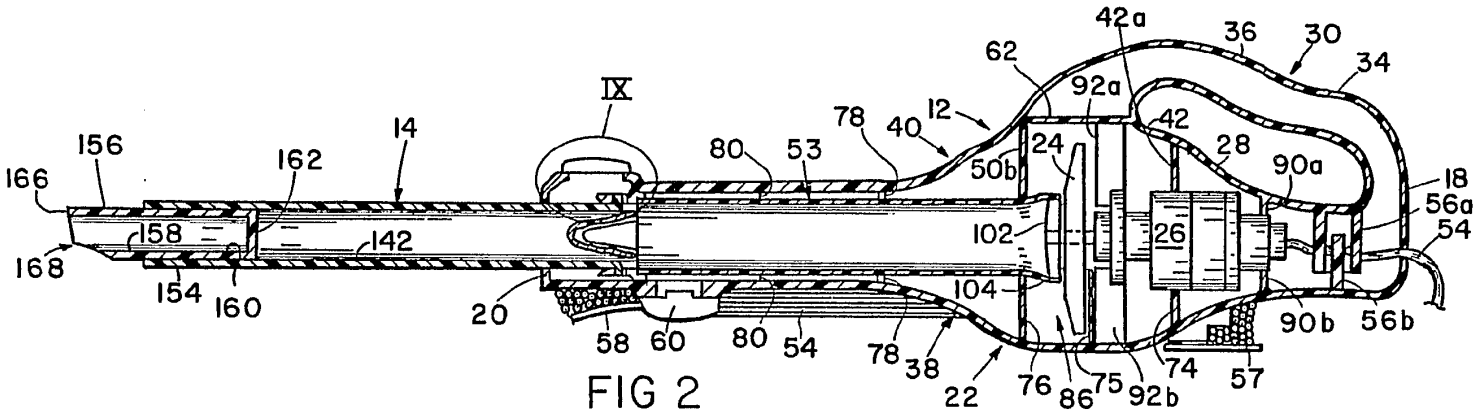

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FIG 2

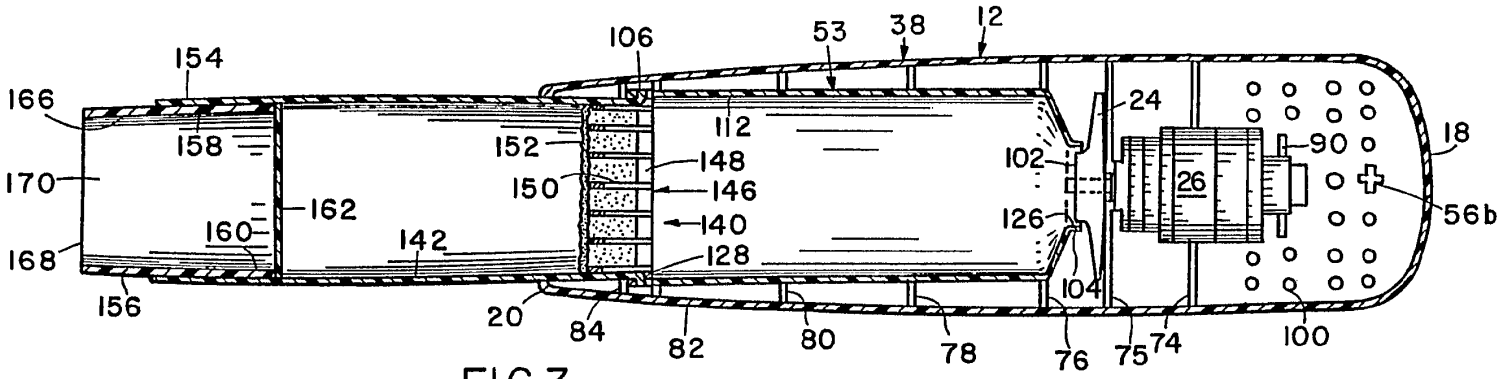

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FIG 3

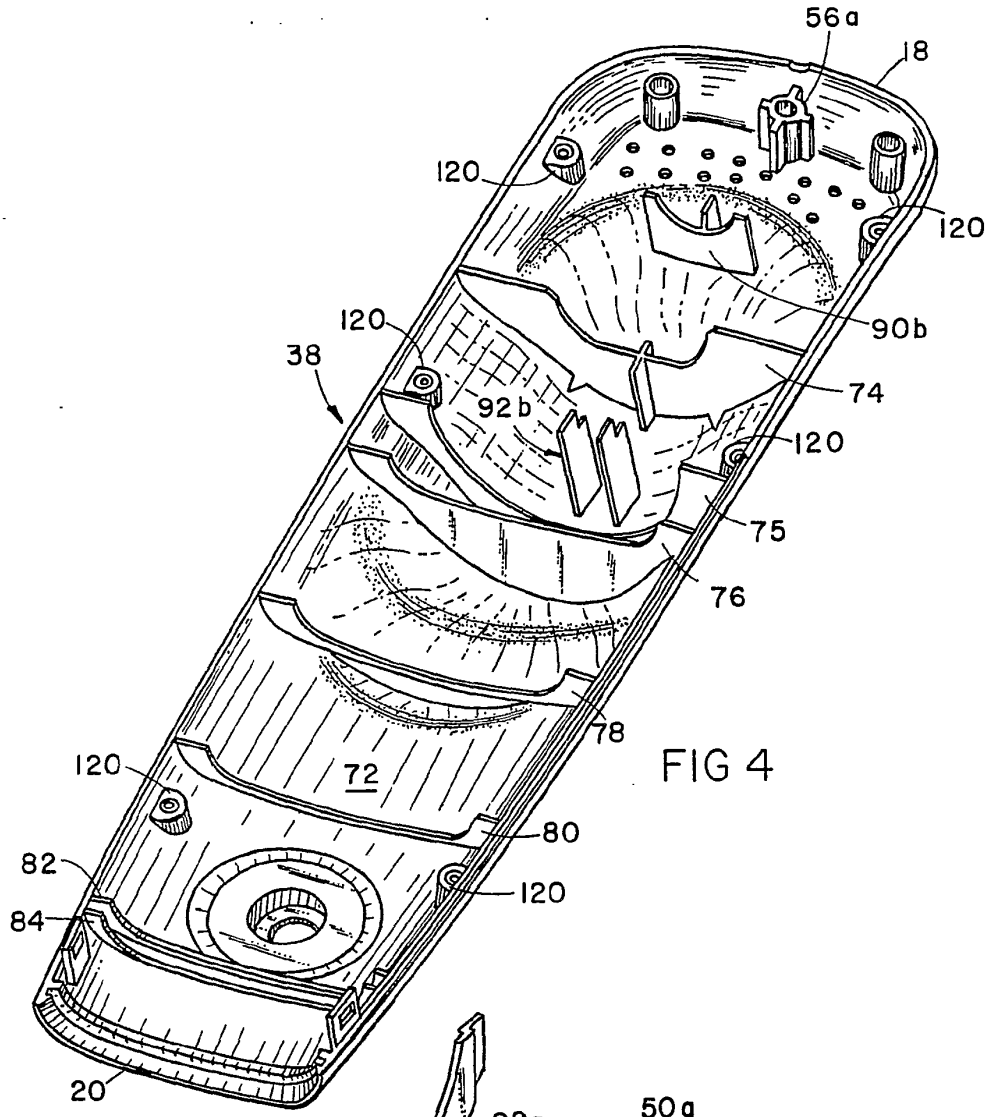

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FIG 4

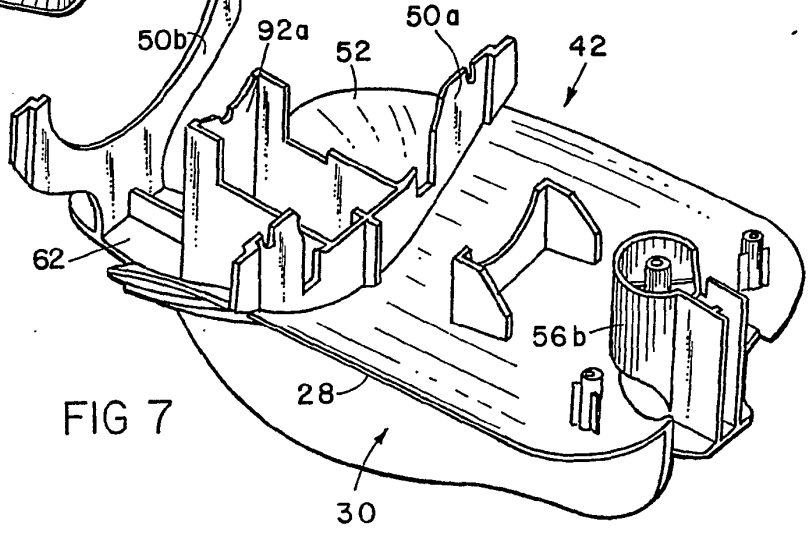

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FIG 7

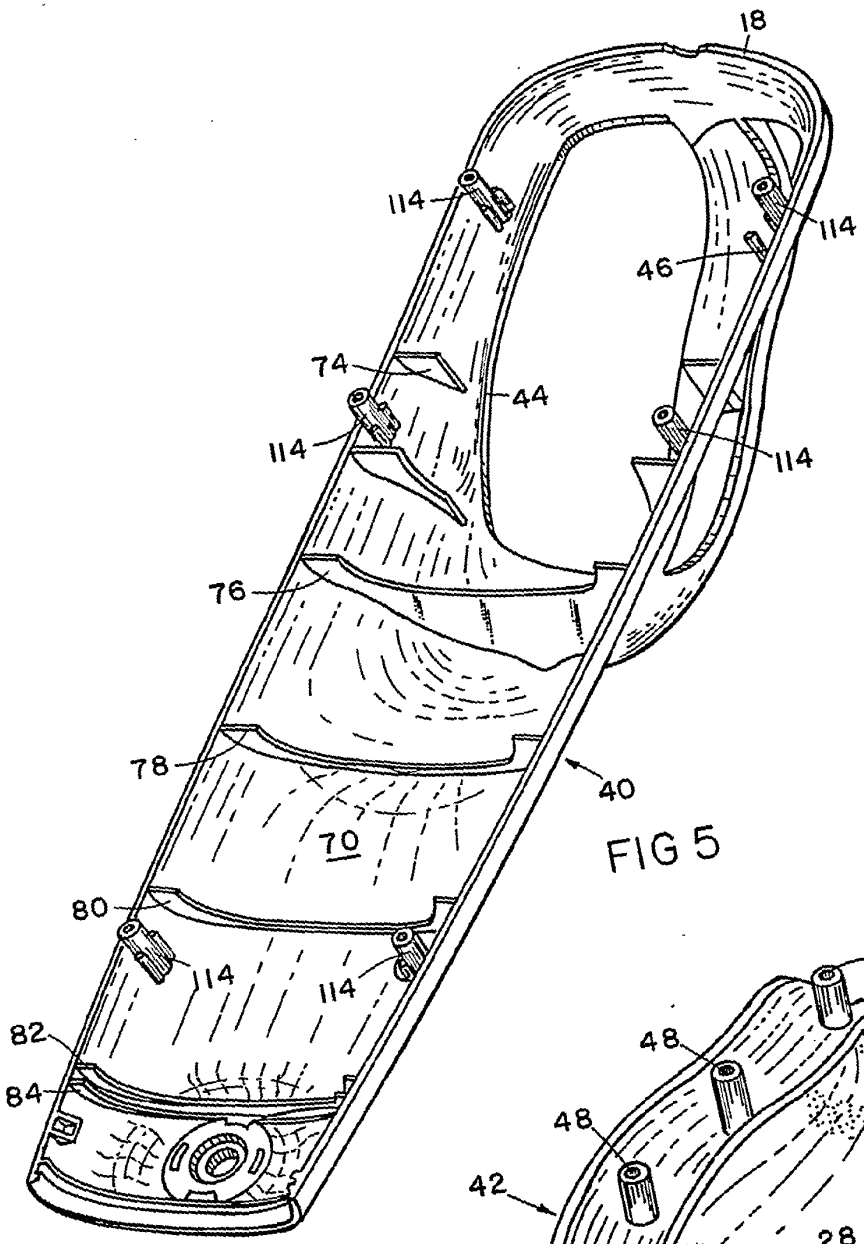

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FIG 5

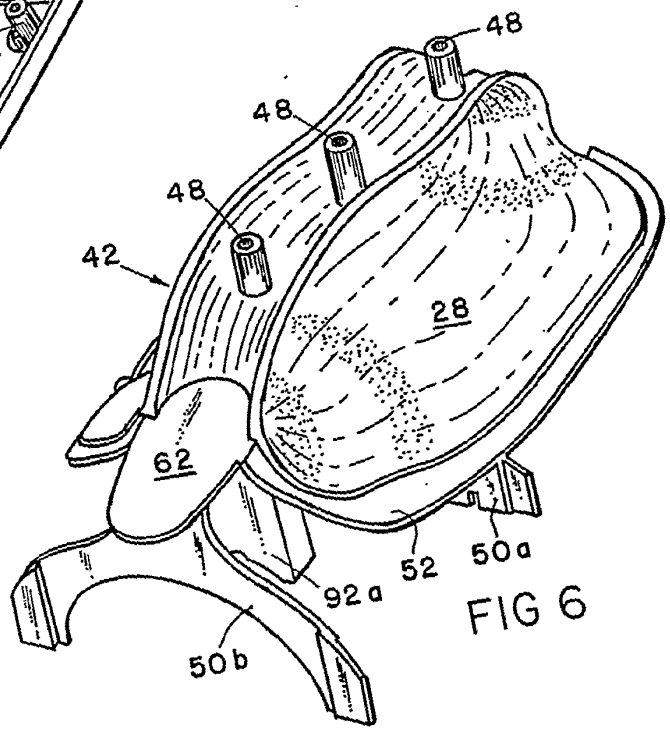

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FIG 6

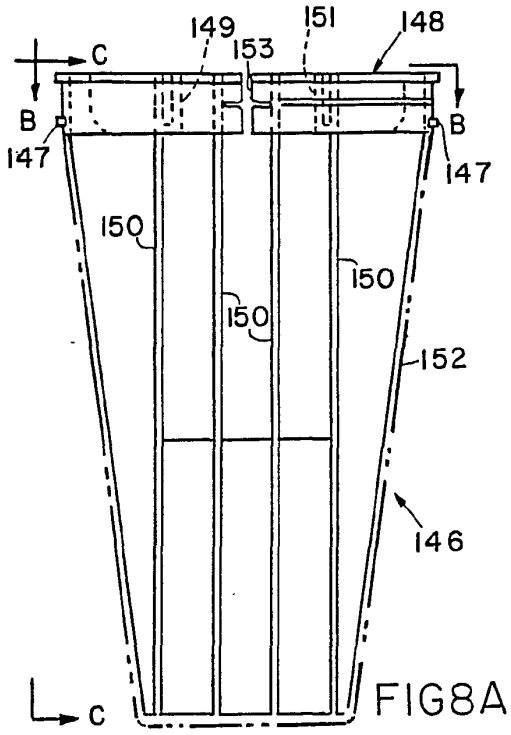


FIG8A

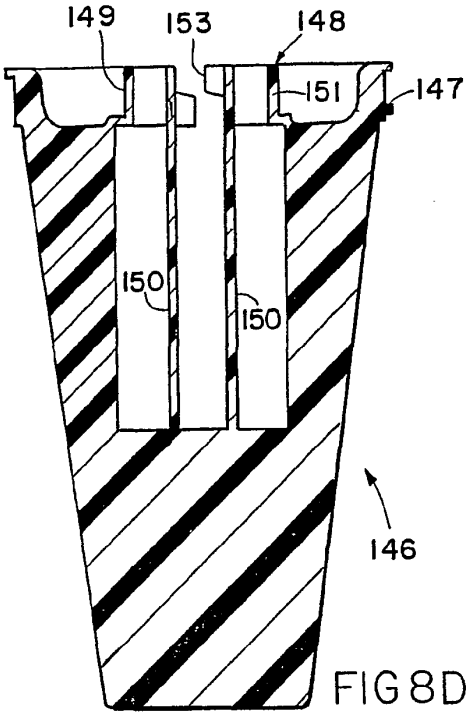


FIG 8D

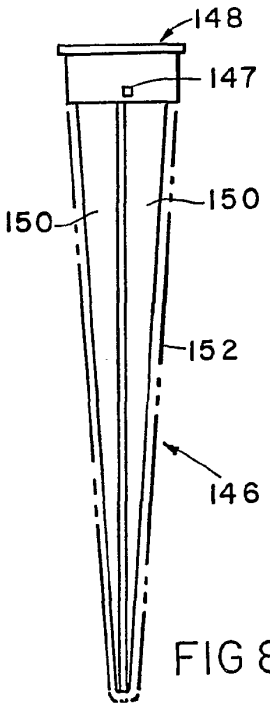


FIG 8C

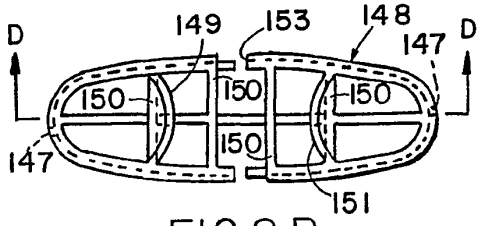


FIG 8 B

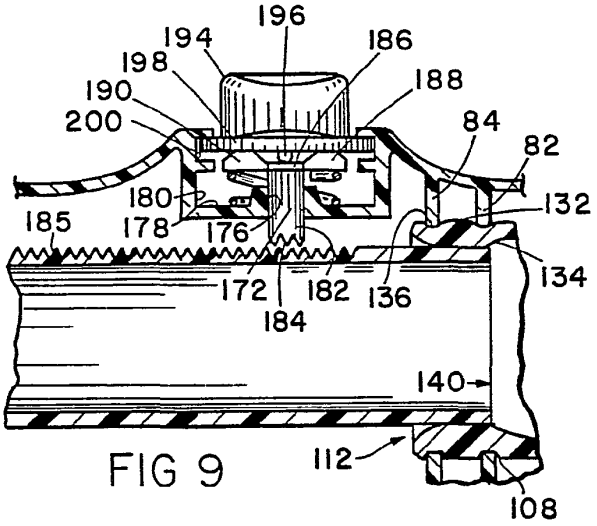


FIG 9

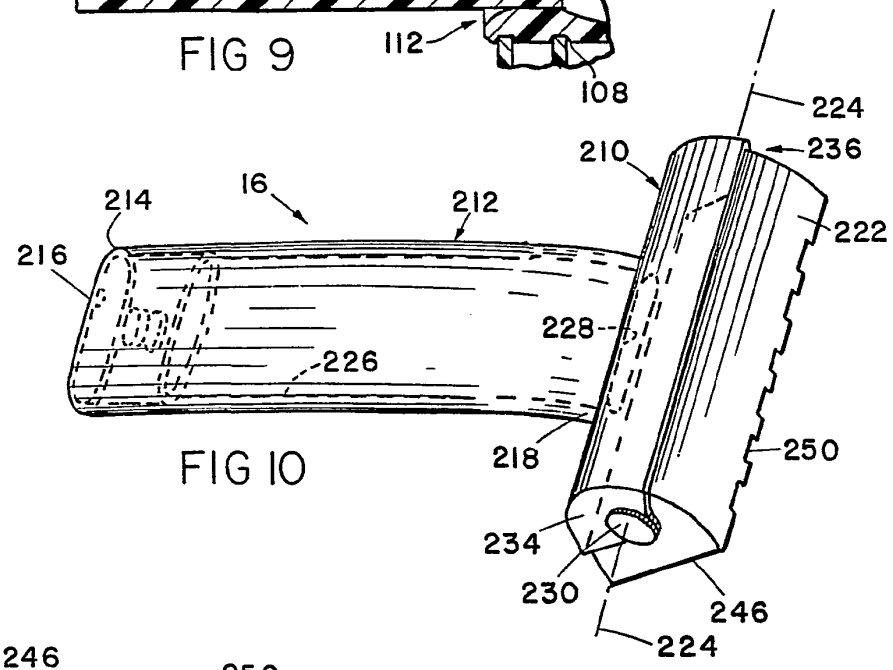


FIG 10

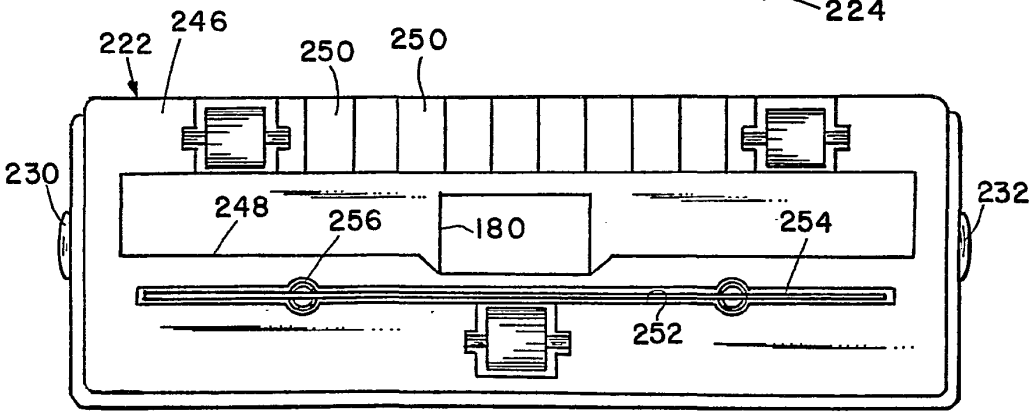


FIG 11

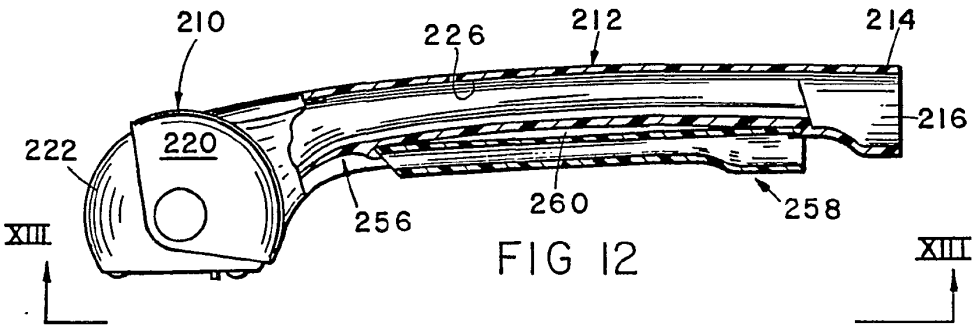


FIG 12

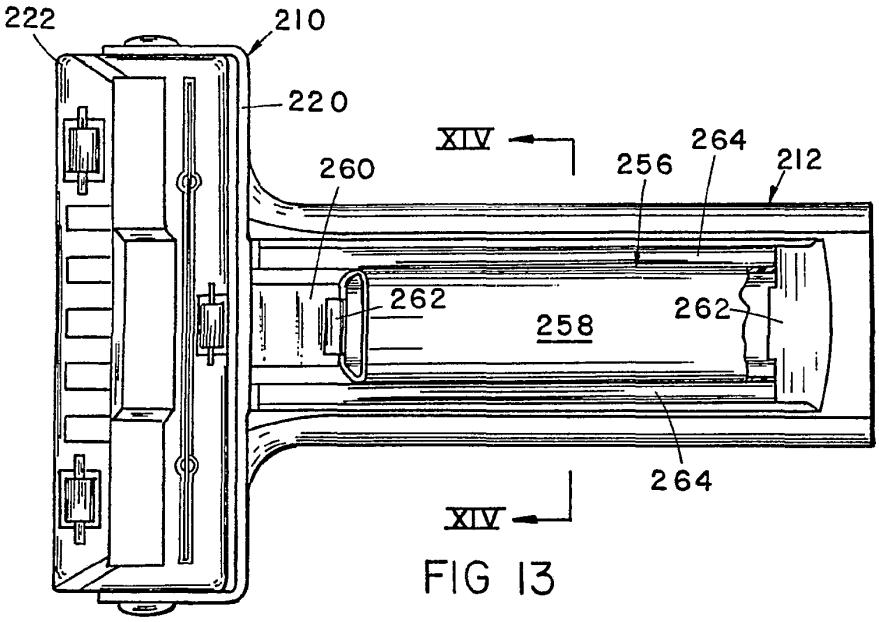


FIG 13

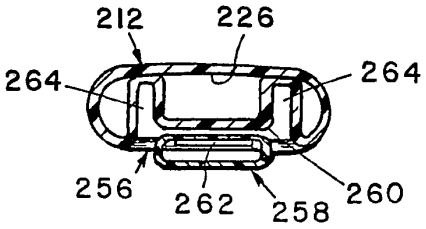


FIG 14

VACUUM CLEANER

This invention relates generally to vacuum cleaners, and particularly to vacuum cleaners convertible from a hand-held vacuum to a stick-type vacuum cleaner.

A variety of different dry-type vacuum cleaners are available for a variety of uses ranging from heavy duty rug and carpet cleaners, light duty rug and carpet cleaners for cleaning small spills and crumbs, and compact hand-held cleaners for cleaning cushions, pillows, stair treads and the like. There have also been developed cleaners particularly designed or equipped with conversion tools to be used for special purposes such as removal of spider webs near the ceiling, drapery valences, and other hard to reach areas.

In recent years, due to the introduction of plastics and substantial improvements in the design of electric motors for this type of equipment, the bulk and weight of these machines have been reduced substantially. Also, the development of compact rechargeable, heavy duty batteries has made possible the so-called "cordless vacuum cleaner". However, there remains the problem that the machines are limited to one or two functions. For other functions, it has been necessary to have a second tool or a bulky and clumsy conversion kit. Such tools and conversion kits are necessary because the vacuums are too large or bulky to life above the head to clean out of reach areas or tight areas.

Stick vacuums, that is hand-held vacuums attached to the end of a rod, were designed to be used to clean carpets or floors from a standing position, or to clean hard to reach areas such as ceilings, drapery valences, and the like. However, a majority of the stick-vacs

proved awkward to handle since substantially all of the weight of the vacuum was disposed at the far end of the wand. When used above or off the floor, the mass of the vacuum at the end of the wand requires the operator to exert a great deal of energy in suspending the vacuum at the end of the wand. Moreover, accessory cleaning tools were stored separate from the portion of the vacuum being held by the user, making them rather awkward to access.

The instant invention provides a vacuum cleaner convertible from a lightweight and manoeuvrable hand-held vacuum to an extended stick-like vacuum to clean floors from a standing position and otherwise inaccessible areas. In the extended position, the nozzle is sufficiently strong to support the weight of the vacuum. Moreover, the vacuum cleaner is adapted to receive a floor cleaning tool or head which may be used in either the extended or retracted position, depending upon the desired cleaning task to be performed. The floor cleaning tool conveniently carries at least one accessory cleaning tool thereon.

The vacuum cleaner includes a low profile, oblate housing having an opening in a first end which extends substantially the length of the housing, and having a shape substantially identical to the exterior shape of the housing. The housing is enlarged toward the second end to contain a motor driven fan for drawing air into the first end and out the second end of the vacuum housing. Telescopically received within the first end of the housing is an elongate tubular dirt cup adapted to slide therein between a first retracted position and a second extended position. The tubular dirt cup may be locked into any one of a number of positions between and including the fully retracted and extended positions. The dirt cup includes a removable filter at one end and

a flapper valve at an opposite end adapted to prevent the debris from falling back out the dirt cup once captured. A handle extending from the top of the vacuum cleaner housing provides a compound grip to optimally position the centre of gravity of the vacuum when used as a hand-held vacuum or in the extended position as a stick-like vacuum. The angles of the two grip positions and handle contours are ergonomically designed so the operator may comfortably use the vacuum.

The vacuum cleaner also includes a detachable floor cleaning tool having a pivotal cleaning head designed to engage the surface to be cleaned. An accessory such as a crevice tool is detachably coupled, and nested in a neck portion of the floor cleaning tool, for easy access by the user. The accessory is designed to be attached to the end of the elongate dirt cup and fully movable therewith.

The instant invention provides numerous advantages over prior hand-held and stick-like vacuum cleaners, including the ergonomic design for the wide range of readily convertible operating positions, as well as the low profile nozzle to access tight or otherwise inaccessible areas. The extensible dirt cup offers the advantage of a stick vacuum without the stick, and always provides the same travel distance for debris entering the vacuum before it is captured by the filter regardless of whether in the retracted or extended position, making for a more efficient vacuum. Moreover, the short distance to the dirt cup reduces the risk that debris may clog or block the intake.

Additional advantages include a convertible hand vacuum/stick vacuum having a floor cleaning tool which carries accessories for special cleaning applications. The accessories are easily accessed by the user and are

aesthetically incorporated in the overall function and design. The improved filter design also improves operational and cleaning functions. The combination of the dirt cup/extension into the extensible dirt cup reduces the need for parts in assembly as well as reduce replacement part inventory, while also providing an attractive, versatile and easily manoeuvrable design. The low profile and linear alignment of the components may be formed from inexpensive materials and easily assembled, thus providing an inexpensive yet efficient and versatile vacuum cleaner.

A better understanding of the objects, benefits and advantages of our invention may be obtained from the appended detailed description and drawings, wherein:

Figure 1 is an oblique view of one embodiment of the invention;

Figure 2 is a side, cross-sectional view taken along lines II-II in Figure 1;

Figure 3 is a cross-sectional view taken along lines III-III in Figure 2;

Figure 4 is an oblique view of the lower one-half of the housing;

Figure 5 is an oblique view of the upper one-half of the housing;

Figures 6 and 7 are oblique views of an insert for the upper one-half of the housing;

Figures 8A-8D illustrate one embodiment of a filter assembly for use in this invention;

Figure 9 is an enlarged, fragmentary side cross-sectional view of one embodiment of a locking mechanism; and

Figures 10 to 14 generally illustrate one embodiment of a floor cleaning and accessory tool.

For purposes of the following description, the terms

"upper", "lower", "right", "left", "rear", "front", "vertical", "horizontal" and derivatives thereof shall relate to the invention as oriented in Figure 1. However, it is to be understood that the invention may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the inventive concepts defined in the appended claims. Specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

Throughout the following description referring to the many drawing figures, like reference numerals will be used to indicate like components, wherein Figure 1 illustrates one embodiment of a vacuum cleaner 10 of this invention including an elongate, low profile, oblate housing 12, a variably extensible dirt cup 14 and a detachable floor cleaning tool 16. Housing 12 has a rear and front end 18 and 20, respectively defining a longitudinal axis A-A extending therebetween. Proximate first end 18 and located approximately one-quarter of the length of housing 12 is an enlarged, rondure, or bulbous portion 22 adapted to accommodate a centrifugal fan 24 (Figures 2 and 3) and an air-cooled electric motor 26 therein. From rondure or enlarged portion 22 to front end 20, the size of housing 12 is reduced forming a low profile, elongate nose portion 23 having a substantially oblate or elliptical cross-section perpendicular to longitudinal axis A-A of housing 12. The low profile, oblate portion or nose 23 and dirt cup 14 provides sufficient cross-sectional area for good air flow while

simultaneously allowing access of dirt cup 14 and nose portion 23 to otherwise inaccessible areas.

Integral with housing 12 and extending from an upper surface 28 of rondure portion 22 is a handle 30 rejoining housing 12 near back end 18. Handle 30 includes a switch 32 for turning the motor 26 on and off, and a compound angle forming two ergonomically designed grip positions 34 and 36. The angular orientations of the two grip positions 34, 36 are adapted to position the vacuum's centre of gravity either below or ahead of the user's hand while the vacuum is used as a hand-held vacuum or as stick-like vacuum. For example, grip position 34 may be inclined between 5 degrees and 15 degrees from longitudinal axis A-A to provide a grip position suitable for use as a stick vacuum. Grip position 36 may be inclined between 10 degrees and 25 degrees with respect to longitudinal axis A-A to provide an ergonomic grip when used as a hand-held vacuum.

Housing 12 is preferably formed from a high impact polystyrene plastic (HIPP) or ABS plastic in three separate pieces: one forming lower half 38 and two parts, upper housing 40 and handle insert 42, forming the upper half. Handle insert 42 is adapted to fit within opening 44 of upper housing 40 to complete the lower side of handle 30 and the upper surface of bulbous portion 22 for the fan and motor 24, 26 (Figures 6 and 7). Handle insert 42 and upper housing 40 may be held together by post and socket fasteners 46, 48, respectively, extending from the respective portions comprising handle 30. Ribs 50 extending from lower surface 52 of handle insert 42 extend laterally beyond the portion comprising outer surface 28 of rondure housing 22, thus preventing it from extending beyond the remainder of outer surface 28 of housing 40. Each piece is preferably formed using well-

known injection moulding techniques.

An electric cord 54 exiting back 18 of housing 12 is used to supply AC current to motor 24. A first end of cord 54 is secured within housing 12 by anchor 56a-56b (Figures 4 and 7) such that any tensional force applied to cord 54 will not break the electrical coupling to motor 24. Because of the compact nature of housing 12, it is preferred that cord 54 be stowed on the exterior of housing 12.

Back 18 of lower housing 38 is adapted to receive a plate 57 (Figures 1 and 2) at the base of rondure portion 22, disposed parallel to the longitudinal axis A-A of housing 12. Cord 54 is also wrapped about a hook 58 extending from a disc 60 rotatably coupled with lower housing 38 proximate front 20. Disc 60 includes a shaft 62 journalled within a hole in lower housing 38 adapting disc 60 to rotate about the shaft. Cord 54 may be wrapped around plate 56 and hook 58 and retained in place using a conventional catch (not shown) formed in the plug and adapted to pinch an adjacent portion of the cord. Cord 54 may be quickly released by rotating disc 60 such that hook 58 is positioned toward the back end of housing 12 and allowing cord 54 to fall free.

Although this invention has been described with an electric cord stowed on the exterior of the vacuum housing, it is contemplated that back 18 of housing 12 may be slightly modified to accommodate a cord reel well-known in the art. It is further contemplated by the invention that AC power may be substituted by a DC power supply consisting of rechargeable batteries. Such a DC power supply may be easily accommodated within housing 12 as well as the appropriate circuitry used to recharge the cells. Each of the above modifications may be made using conventional and readily available materials.

The interior surfaces 70 and 72 (Figures 4 and 5) of upper and lower housings 38 and 40, respectively, generally conform to the external shape, periodically reinforced and strengthened by ribs or bulkheads 74-84 (Figures 2 to 5). Each rib extends substantially perpendicular to the longitudinal axis of housing 12. Ribs 50a and 50b, together with tongue 62 extending from insert 42, cooperate with ribs 74, 76 extending from lower housing 38 to form a chamber 86 enclosing fan 24. Motor 26 is supported within housing 12 by ribs and/or mounts such as 50a, 74, 90a-90b and 92a-92b so that fan 24 is unencumbered and free to rotate within chamber 86.

Centrifugal fan 24 located within chamber 86 is oriented to draw air in through extensible dirt cup 14 and out through perforations 100 in back 18 of lower housing 38. Fan 24 is preferably powered by an electric motor 26, such as made by Ametek's, Lamb Electric Division of Ohio. Motor and fan 24, 26 are supported within chamber 86 such that an air inlet 102 of fan impeller 24 is concentrically received within one end 104 of casing 53. Casing 53 extends from end 104 immediately adjacent impeller 24, terminating at its opposite end 106 just inside end 20 of housing 12.

Casing 53 is centred within housing 12 and retained therein by ribs 76-84 defined in each half 38, 40 of housing 12. Ribs 82 and 84 (Figure 9) are specifically adapted to engage grooves 108 extending around outer surface 110 of casing 53 near end 112. Ribs 76-84 and upper and lower housing 38 and 40 are specially designed to be clamped together about fan 24, motor 26 and casing 53 in registered alignment by bosses 114 receiving threaded fasteners extending through sockets 120 in lower housing 38 (Figures 4 and 5).

The geometry of casing 53 changes from end-to-end

(Figure 3). At end 104, opening 126 is generally circular, having an inside diameter slightly larger than the outside diameter of air inlet 102 of impeller 24. It is preferred that substantially close tolerances be maintained between the outside diameter of impeller air inlet 102 and the inside diameter of impeller air inlet 102 and the inside diameter of opening 126 to assure efficient air flow. Casing 53 tapers rapidly outward from end 104 in a horizontal direction to obtain a maximum cross-sectional area within the oblate shape of housing 12 toward end 20. Slidably received in end 106 is the extensible dirt cup 14 adapted to extend from and retract within the casing. End 106 has an opening 128 shaped substantially identical to the outer surface 130 of dirt cup 14 with at least a portion of end 106 (Figure 9) having ramping surfaces 134, 136, each adapted to glide up and over dirt cup end 140.

The inner surface 112 of casing opening 128 fits closely with outer surface 130 of dirt cup 14 to provide a substantially airtight seal. However, if desired, a gasket or sealing material (not shown) may be fixed along either ramp surface 134 or 136, or along any other portion of casing 53 or housing 12 in contact with outer surface 130 of dirt cup 14 to form the seal. The gasket or seal may also act as a bearing surface to reduce the friction associated with the sliding motion of dirt cup 14 within casing 53. Both casing 53 and dirt cup 14 may be formed from a polymeric material using well-known moulding techniques to produce the inner passages and openings.

Dirt cup 14 has a tubular inner wall 142 forming a passage extending the length of the dirt cup and concentric with the longitudinal axis A-A of vacuum 10. One end 140 of dirt cup passages 142 is adapted to

receive a filter assembly 146 (Figures 8A-8D) including a split-oval frame 148 having a plurality of tapered ribs 150 extending perpendicular therefrom. Frame 148 is fitted with a spun-bonded polypropylene filter 152 which may be pleated or sewn together to form a pocket for each rib 150, effectively increasing the surface area of filter 152 to trap dirt and debris. Filter assembly 146 is disposed within passage 142 such that the ribs 150 are oriented toward the opposite end 154 of dirt cup 14. Filter assembly 146 may be retained within end 140 by locking tabs 147 extending from each apex of the generally elliptical frame adapted to engage complimentary slots or notches formed on the inside of dirt cup end 140. Filter assembly 146 may be disengaged from end 140 by pinching ribs 149 and 151 together, closing gap 153 and withdrawing locking tabs 147 from dirt cup end 140.

End 154 of dirt cup 14 is fitted with an insert 156 having an external shape substantially similar to the oblate or elliptical transverse section exhibited by dirt cup 14 and front end 20 of housing 12. However, with respect to insert 156, the external dimensions preferably do not exceed the internal dimensions of passage 142 in order to be telescopically received by floor cleaning tool 16 described in greater detail below. Insert 156 includes a passage 158 extending therethrough parallel to and preferably concentric with longitudinal axis A-A of vacuum 10. End 160 disposed within passage 142 is adapted to retain a flapper valve 164 adapted to seat passage 158 with flow in a single direction. The nozzle end 166 of insert 156 includes an end face 168 and contains opening or orifice 170 to passage 158. Nozzle end face 168 is angled between 35 degrees and 55 degrees with respect to longitudinal axis A-A, generally placing

it parallel to the surface to be cleaned with the operator holding either one of the two grip positions 34, 36 on handle 30.

Dirt cup 14 is adapted to slidably extend from and retract within casing 53. To maintain any one position, a locking mechanism 172, as shown in Figure 9, extends through housing 12 proximate front end 20 and includes a plunger 174 extending through a hole 176 defined in the bottom 178 of a cylindrical recess or cavity 180 formed within housing 12. Tip 182 of plunger 174 includes serrations 184 adapted to engage serrated grooves 185 formed along the outer surface 130 of dirt cup 14. An opposite end 186 of plunger 174 has a flange or plate 188 containing a cam 190 along an upper surface. Disposed above flange 188 and cam surface 190 is a knob 194 having a lower cam surface 196 adapted to engage cam 190. Knob 194 also includes a flange 198 extending around its perimeter adapted to engage a retaining channel 200 which holds knob 194 against cam surface 190 of plunger 174. Rotation of knob 194 engages cam surfaces 190 and 196, forcing plunger 174 downwardly against spring 208 and forcing tip 182 against serrated grooves 185 in dirt cup outer surface 130. Friction between tip 182 and serrated grooves 185 in outer surface 130 is sufficiently strong to retain dirt cup 14 in position while vacuum 10 is in use. Rotating knob 194 in an opposite direction disengages cam surfaces 190 and 196 and allows spring 208 to bias plunger 174 upwardly to disengage tip 182 from dirt cup 14.

In one embodiment, vacuum 10 includes a detachable floor cleaning tool 16 (Figures 1 and 10 to 14) having a foot 210 disposed at one end of an elongate neck 212. The exterior of neck 212 is substantially identical in shape to the exterior shape of dirt cup 14. At an upper

end 214, neck 212 has a cavity 216 adapted to firmly receive nozzle 166 of insert 156 and retain tool 16 thereon. The opposite end 218 of neck 212 comprises a shroud 220 about a floor engaging head 222 pivotal about an axis 224. A passage 226 within neck 212 extends the entire length thereof from the bottom of cavity 216 to an opening 228 within shroud 220. Tool 16 may be formed from the same material as casing 53 using the same moulding technique.

Floor engaging head 222 within shroud 220 is substantially a cylinder having outside dimensions substantially identical to the inside dimensions of shroud 220 and is pivotally coupled at its ends 230 and 232 to shroud ends 234 and 236 (Figure 11). Head 222 is preferably formed as two pieces adapted to snap-fit together. Each half of head 222 may be made from injection moulded ABS or high impact, high heat polystyrene plastic. Head 222 has a flat 246 parallel to axis 224 and adapted to engage the floor (Figure 11). At least one channel 248 is formed therein, extending along the length and increasing in depth from its outer ends 230 and 232 toward a centreline. Channel 248 converges to a throat 180 extending perpendicular to axis 224 and in fluid communication with passage 226 extending from shroud 220. Additional channels 250 may be formed within flat 246 extending from the external surface of head 222 and connected to channel 248. Channels 248 and 250 within floor engaging head 222 provide a means for causing a high velocity stream of air to pass through or close to the surface to be cleaned to entrain dirt and other materials on or in that surface. In addition, flat 246 includes a recess 252 adjacent and parallel to the rear edge of channel 248 adapted to retain a flexible and resilient strip brush 254. Brush 254 is biased outwardly

in a direction perpendicular to flat 246 by springs 256 disposed between the head interior and strip brush 254. To facilitate easy movement of head 222 along the surface to be cleaned, flat 246 includes a plurality of wheels 258, proportionally spaced about in flat 246.

Nested in lower surface 256 of neck 212 is at least one accessory cleaning tool such as crevice tool 258. In a preferred embodiment, crevice tool 258 is retained within recess 260 in surface 256 by detents 262 which engage each end of crevice tool 258. As shown in Figures 12 and 13, recess 260 is preferably located along a longitudinal centreline extending the length of tool 16, to partially conceal accessory tool 258 and not interfere with the blow moulding technique and design of tool 16. In transverse section (Figure 13), recess 260 is bordered by channels 264 actually formed by the compression of the plastic tube used to form tool 16. Channels 264 also make tool 16 more rigid and also define the dimensions of passage 226 which runs from cavity 216 at the rear to opening 228 in shroud 220.

In operation, the desired configuration is selected by the operator to suit the cleaning task to be performed. For example, if vacuum 10 is desired to be used in a hand vacuum configuration, knob 194 is rotated to release dirt cup 14 such that it may be retracted a predetermined distance within housing 12. If a small area is to be cleaned, foot 16 may be removed from the end of dirt cup 14 by simply pulling on the pressure connection. With dirt cup 14 in a retracted position within housing 12, the operator holds vacuum 10 by grasping grip position 34 of handle 30 locating the centre of gravity below the operator's hand and slightly forward, such that end face 168 of dirt cup 14 may be naturally placed substantially parallel to the surface to

be cleaned. With the operator gripping position 34, the vacuum may be easily actuated sliding to and aft switch 32.

For areas out of reach of the user, dirt cup 14 may be extended by rotating knob 194 to disengage dirt cup 14. The dirt cup may then be extended to the desired length and locked into position by rotating knob 194. The operator may then actuate vacuum 10 and perform the cleaning task.

For cleaning large surface areas such as a floor, the operator moves dirt cup 14 to its fullest extension and locks it in place. The operator may also attach cleaning foot 16. Foot 16 is retained on the end of dirt cup 14 by a friction coupling between cavity 216 and insert 156. The operator may stand upright, grasping vacuum 10 at grip position 36, thus locating the centre of gravity substantially below and forward of the grip position to aid in moving the vacuum along the surface to be cleaned. Because the dirt cup extends, a substantial portion of the vacuum weight is retained near the compound handle, making for easy manipulation of the vacuum. Because the dirt cup extends instead of moving the vacuum body further from the user, this invention provides all the advantages of a stick-like vacuum, but without the stick and associated weight shift.

In order to vacuum areas too narrow for cleaning tool 16, or even nozzle insert 156, accessory cleaning tool 258 is used. Floor cleaning tool 16 is removed from insert 156. Accessory cleaning tool 258 is detached from surface 256 and inserted into orifice 170. Accessory cleaning tools offer a wide variety of cleaning characteristics and are well known. In this particular embodiment, accessory tool 258 is a crevice tool having a long, thin, rectangular tube. The end received within

orifice 170 forms a substantially tight seal, causing the suction created by the vacuum to be concentrated at the open end of crevice tool 258. When not in use, crevice tool 258 or other accessory is removed from orifice 170 and relocated in recess 260 and retained therein by detents 262 snapped into opposite ends of tool 258.

To evacuate dirt and debris contained in vacuum 10, foot 210 may be removed and dirt cup 14 completely withdrawn from housing 12. Dirt cup 14 is released from housing 12 by disengaging plunger 174 and pulling dirt cup 14 from end 112 of casing 53. With dirt cup 14 remove, filter assembly 146 may be withdrawn from first end 144 by pinching ribs 149, 151. Spun-bonded, polypropylene filter 152 may be removed from frame 148 and washed or otherwise cleaned to remove dirt and debris. Filter 152 may be replaced on frame 148 such that ribs 150 extend into filter 152. With filter assembly 146 withdrawn from dirt cup 14, dirt and debris not entrained in filter 152 may be emptied into another container. Filter assembly 146 is then reinserted into first end 144 such that locking tabs 147 engage recesses in the first end 140 of dirt cup 142 and dirt cup 14 is then reinserted into housing 12. Operation resumes as outlined above.

Although the invention has been described with respect to specific preferred embodiments thereof, many variations and modifications will be apparent to those skilled in the art.

CLAIMS

1. A vacuum cleaner, comprising:

a housing;

a tubular dirt cup slidably disposed within said housing and adapted to move between a first position within said housing and a second position extending from said housing; and

suction means disposed within said housing for creating a vacuum in said tubular dirt cup.

2. The vacuum cleaner of Claim 1, further including:

means for fixing the position of said tubular dirt cup between and including said first and last positions; and

means within said tubular dirt cup for trapping dirt and debris therein.

3. The vacuum cleaner of Claim 2, wherein said housing includes a handle extending from an upper portion of said enlarged portion and defining at least two grip positions at different angles with respect to a longitudinal axis of said housing.

4. The vacuum cleaner of Claim 3, further including a floor cleaning tool detachably coupled to an end of said tubular dirt cup extending from said nozzle, said floor cleaning tool having a pivotal floor engaging head.

5. The vacuum cleaner of Claim 4, further

including:

a casing within said housing and having a first end concentric with said suction means and a second end slidably receiving said tubular dirt cup; and

means for restraining withdrawal of said tubular dirt cup from said casing.

6. The vacuum cleaner of Claim 5, wherein said means for fixing the position of said tubular dirt cup includes:

a biased plunger having a tip adapted to engage said tubular dirt cup;

a knob disposed above said plunger; and

cam means between said knob and said plunger for engaging and disengaging said plunger with respect to said tubular dirt cup.

7. The vacuum cleaner of Claim 6, further including at least one accessory tool detachably coupled to said floor cleaning tool for attachment to said end of said tubular dirt cup in place of said floor cleaning tool.

8. The vacuum cleaner of Claim 7, wherein said suction means includes:

a centrifugal fan having a central air inlet;

a motor driving said centrifugal fan; and

said centrifugal fan having said central air inlet disposed within and concentric within said first end of said casing and enclosed within a chamber within said housing.

9. A vacuum cleaner convertible between a hand-held vacuum to a stick-type vacuum, comprising:

a housing having a rondure portion near a first end and an oblate, low profile portion at a second end;

an elongate dirt cup slidably disposed within said low profile portion and adapted to move between a first and a second position;

a handle extending from an upper surface of said rondure portion defining a first and a second grip position, each disposed at a different angle with respect to said longitudinal axis of said housing.

10. The vacuum cleaner as recited in Claim 9, further including means extending through a wall of said housing for releasably fixing a position of said elongate dirt cup between, and including, said first and last positions.

11. The vacuum cleaner as recited in Claim 9, including a floor cleaning tool detachably coupled to one end of said elongate dirt cup, said floor cleaning tool having a cleaning head pivotally coupled within a shroud disposed perpendicular to said longitudinal axis of said housing.

12. The vacuum as recited in Claim 9, further including a casing coaxially disposed within said low profile portion and adapted to slidably receive said elongate dirt cup.

13. The vacuum cleaner as recited in Claim 9, wherein said vacuum creating means includes:

a motor;

a centrifugal fan coupled to said motor and having a central air intake coaxial with a shaft from said motor;

a casing having a first end concentrically disposed about said air intake of said centrifugal fan and a second end slidably receiving said elongate dirt cup; and

a chamber formed by said housing about said first end of said casing and said centrifugal fan having an outlet through said motor and said first ends of said housing.

14. The vacuum cleaner as recited in Claim 10, wherein said fixing means includes:

a plunger having an axis substantially perpendicular to the longitudinal axis of said housing and a tip adapted to releasably engage said elongate tubular dirt cup to hold said dirt cup in fixed relation to said housing; and

means for releasably urging said plunger against said elongate tubular dirt cup.

15. The vacuum cleaner as recited in Claim 11, wherein said cleaning head of said floor cleaning tool includes a flat adapted to engage the surface to be cleaned and having a channel extending substantially perpendicular to the longitudinal axis of said housing, said channel in fluid communication with a leading edge of said cleaning head by at least one passage formed therein to generate a high velocity stream of air to pass through or over the surface to be cleaned to entrain dirt and other debris on or in that surface.

16. The vacuum cleaner of Claim 11, further including at least one accessory tool detachably coupled to said one end of said elongate dirt cup in place of said floor cleaning tool and detachably stored on said floor cleaning tool.

17. A vacuum cleaner, comprising:

an elongate housing having an enlarged portion near first end and a generally oblate portion integral with and extending from said second end of said housing to define a longitudinal axis, said oblate portion having an opening at its free end in fluid communication with an interior of said housing;

a handle integral with and extending from an upper portion of said housing defining at least two grip orientations with respect to said longitudinal axis of said housing;

an elongate dirt cup concentric with said nozzle and slidably received within said opening, said dirt cup having a passage extending from an inlet at a first end to an opening at a second end, said dirt cup adapted to move between a first retracted position within said oblate portion of said housing to a second extended position;

a motor driven fan disposed within said rondure portion of said housing and adapted to draw air through said inlet and into said dirt cup;

a floor cleaning tool detachably coupled to said first end of said elongate dirt cup; and

at least one accessory tool detachably stored on said floor cleaning tool and detachably coupled to said first end of said elongate dirt cup in place of said floor cleaning tool.

18. The vacuum cleaner of Claim 17, including means for releasably fixing a portion of said elongate dirt cup slidably disposed in and extending from said housing.

19. The vacuum cleaner of Claim 18, including a casing disposed within said housing and slidably

receiving said elongate dirt cup, said casing forming a generally tight seal between said motor driven fan and said elongate dirt cup.

20. A vacuum cleaner, comprising:

a housing having an elongate and oblate first end having an opening defined therein concentrically extending the length of said housing;

fan means disposed within said housing distant from said first end for creating a vacuum therein causing air to flow through said opening in said first end and out a second end of said housing;

an elongate tubular dirt cup concentric with and slidably disposed within said opening in said first end and adapted to move between a retracted position within said housing to an extended position from said opening in said first end;

means extending through said housing and engaging said dirt cup to adjust the position of said dirt cup within said first end;

flapper means disposed within a first end of said dirt cup for providing a single flow direction through said dirt cup;

means disposed within a second end of said dirt cup for filtering the flow of air through said dirt cup;

a floor engaging tool detachably received over said first end of said dirt cup; and

an integral handle extending from an upper surface of said housing, said handle having at least two grip positions defined by an obtuse angle; and

at least one accessory cleaning tool detachably coupled to said floor engaging tool for storage and detachably coupled to said first end of said dirt cup in place of said floor engaging tool.

21. A vacuum cleaner, comprising:

an elongate, generally low profile housing having a first and second end defining a longitudinal axis and having a generally oblate transverse cross-section, at least a portion of said housing between said first and second end enlarged, adapted to accommodate means for creating a vacuum within said housing; and

a handle extending from and integral with said enlarged portion and said first end of said housing and defining at least two grip positions disposed along dissimilar angular orientations with respect to said longitudinal axis; and

an opening defined in said second end of said housing for receiving an extensible container generally along the longitudinal axis, said container adapted to receive and retain debris drawn therein by said vacuum creating means.

22. The vacuum cleaner of Claim 21, further including:

means for adjustably fixing the extensible position of said container with respect to said second end; and

a floor cleaning tool detachably coupled to a free end of said extensible container extending from said second end of said housing; and

an accessory cleaning tool detachably stored on said floor cleaning tool and detachably coupled to said free end of said extensible container in place of said floor cleaning tool.

23. The vacuum cleaner of Claim 22, wherein said at least two grip positions provides a first grip position generally above said enlarged portion of said housing and a second grip position generally toward said first end of

said housing.

24. The vacuum cleaner of Claim 23, wherein said handle is curved defining said first and second grip position so that a hand gripping said first and second grip position changes an angle of said hand in relationship to said horizontal axis and the surface being cleaned.

25. The vacuum cleaner of Claim 24, wherein said enlarged portion of said housing includes:

a centrifugal fan having an air inlet adapted to draw air in from said second end of said housing and said container; and

means for driving said centrifugal fan to create said vacuum.

26. The vacuum cleaner of Claim 25, wherein said container includes:

a tubular, generally oblate dirt cup adapted to retract within and extend from said opening in said second end of said housing and having an opening at a first and second end, said first end disposed within said housing;

filter means releasably fixed in said opening in said first end; and

a flapper valve disposed within said opening on said second end, adapted to permit air and debris to flow in a single direction in said tubular dirt cup.

27. The vacuum cleaner of Claim 26, further including a casing disposed within said second end of said housing and adapted to slidably receive said tubular dirt cup therein in substantially airtight engagement,

said casing also adapted to provide fluid communication between said inlet of said centrifugal fan and said openings of said tubular dirt cup so as to entrain debris within a high velocity air stream and capture said debris within said dirt cup.

28. A vacuum cleaner, comprising:

an elongate, generally low profile housing having a first and a second end, said second end having an opening therein in fluid communication with an interior of said housing;

a compound handle extending from said housing and integral therewith, interconnecting said first end with a point between said first and second end of said housing and defining at least two grip positions linearly along said handle, each having a predetermined angular orientation with respect to the longitudinal axis of said housing; and

means disposed within said housing for creating a high velocity of air flow into said second end into said interior.

29. The vacuum cleaner of Claim 28, wherein said means for creating a high velocity air flow includes:

an extensible container slidably disposed within said opening in said second end of said housing and adapted to be releasably fixed between and including a first retracted position within said housing and a second extended position from said second end;

a casing concentrically received about one end of said extensible container and disposed within said second end of said housing for receiving said container in sliding engagement therein in a first end; and

means partially received within a second end of said

casing and disposed within said housing for creating a vacuum in said casing and drawing debris entrained therein into said container.

30. The vacuum cleaner of Claim 29, wherein said extensible container includes:

filter means detachably fixed within a first end of said container received within said casing; and

valve means disposed within an opposite end of said container for retaining debris within said container.

31. The vacuum cleaner of Claim 30, wherein said container is releasably fixed with respect to said housing by cam operated means extending through said housing for releasably engaging an exterior surface of said container.

32. The vacuum cleaner of Claim 31, further including a detachable floor cleaning tool received about said opposite end of said container.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

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Relevant Technical fields

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(ii) Int Cl (Edition 5) A47L 5/24

Search Examiner
A C HOWARD

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search
5 JULY 1993

Documents considered relevant following a search in respect of claims 1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0307240 A1 (BILOU) whole specification relevant	1
X	US 4610048 (ISHIHARA ET AL) whole specification relevant	1, 5, 8
X	US 3966444 (CLOWERS) whole specification relevant	1, 3, 4

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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FIG. 1

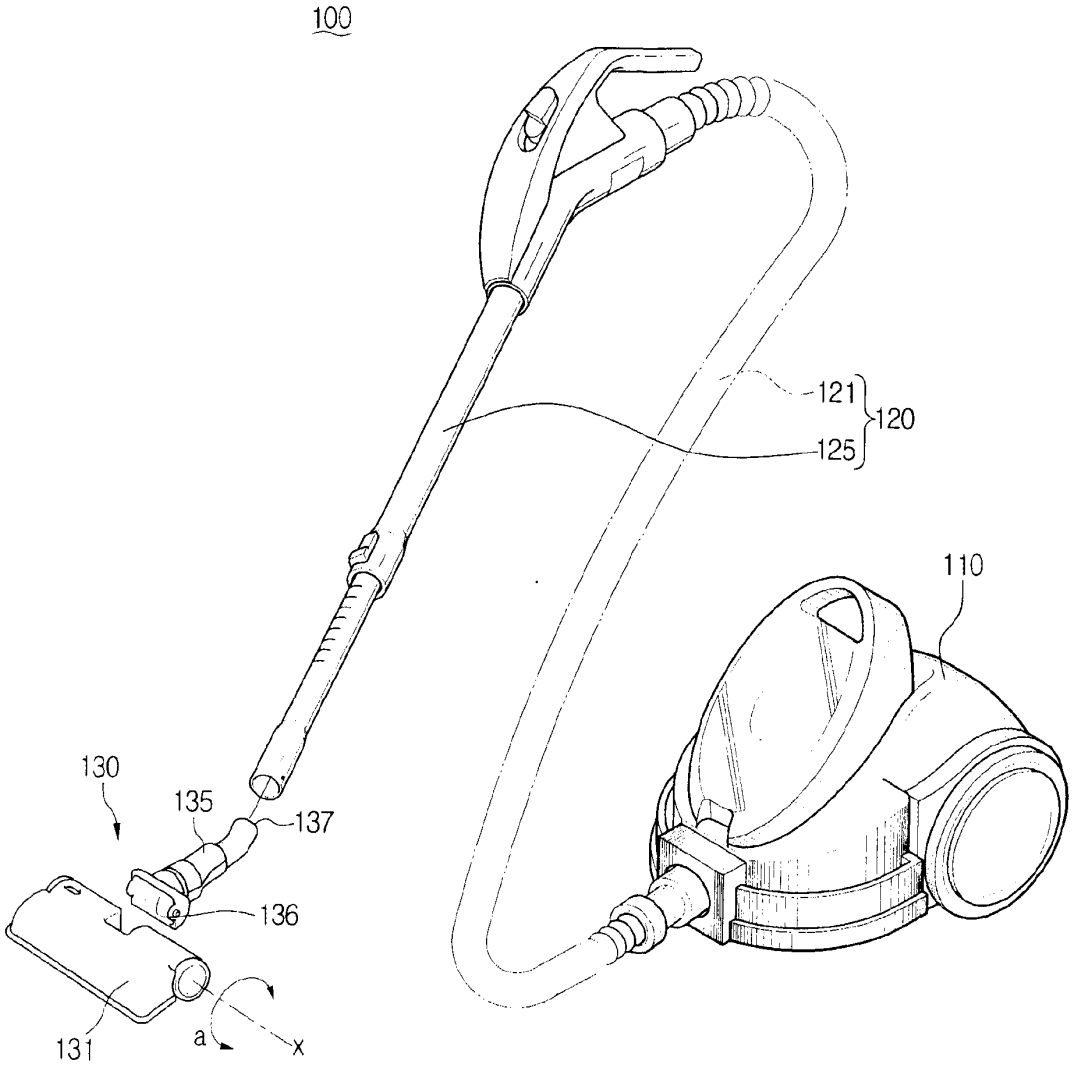


FIG. 2

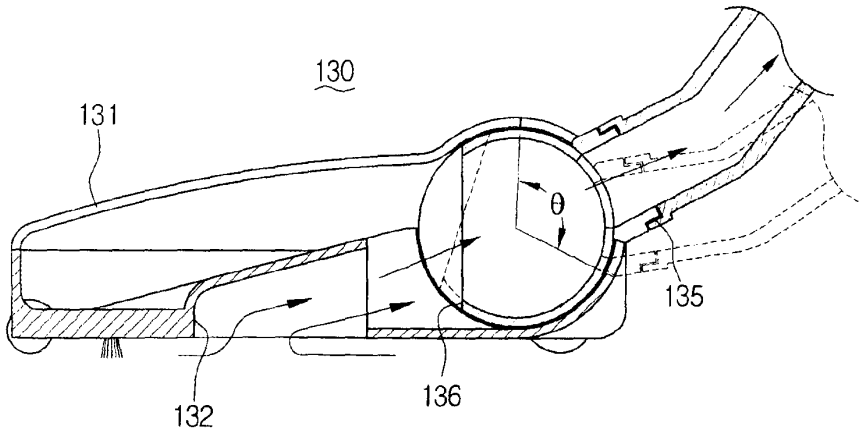


FIG. 3

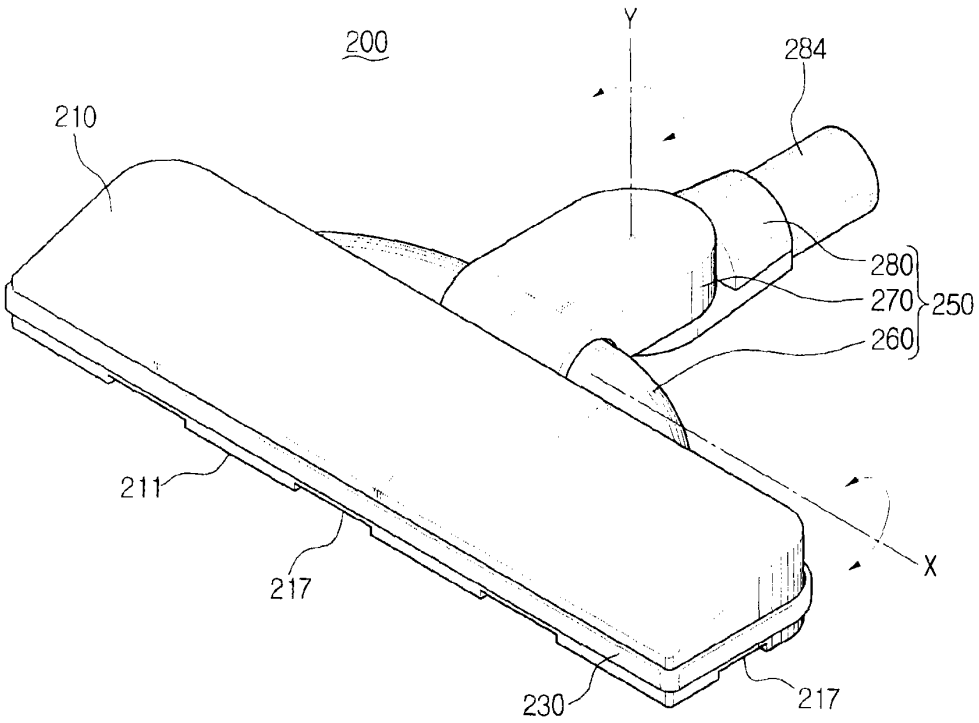

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FIG. 4

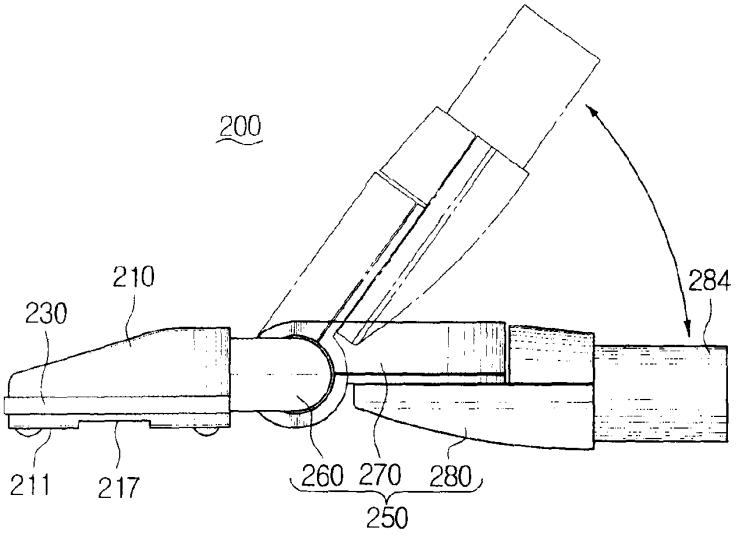

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FIG. 5

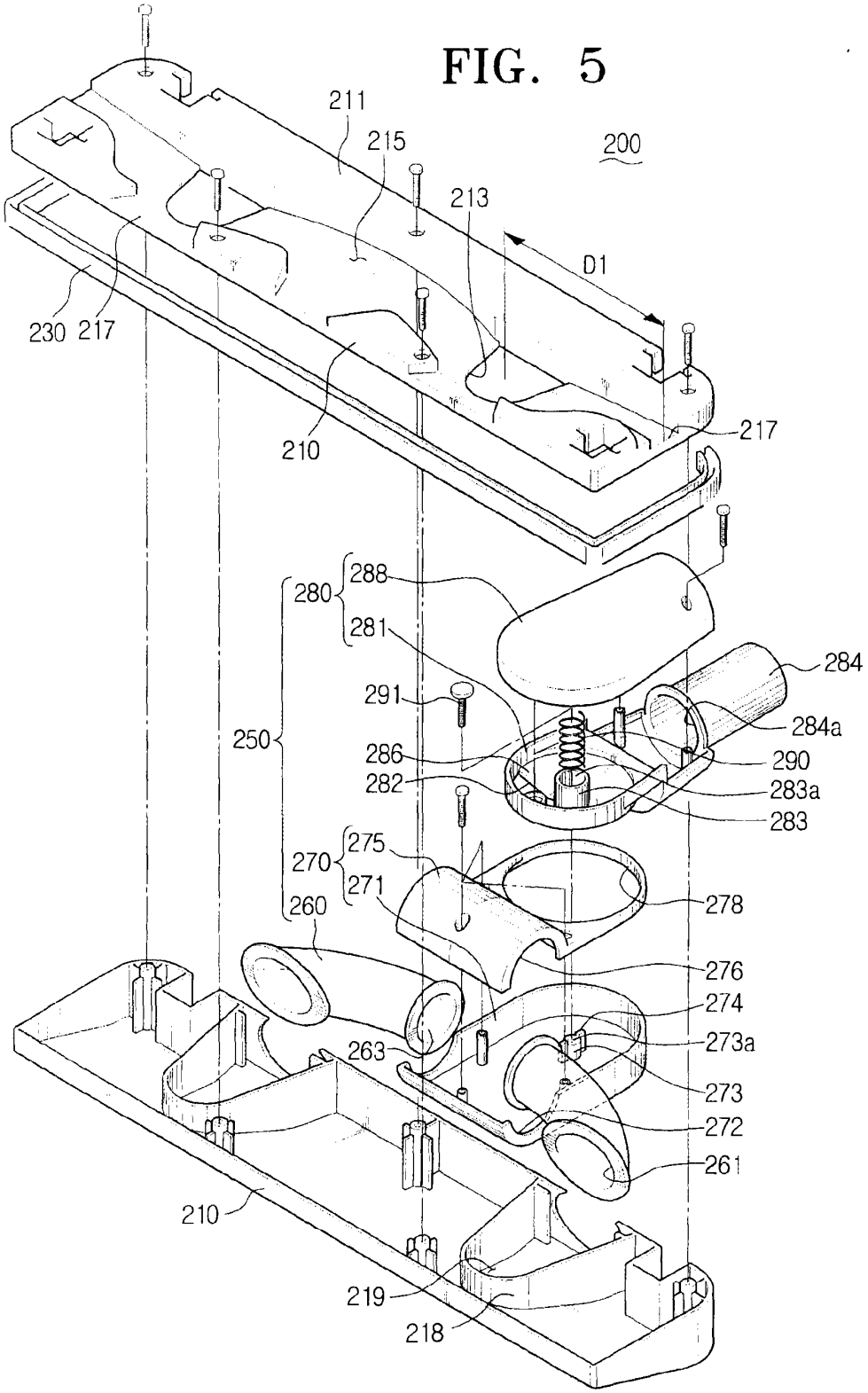

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218

FIG. 6

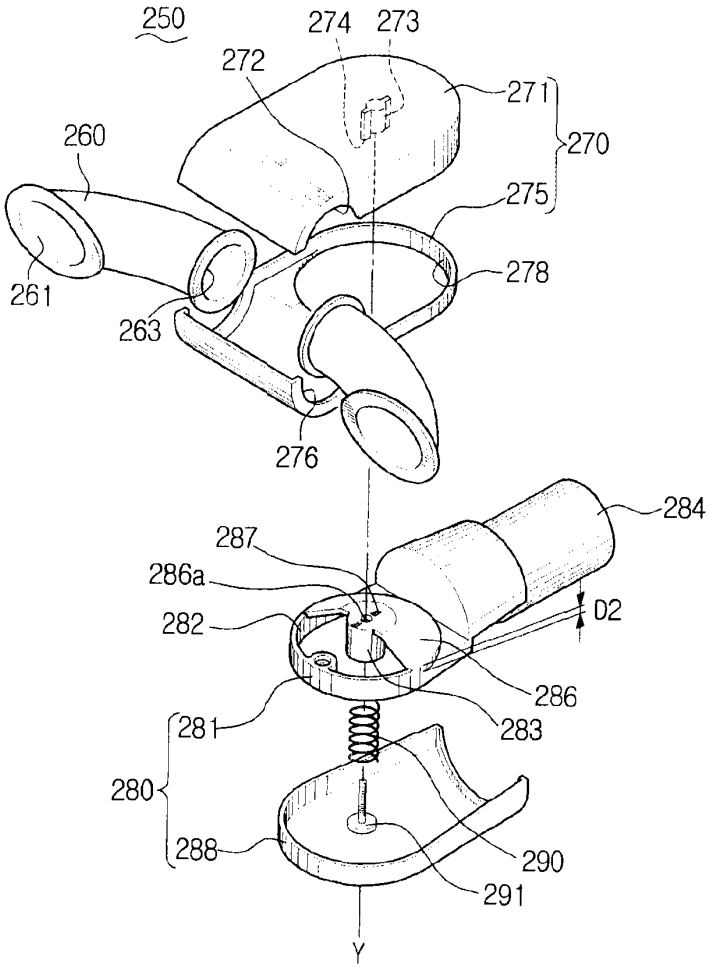
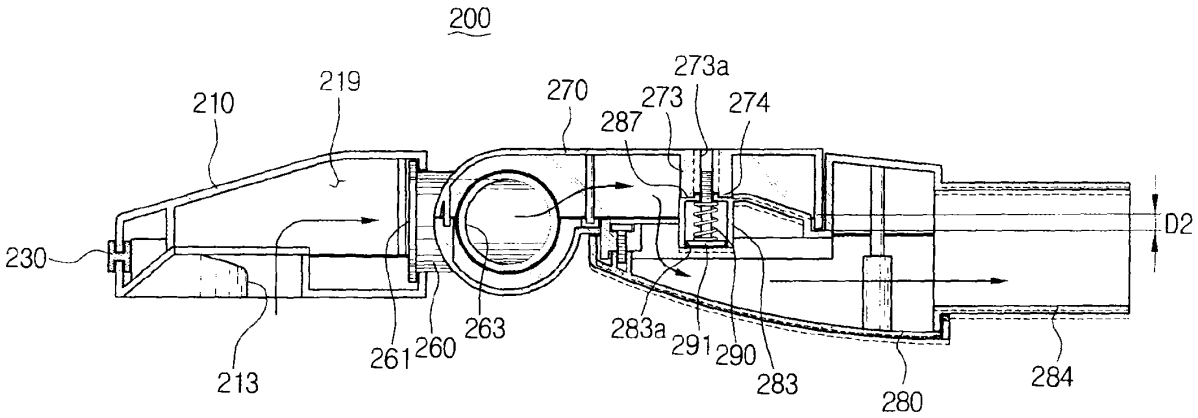

250
274
273
272
271
270
260
275
278
261
263
276
284
287
286a
282
D2
286
281
283
280
288
290
291
Y

FIG. 7


200
210
219
270
273a
273
274
287
230
D2
213
261
260
263
283a
291
290
283
280
284

DESCRIPTION

VACUUM CLEANER AND SUCTION PORT ASSEMBLY THEREOF

Field of the Invention

The present invention relates to a vacuum cleaner, and more particularly, to a suction assembly of a vacuum cleaner which draws in air and contaminants from a surface being cleaned.

Background of the Invention

Conventional vacuum cleaners generally draw in air and dust from a surface being cleaned by utilizing a suction force generated by a vacuum generator of the vacuum cleaner body. Referring to FIG. 1, a general conventional vacuum cleaner 100 comprises a cleaner body 110 housing a vacuum generator (not shown) therein, an extended flow passage 120 having at least one of an extension pipe 125 and an extension hose 121, connected in fluid communication with the cleaner body 110, and a suction port assembly 130 formed at an end of the extended flow passage 120 to draw in air and dust from the surface being cleaned.

As seen in FIG. 2, the suction port assembly 130 has a suction head 131 and a suction port 132 extending therein. The suction port assembly 130 is movable along the surface being cleaned during a cleaning operation. An articulated portion 135 shaped as a neck connects the suction head 131 in fluid communication to the extended flow passage 120. The extended flow passage 120 is movably connected with the suction head 131 which is lifted up by the articulated portion 135.

A conventional articulated portion 135, as seen in FIG. 1, includes a first connection hole 136 for pivotal connection with the rear side of the suction head 131, and a second connection hole 137 for removable connection with the extension pipe 125 of the extended flow passage 120. The first connection hole 136 is formed in a square shape to guide the air from the suction hole 132 towards the extended flow passage 120 even when the articulated portion 135 is pivoted at an angle with respect to the suction head 131.

However, the conventional articulated portion 135 of the suction port assembly 130 only allows pivotal movement between the suction head 131 and the extended flow passage 120 in the lifting direction 'a' (FIG. 1) with respect to the surface being cleaned, covering only a limited range of cleaning area. For example, the conventional vacuum cleaner 100 often has difficulty in cleaning crevices or corners of a room.

Additionally, because the first connection hole 136 of the articulated portion 135 is formed in a square shape, as shown in FIG. 2, the pivotal movement of the articulated portion 135 is limited to within a predetermined angle θ so that the first connection hole 136 is not exposed to the outside of the suction head 131. If the articulated portion 135 is moved more than the predetermined angle θ, the bottom surface of the suction head 131 is lifted apart from the cleaning surface, thereby reducing cleaning efficiency. Even when the articulated portion 135 is moved within the predetermined angle θ, suction efficiency is often reduced due to the partial blocking of the first connection hole 136 by inner structures of the suction head 131.

Summary of the Invention

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Accordingly, on object of the present invention is to provide a suction port assembly of a vacuum cleaner, which has an improved articulated portion enabling a higher efficiency cleaning operation and facilitating rotation of the extended flow passage with respect to the suction head.

The foregoing object is basically attained by providing a suction port assembly of a vacuum cleaner for drawing in air and dust from a surface being cleaned when the vacuum cleaner is in operation, the suction port assembly being connected in fluid communication with a cleaner body through an extended flow passage which includes at least one of an extension pipe and an extension hose, the suction port assembly comprising:

a suction head having a suction hole formed at a bottom surface thereof opposite to the surface being cleaned;

a first connection member extending from one side of the suction head; and

having an exit end connected in fluid communication with the suction hole;

a second connection member rotatably connected at one end to the exit of the first connection member and rotatable about a first axis to move upwardly and downwardly with respect to the suction head;

a third connection member connecting the second connection member to the extended flow passage in fluid communication therewith and being rotatable with respect to the second connection member about a second axis which is substantially perpendicular to the first axis,

wherein the second connection member includes a first connection opening connected in fluid communication with the suction hole at the end which is connected with the third connection member; and a first connection boss extends from the inner sidewall of the second connection member toward the first connection opening, and has a connection hole at a lower end thereof, and

wherein the third connection member includes an upper wall having a second

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connection opening connected to the first connection opening when the second and third connection members are engaged with each other; and a hole located adjacent to the second connection opening to oppose the connection hole, and

wherein the second connection member and the third connection member are rotatably connected by a fastener connected to the connection hole through the hole of the third connection member.

Accordingly, the rotational range of the extended flow passage about the first axis with respect to the suction head is extended. Moreover, because the extended flow passage is rotatable with respect to the suction head about a plurality of axes, a wide range of cleaning areas including crevices and corners can be cleaned efficiently.

The second axis is preferably substantially parallel to the normal line of the surface being cleaned, when the second connection member is substantially parallel to the surface being cleaned.

The fastener may comprise a screw fastener which screws into the connection hole and the third connection member may include a second connection boss extending from the inner side of the upper wall toward the inside of the third connection member and having a fastener seating hole for receiving a head portion of the screw fastener that engages the connection hole.

A stopper protrusion and a stopper hole are preferably formed on an end of the first connection boss and on an upper surface of the upper wall, respectively. The stopper protrusion and the stopper hole preferably face each other when the third connection

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member is rotated to a predetermined position with respect to the second connection member.

A coil spring may be further provided in the fastener seating hole of the second connection boss. The coil spring is preferably supported at its upper end by the upper wall of the third connection member, and supported by the screw fastener at its lower end, and preferably resiliently urges the upper wall of the third connection member towards the second connection member.

The upper wall of the third connection member is preferably angled at a predetermined height with respect to the other upper surfaces of the third connection member, and upon engagement between the second and third connection members, the upper wall is preferably inserted in the first connection opening to block the first connection opening from the outside.

Accordingly, relative rotation of the second and the third connection members can be resiliently controlled.

The suction head may include a pair of suction holes in the bottom surface thereof which oppose the surface being cleaned, and a connection recess disposed in the bottom surface in abutment with the pair of suction holes.

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The suction head may include a pair of inner flow passages formed in the suction head to connect the pair of suction holes to a pair of first connection members. The pair of inner flow passages are preferably isolated from each other in the suction head.

The suction head may include one or more suction holes formed along an edge of the suction head in fluid communication with the connection recess.

By drawing contaminants in through the side of the suction head in addition to the front, contaminants, even in the crevice and corner areas, can be efficiently cleaned.

Brief Description of the Drawings

By way of example only, a specific embodiment of the present invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 is an exploded perspective view of a conventional vacuum cleaner;

FIG. 2 is a side elevational view in section illustrating a conventional suction head of the conventional vacuum cleaner illustrated in FIG. 1, showing the assembly in operation;

FIG. 3 is a perspective view of a suction port assembly according to an embodiment of the present invention;

FIG. 4 is a side elevational view of the suction port assembly illustrated in FIG. 3,

showing the assembly moving between positions;

FIG. 5 is an exploded perspective view of a bottom side of a suction head of the suction port assembly illustrated in FIG. 3;

FIG. 6 is an exploded perspective view of an articulated portion of the suction port assembly illustrated in FIG. 3; and

FIG. 7 is a side elevational view in section of the suction port assembly illustrated in FIG. 3, showing the assembly in operation.

Detailed Description of the Preferred Embodiments

The present invention will be described in greater detail with reference to the accompanying drawings.

The matter defined in the description, such as the detailed construction and elements, are provided only to assist in a comprehensive understanding of the invention. Thus, it is apparent that the present invention can be carried out without such defined matter. Also, well-known functions or constructions are not described in detail.

Referring to FIGS. 3 and 4, a suction port assembly 200 of a vacuum cleaner according to an embodiment of the present invention includes a suction head 210 and an articulated portion 250.

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The suction head 210 draws in dust from a surface being cleaned, and as shown in FIG. 5, includes a pair of spaced suction holes 213, an inner partition 218, a connection recess 215, and a suction groove 217. A member 230 is a bumper which decreases impact of the suction head 210 with obstacles during operation of the vacuum cleaner.

The pair of spaced suction holes 213 are located in the bottom surface 211 of the suction head 210. Because there are a pair of suction holes 213, rather than a single hole, a distance D1 between the suction groove 217 at the side of the suction head 210 and the suction holes 213 is reduced, thereby increasing cleaning efficiency.

The connection recess 215 is formed by the bottom surface of the suction head 210 between the suction holes 213. Accordingly, a suction area covered by the suction holes 213 increases to the range of the connection recess 215.

A plurality of suction grooves 217 are dispersed along the side of the suction head 210, in abutment with the connection recess 215. Contaminants are drawn in through the suction grooves 217 and passed through the connection recess 215 and guided to the suction holes 213. The suction grooves 217 draw in both the contaminants on the surface being cleaned and also the contaminants piled in front or to the sides of the suction head 210, thereby improving cleaning efficiency.

The inner partition 218 is formed inside the suction head 210 and defines in the interior of the suction head 210 inner passages 219 which connect the suction holes 213 to a first connection member 260. Air drawn in through the suction holes 213 can flow to a

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second connection member 270. Flow deterioration of the air drawn in through the suction holes 213 is prevented in the suction head 210, thereby improving effieiency.

The articulated portion 250 connects the suction head 210 with the extension pipe 125 (FIG. 1) and allows the suction head 210 to rotate about a plurality of axes X and Y (FIG. 3). As shown in FIGS. 3 and 4, the articulated portion 250 rotates about the first axis X with the suction head 210, and rotates about the second axis Y in a transverse direction with respect to the suction head 210. The articulated portion 250 includes the first and the second connection members 260 and 270, and a third connection member 280.

Referring to FIGS. 5 and 6, one or more of the first connection members 260 extend rearwardly from the suction head 210. Each of the first connection members 260 has an entrance end 261 connected to the inner passage 219 defined inside the suction head 210, and a tubular exit end 263 which is connected to the second connection member 270. The number or shape of the first connection member 260 can be modified as long as the inner passages 219 are connected with the second connection member 270. Preferably, a pair of the first connection members 260 are formed in register with the pair of suction holes 213. The tubular exit ends 263 of each of the first connection members 260 are formed opposite one another such that the second connection member 270 is engaged with the first connection members 260 in a rotatable manner about the first axis X.

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One end of the second connection member 270 is connected to the tubular exit ends 263 of the first connection members 260 in a rotatable manner with respect to the first axis X (FIG. 3), while the other end thereof is removably connected to the extension pipe 125 (FIG.1) through the third connection member 280. The first axis X is substantially parallel with respect to the length of the suction head 210 which is substantially perpendicular with respect to the advancing direction of the suction head 210, and also parallel with respect to the surface being cleaned. Accordingly, the articulated portion 250 is movable up and down with respect to the suction head 210. The second connection member 270 includes a first cover 271 and a second cover 275. The second connection member 270 also has a space in which the air from the first connection members 260 can flow when the first and the second covers 271 and 275 are connected with each other. The first cover 271 constitutes the upper wall of the second connection member 270. The first cover 271 also has recesses 272 formed on opposite sidewalls of the first cover 271 to accommodate a part of each of the tubular exit ends 263 of the first connection members 260, and a first connection boss 273 extends from the inner sidewall of the first cover 271 opposite to the third connection member 280. The first connection boss 273 has a screw-threaded hole 273a approximately at a center portion thereof, and a stopper protrusion 274 that extends from the outer circumference at the boss 273.

The second cover 275 forms the lower wall of the second connection member 270. The second cover 275 includes recesses 276 formed oppositely on opposite sidewalls of second connection member 270 to accommodate a part of each of the tubular exit end 263 of the first connection members 260. When the first and the second covers 271 and

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275 are engaged with each other, with the first connection members 260 interposed there between, the recesses 272 and 276 form entrance ends which correspond to the tubular exit ends 263 of the first connection members 260. The second cover 275 has a first connection opening 278 at its other end near the third connection member 280, which enables rotation of the second cover 275 about the second axis Y with the third connection member 280, and is in fluid communication with the second connection opening 282 of the third connection member 280. When the first and second covers 271 and 275 are engaged with each other, the first connection boss 273 is disposed within the first connection opening 278.

The third connection member 280 includes a third cover 281 and a fourth cover 288. The third connection member 280 is rotatably connected about the second axis Y with respect to the second connection member 270 at one end, and disengageably connected with the extension pipe 125 (FIG. 1) of the extended flow passage 120 (FIG. 1) at the other end. An upper wall 286 is formed on one end of the third cover 281, in rotatable engagement with the second connection member 270 via the first connection opening 278 of the second connection member 270, and a tubular connector 284 is disengageably connected with the extension pipe 125. When the third and the fourth covers 281 and 288 are engaged with each other, the entrance end 284a of the tubular connector 284 is blocked and a space is defined in the third connection member 280 through which air moves. When the second and third connection members 270 and 280 are engaged with each other, the second connection opening 282 is formed in the upper wall 286, in connection with the first connection opening 278. As shown in FIG. 7, air is drawn in through the suction holes 213 of the suction head 210 and passes through

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the inner passages 219 in the suction head 210, the first and second connection members 260 and 270, and flows into the third connection member 280. From the third connection member 280 air flows to the extended flow passage 120 (FIG. 1) through the tubular connector 284, and into the cleaner body 110 (FIG. 1). A second connection boss 283 extends downwardly from the upper wall 286, corresponding to the first connection boss 273 of the second connection member 270. A screw-piercing hole 286a (FIG. 6) is formed approximately at the center of the upper wall 286 which opposes the upper end of the second connection boss 283. The screw-piercing hole 286a aligns with the fastening hole 273a. The second connection boss 283 has a fastener seating recess 283a on which a screw fastener 291 is seated. The second and third connection members 270 and 280 are engaged by inserting the screw fastener 291 into the fastener seating recess 283a, through the screw-piercing hole 286a and engages the threads of screw-threaded hole 273a. The screw fastener 291 and the screw-threaded hole 273a are formed such that a gap is defined therebetween, allowing the second and third connection members 270 and 280 to rotate smoothly with respect to each other.

The articulated portion 250 restricts relative rotation of the second and third connection members 270 and 280 about the second axis Y at a predetermined position. This prevents the inconvenience of the suction head 210 rotating freely about the second axis Y. To this end, the second and third connection members 270 and 280 each have a stopper protrusion 274, a stopper hole 287 and a spring 290.

As shown in FIG. 5, the stopper protrusion 274 extends from the outer circumference of the first connection boss 273. The stopper hole 287 is, as shown in FIG. 6, located in the

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upper surface of the upper wall 286 of the third connection member 280 adjacent to the second connection opening 282 and the screw-piercing hole 286a. Both the stopper protrusion 274 and the stopper hole 287 face each other when the third connection member 280 rotates with respect to the second connection member 270 in parallel relation with respect to the advancing direction of the suction head 210. When the stopper protrusion 274 and the stopper hole 287 face each other, the spring 290 urges the third connection member 280 upwardly for insertion into the stopper hole 287. The spring 290 is disposed in the fastener seating recess 283a of the second connection boss 283, and compressed toward the upper wall 286 by the screw fastener 291 which is engaged in the screw-threaded hole 273a. In order to prevent air leakage due to the movement of the third connection member 280 through the junctions between the second and third connection members 270 and 280, the upper wall 286 extends beyond the upper surface of the third connection member 280 by a predetermined distance D2 (FIG. 6). The upper wall 286 of the third connection member 280 is inserted in the second screw-piercing hole 286a when the second and third connection members 270 and 280 are engaged with each other, and the third connection member 280 is moved within the predetermined distance D2 as the height of the upper wall 286 allows.

In the suction port assembly 200, the first connection members 260 are depicted as extending rearwardly from the suction head 210. However, other variations are also possible. For example, the first connection members 260 can extend upwardly from the suction head 210, and can be formed in tubular or duct shape.

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Because the suction head 210 is rotatably connected to the extension pipe 125 in a plurality of directions, a wide range of areas including crevice and corner areas can be easily cleaned.

Additionally, because the upward and downward rotation of the suction head 210 is smoother, the operator can perform a cleaning operation with various, convenient postures. Also, suction degradation in association with the rotation angle of the suction head 210 is prevented.

Also, since the vacuum cleaner can collect contaminants pushed by the movement of the suction head 210 to the crevice areas, for example, through the suction holes, a higher cleaning efficiency is obtained.

The present teaching can be readily applied to other types of apparatuses. Also, the description of the present invention is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

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CLAIMS

1. A suction port assembly of a vacuum cleaner for drawing in air and dust from a surface being cleaned when the vacuum cleaner is in operation, the suction port assembly being connected in fluid communication with a cleaner body through an extended flow passage which includes at least one of an extension pipe and an extension hose, the suction port assembly comprising:

a suction head having a suction hole formed at a bottom surface thereof opposite to the surface being cleaned;

a first connection member extending from one side of the suction head; and

having an exit end connected in fluid communication with the suction hole;

a second connection member rotatably connected at one end to the exit of the first connection member and rotatable about a first axis to move upwardly and downwardly with respect to the suction head;

a third connection member connecting the second connection member to the extended flow passage in fluid communication therewith and being rotatable with respect to the second connection member about a second axis which is substantially perpendicular to the first axis,

wherein the second connection member includes a first connection opening connected in fluid communication with the suction hole at the end which is connected with the third connection member; and a first connection boss extends from the inner sidewall of the second connection member toward the first connection opening, and has a connection hole at a lower end thereof, and

wherein the third connection member includes an upper wall having a second connection opening connected to the first connection opening when the second and third connection members are engaged with each other; and a hole located adjacent to the second connection opening to oppose the connection hole, and

wherein the second connection member and the third connection member are

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rotatably connected by a fastener connected to the connection hole through the hole of the third connection member.

2. The suction port assembly of claim 1, wherein the second axis is substantially parallel to a normal line of the surface being cleaned, when the second connection member is substantially parallel to the surface being cleaned.

3. The suction port assembly of claim 1 or claim 2, wherein the fastener comprises a screw fastener which screws into the connection hole and wherein the third connection member includes a second connection boss extending from the inner side of the upper wall toward the inside of the third connection member, and has a fastener seating hole for receiving a head portion of the screw fastener that engages the connection hole.

4. The suction port assembly of any of claims 1 to 3, wherein a stopper protrusion and a stopper hole are formed on an end of the first connection boss and an upper surface of the upper wall, respectively,

and the stopper protrusion and the stopper hole face each other when the third connection member is rotated to a predetermined position with respect to the second connection member.

5. The suction port assembly of claim 4 when dependant on claim 3, wherein a coil spring is disposed in the fastener seating hole of the second connection boss, the coil spring being supported by the upper wall at an upper end, and supported by the screw fastener at a lower end, and resiliently urges the upper wall of the third connection member towards the second connection member.

6. The suction port assembly of any of claims 1 to 5, wherein the upper wall is

angled with respect to an upper surface of the third connection member, and upon engagement between the second and third connection members, the upper wall is inserted in the first connection opening to block the first connection opening.

7. The suction port assembly of any of claims 1 to 6, wherein the suction head includes a pair of suction holes in the bottom surface thereof which opposes the surface being cleaned, and a connection recess disposed in the bottom surface in abutment with the pair of suction holes.

8. The suction port assembly of claim 7, wherein the suction head includes a pair of inner flow passages formed in the suction head to connect a pair of suction holes to a pair of first connection members, with the pair of inner flow passages being isolated from each other in the suction head.

9. The suction port assembly of claim 7 or claim 8, wherein the suction head includes one or more suction grooves formed along an edge of the suction head in fluid communication with the connection recess.

10. A suction port assembly substantially as herein described with reference to, and as illustrated in, Figs. 3 to 7 of the accompanying drawings.

11. Vacuum cleaner substantially as herein described, with reference to, and as illustrated in, Figs 3 to 7 of the accompanying drawings.

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[Continued on next page]

(54) Title: A VACUUM CLEANER

(57) Abstract: A vacuum cleaner (1) of the stick-vac type, comprising a handheld vacuum cleaner (3) which is attached to an elongate, rigid wand (5) and which is fluidly connected to a cleaner head (7) provided at the end of the wand (5). The cleaner head (7) is connected to the wand (5) via a mechanical steering couple (25) for directionally steering the cleaner head (7) in plane parallel contact with the floor as the wand (5) is rotated about its axis.

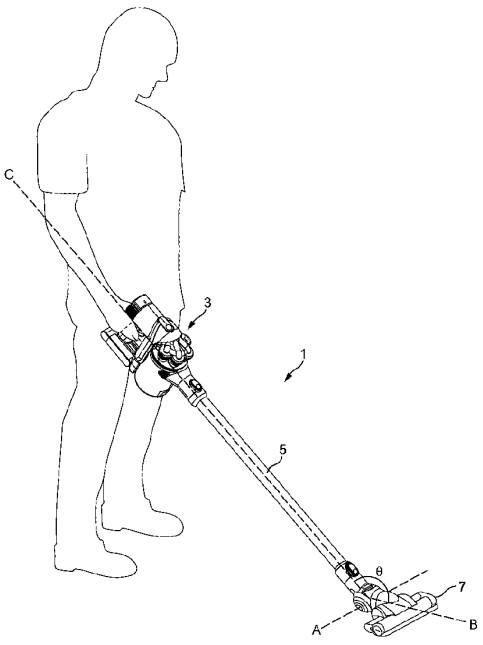


FIG. 4

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ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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A Vacuum Cleaner

The present invention relates to the field of vacuum cleaners, and more specifically to "stick-vac" type vacuum cleaners of the general type comprising a handheld vacuum cleaner which is attached to an elongate, rigid wand and which is fluidly connected to a cleaner head provided at the end of the wand.

Broadly speaking, there are four types of vacuum cleaner: "upright" vacuum cleaners, "cylinder" cleaners (also referred to as "canister" cleaners), "handheld" vacuum cleaners and "stick" vacuum cleaners, the latter being popularly referred to as "stick-vac" cleaners, or simply "stick-vacs".

Upright cleaners and cylinder cleaners are well known. They tend to be mains-operated and are used for relatively heavy-duty cleaning applications.

Handheld vacuum cleaners are relatively small, highly portable vacuum cleaners, best suited to relatively low duty applications such as spot cleaning floors and upholstery in the home, interior cleaning of cars and boats etc. Unlike upright cleaners and cylinder cleaners, they are designed to be carried in the hand during use, and tend to be battery-operated.

Stick-vac cleaners essentially offer a lightweight, functional alternative to upright cleaners for relatively low duty floor-cleaning applications, such as cleaning up floor spills.

Broadly speaking, there are two distinct types of stick-vac. The first type is, in a sense, an ultra slim-line upright cleaner, though usually "cordless" rather than mains-operated. An example of this type of stick-vac cleaner is shown in UK Patent Application No.

GB2377880A1, in this case additionally incorporating a removable, handheld vacuum-cleaner.

The second type of stick-vac cleaner is a spin-off from the handheld vacuum cleaner, and comprises a handheld vacuum cleaner in combination with a rigid, elongate suction wand which effectively reaches down to the floor so that the user may remain standing while cleaning a floor surface. A floor tool is typically fixedly attached to the end of the rigid, elongate suction wand, or alternatively may be integrated with the bottom end of the wand. Designs of this type of stick-vac cleaner are shown in USD298875, USD303173 and USD280033. In each case, the handheld suction unit incorporates the motor, the fan and some sort of separating apparatus, which may be a bag or a cyclonic separation system.

The present invention relates to stick vac cleaners of the second type. In the case of these stick vac cleaners, the wand and floor tool are typically conceived and marketed as low-cost accessories for a handheld vacuum cleaner, and as such the functionality of the cleaner in stick vac mode tends to be relatively poor compared to dedicated stick vac cleaners of the first type.

It is an object of the present invention to seek to provide an improved stick vac cleaner of the second general type described above.

According to the present invention there is provided a stick-vac cleaner comprising a handheld vacuum cleaner which is attached to an elongate, rigid wand and which is fluidly connected to a cleaner head provided at the end of the wand, wherein the cleaner head is connected to the wand via a mechanical steering couple for directionally steering the cleaner head in plane parallel contact with the floor as the wand is rotated about its axis.

By providing a mechanical steering couple between the wand and cleaner head according to the present invention, the manoeuvrability of the stick-vac cleaner is

greatly improved compared to conventional stick-vac cleaners of the second general type..

Any suitable mechanical steering couple may be used. In particular, the mechanical steering couple may be configured to constrain the wand and the cleaner head for co-rotation about the wand axis whilst permitting relative rotation of the wand and cleaner head about an axis which is non-parallel to the wand axis. This type of steering couple can be implemented relatively cheaply, whilst still providing a high degree of manoeuvrability for the cleaner.

The wand and the cleaner head may be coupled for relative rotation along a rotatable scarf joint or via an elbow joint. The use of a scarf joint is considered to be particularly advantageous, in that it provides a mechanical turning advantage for the cleaner head during steering.

The wand may be hingedly connected to the cleaner head passively for varying the lie angle between the wand and the cleaner head. A variable lie angle helps maintain the cleaner head in contact with the floor across a relatively wide range of turning angles during steering of the cleaner head. Here, the term "lie angle" is somewhat analogous to the lie angle between the sole of a golf club head and the shaft of the club.

In the case where the wand and cleaner head are coupled by an elbow joint, this elbow joint may be a hinged elbow joint for varying the lie angle between the cleaner head and the wand.

The dust-laden air may be ducted to the handheld vacuum cleaning unit through the wand. The wand thus advantageously serves the dual purpose of fluidly connecting the cleaner head to the hand held vacuum cleaner whilst also transmitting steering torque to the cleaner head.

The handheld vacuum cleaner may comprise a pistol grip handle. The provision of a pistol grip handle on the handheld vacuum cleaner is considered to be particularly advantageous in a stick-vac cleaner according to the present invention, because it tends to align a user's forearm with the wand (the wand being analogous to the barrel of a pistol). Consequently, steering of the cleaner can be controlled primarily through supination and pronation of the forearm, which is comfortable and natural for the user.

A pistol grip handle also provides good leverage for effective transmission of steering torque between the handle and the cleaner head (via the wand), and in particular reduces the tendency for a user's hand to roll "over the top" of the handle as the handle is rotated to steer the cleaner head. The provision of a straight pistol grip which extends perpendicular to the wand is considered to be particularly beneficial in this regard.

The provision of a pistol grip handle does not make it essential to use a trigger, though use of a trigger may of course be convenient, for example to switch the handheld cleaner on and off.

The handheld vacuum cleaner will comprise some form of motor, which will be a relatively heavy component in the handheld vacuum cleaner. Advantageously, this motor may be positioned at or near the upper end of the pistol grip, so that the weight of the motor may be supported more comfortably on top of the user's hand.

The handheld vacuum cleaner may incorporate a cyclonic separation system, in which case the wand may be axially aligned with a tangential inlet to the cyclonic separation system. The dirty air thus feeds directly into the cyclonic separation system along the preferred inlet axis. This reduces "discontinuity" pressure losses between the wand and the separation system, which is particularly advantageous in the present case because of the relatively high pressure drop across the ends of the (relatively long) wand.

Embodiments of the invention will now be described, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view showing a stick vac cleaner in use;

Figure 2 is a close-up perspective view of part of the stick-vac cleaner in Figure 1;

Figure 3 is a perspective view of a floor tool forming part of the stick-vac cleaner shown in Figure 1;

Figure 4 is a view corresponding to Figure 1, but illustrating various operational axes of rotation associated with steering the stick-vac cleaner across the floor;

Figure 5 is a perspective view showing an alternative floor tool which may form part of a stick vac cleaner in accordance with the invention; and

Figure 6 is a cross-sectional side view of the tool shown in Figure 5.

Figure 1 shows a stick-vac cleaner 1 in use, comprising a handheld vacuum cleaner 3 which is carried in the hand, an elongate wand 5 attached to the handheld cleaner 3 and which reaches down to the floor and a cleaner head 7 provided at the end of the wand 5, which makes contact with the floor (the floor itself, though implicit, is not explicitly shown in Figure 1).

Referring to Figure 2, the handheld vacuum cleaner 3 comprises a motor-driven fan which is arranged inside a motor casing 9 for drawing air in through a suction nozzle 11 positioned at the front of the hand held vacuum cleaner 3. The elongate wand 5 is connected to the suction nozzle 11, and the cleaner head 7 is in turn connected to the lower end of the wand 5. In use, dirty air is drawn in through a suction opening 12 (Figure 3) on the underside of the cleaner head 7 and is ducted to the suction nozzle 11 on the handheld vacuum cleaner 3, through the wand 5.

Dirty air entering the suction nozzle 11 passes through a cyclonic separation system 13, where dirt is separated from the air, before the relatively clean air is then exhausted back to atmosphere via one or more fine-particulate filters (not visible). The dirt which is separated from the airflow inside the cyclonic separating system 13 is collected in a bin 15 for disposal. The hand held vacuum cleaner 3 is powered by a multi-cell rechargeable battery which is housed in a battery pack 17.

The cleaner head 7 forms part of a floor tool 19 which is detachable from the wand 5 by means of a catch 21. The wand 5 is in turn detachable from the handheld cleaner 3 by means of a catch 23. The handheld cleaner 3 can thus be used in isolation as a stand-alone handheld vacuum cleaner by detaching the wand 5 or, alternatively, the handheld vacuum cleaner 3 and wand 5 can be used in combination as a "long reach" handheld vacuum cleaner by detaching the floor tool 19. The use of a detachable floor tool is not essential: for example, the cleaner head 7 may be permanently secured to the wand 5.

The floor tool 19 is shown in more detail in Figure 3, detached from the wand 5.

The floor tool 19 comprises an articulated neck portion 25 which acts as a mechanical steering couple between the wand 5 and the cleaner head 7.

The neck portion 25 comprises a front part 27, the front end of which is connected to the cleaner head 7, and a rear part 29, the rear end of which incorporates the catch 21 for detachable connection to the wand 5. The front part 27 is pivotally connected to the rear part 29, so that the front an rear parts 27, 29 are constrained for relative movement about an axis A. The front and rear parts 27, 29 thus effectively form a hinged elbow joint which allows for variation in the lie angle θ between the cleaner head 7 and wand 5 when the floor tool is connected to the wand 5 (see Figure 4). Thus, the lie angle is adaptable to suit the height of the particular user and, in use, the cleaner can be moved into a lower profile orientation, as desired, for example to clean underneath a bed.

A flexible duct in the form of a hose 31 extends through the articulated neck portion 25. The hose 31 flexibly connects the cleaner head 7 to the end of the wand 5 in use so as not to hinder articulation of the neck portion 25 about the axis A.

The front end of the front part 27 is shaped as a cylindrical collar 27a. This cylindrical collar 27a is connected to the cylindrical end of a rear outlet duct 7a on the cleaner head 7 by a conventional circlip or snap ring arrangement (not visible in Figure 3) which constrains the cleaner head 7 and front part 27 for relative rotation about the axis B of the cylindrical collar 27a. A conventional gasket arrangement (not shown) can be used to form a compression seal between the cleaner head 7 and the neck portion 25; this seal should preferably be a low-friction seal (for example using a PTFE-coated gasket), so as not to hinder free rotation of the cleaner head 7 relative to the neck portion 25.

The neck portion 25 functions as a steering couple by constraining the cleaner head 7 and wand 5 for co-rotation about the wand axis C, whilst nevertheless permitting relative rotation of the cleaner head 7 and the front part 27 about the axis B, which in use is non-parallel to the axis C (see Figure 4). Accordingly, steering of the cleaner head 7 can be controlled by rotating the wand 5 about the wand axis C to direct the cleaner head 7 in the desired direction. As the wand rotates about the axis C, co-rotation of the cleaner head 7 with the wand 5 and relative rotation of the collar 8 and rear outlet duct 7a combine to turn the cleaner head 7 in plane parallel contact with the floor, so that the cleaner head 7 does not bank about the axis B as it turns. Hinging movement of the wand 5 and cleaner head 7 about axis A may also help to maintain the cleaner head 7 in plane parallel contact with the floor, particularly for large turning angles, though this hinging movement is not considered essential to obtain the benefit of directional steering.

A pair of domed wheels 33 is provided on the front part 27. The domed wheels 33 are mounted on stub axles (not visible) either side of the neck portion 25. These stub axles are each angled downwardly to set the respective wheel at a corresponding fixed, positive camber angle. This camber angle is the same for each of the wheels 33, so that

the wheels form a "V" when viewed from the front. As the wand 5 is rotated about the wand axis C, the dome-shaped wheels 33 bank accordingly to maintain rolling contact with the floor. The dome-shaped wheels 33 are thus better able to track through the turn than conventional "flat-sided" wheels.

The handheld vacuum cleaner 3 is provided with a pistol grip handle 35 (see Figure 2), which tends to position a user's forearm parallel to the wand 5. Consequently, steering of the cleaner 1 can be controlled primarily through supination and pronation of the forearm, and is therefore natural and comfortable for the user. A pistol grip also provides good leverage for effective transmission of steering torque from the handle 35 to the cleaner head 7 (via the wand 5 and neck portion 25), and in particular reduces the tendency for a user's hand to roll "over the top" of the handle as the handle is rotated to steer the cleaner head 7.

The motor casing 9 is provided at the upper end of the pistol grip handle 35. Consequently, the weight of the motor inside the motor casing 9 is comfortably supported on top of a user's hand during use of the cleaner 1.

Figure 5 shows an alternative floor tool 190 which may be connected to the wand 5 in accordance with the invention to provide a mechanical steering couple between the wand 5 and a cleaner head.

The floor tool comprises an articulated neck portion 250 which incorporates a front duct part 270 and a rear duct part 290. The front duct part 270 is fluidly connected to a cleaner head 70. The rear duct part 290 is configured to push fit onto the wand 5 (the end of the wand may need to be modified accordingly to accommodate the push fit).

The front duct part 270 is pivotally connected to the cleaner head 70 so that the front part 270 and cleaner head 70 are constrained for rotation about an axis D. This allows for variation of the lie angle between the wand 5 and the cleaner head 70 in use.

The front duct part 270 is connected to the rear duct part 290 by a rotatable scarf joint 300, which constrains the front duct part 270 and rear duct part 290 for rotation about an axis E, non-parallel with the longitudinal axis of the rear duct part 290.

The front duct part 270 and rear duct part 290 together form an air duct for fluidly connecting the cleaner head 70 to the wand 5 in use.

The neck portion 250 acts as a mechanical steering couple between the wand 5 and the cleaner head 70 in similar manner to the neck portion 25. Thus, the neck portion 250 is arranged to constrain the wand 5 and cleaner head 70 for co-rotation about the wand axis C whilst, nevertheless, permitting relative rotation of the wand 5 and cleaner head 70 about the axis E. Accordingly, as the wand 5 is rotated about the wand axis C, co-rotation of the cleaner head 7 with the wand 5 combines with relative rotation of the front part 270 and rear part 290 to turn the cleaner head 7 in plane parallel contact with the floor.

The axis E is non-parallel with the floor, so that relative rotation of the front and rear parts 17, 19 about the axis E involves both a horizontal and vertical component (cf. relative rotation about the axis B in Figure 4, which is solely in a vertical plane). Consequently, relative rotation of the front part 270 and rear part 290 not only counteracts undesirable banking of the cleaner head during steering, but also provides an associated mechanical advantage in turning the cleaner head 70 left or right, further improving manoeuvrability.

Air drawn in through the suction opening on the cleaner head need not be ducted through the wand. For example, the air may be ducted through a flexible hose running alongside the wand; in this arrangement, the wand would nevertheless couple to the cleaner head in similar manner for providing the necessary directional steering capability, so the wand would still physically connect the cleaner head to the handheld vacuum cleaner, but the wand itself need not be hollow.

A stick-vac cleaner according to the present invention, examples of which have been described, is considered to offer significantly better manoeuvrability than existing "stick- vacs" of the same general type, bringing the functionality of this type of stick-vac more into line with the stick-vac cleaners of the first general type described above.

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CLAIMS

1. A stick-vac cleaner comprising a handheld vacuum cleaner which is attached to an elongate, rigid wand and which is fluidly connected to a cleaner head provided at the end of the wand, wherein the cleaner head is connected to the wand via a mechanical steering couple for directionally steering the cleaner head in plane parallel contact with the floor as the wand is rotated about its axis.

2. A stick-vac cleaner according to claim 1, wherein, in use, the mechanical steering couple constrains the wand and the cleaner head for co-rotation about the wand axis whilst permitting relative rotation of the wand and cleaner head about an axis which is non-parallel to the wand axis.

3. A stick-vac cleaner according to any preceding claim, in which the cleaner head and wand are coupled for relative rotation along a scarf joint or via an elbow joint.

4. A stick-vac cleaner according to any preceding claim, in which the wand is hingedly connected to the cleaner head for varying the lie angle between the wand and the cleaner head.

5. A stick vac cleaner according to claims 3 and 4, wherein the cleaner head and wand are coupled by a hinged elbow joint for varying the lie angle between the cleaner head and the wand.

6. A stick-vac cleaner according to any preceding claim, wherein the handheld vacuum cleaner comprises a pistol grip handle.

7. A stick-vac cleaner according to claim 6, wherein the pistol grip handle is substantially straight.

8. A stick-vac cleaner according to claim 6 or 7, wherein the pistol grip handle extends substantially perpendicular to the wand.

9. A stick-vac cleaner according to any of claims 6 to 8, wherein the handheld vacuum cleaner comprises a motor which is positioned at or near the upper end of the pistol grip handle.

10. A vacuum cleaner according to claim any preceding claim, wherein the handheld vacuum cleaning unit incorporates a cyclonic separation system.

11. A vacuum cleaner according to claim 10, wherein the wand is axially aligned with a tangential inlet to the cyclonic separation system.

12. A stick-vac cleaner according to any preceding claim, wherein the wand fluidly connects the handheld vacuum cleaner to the cleaner head.

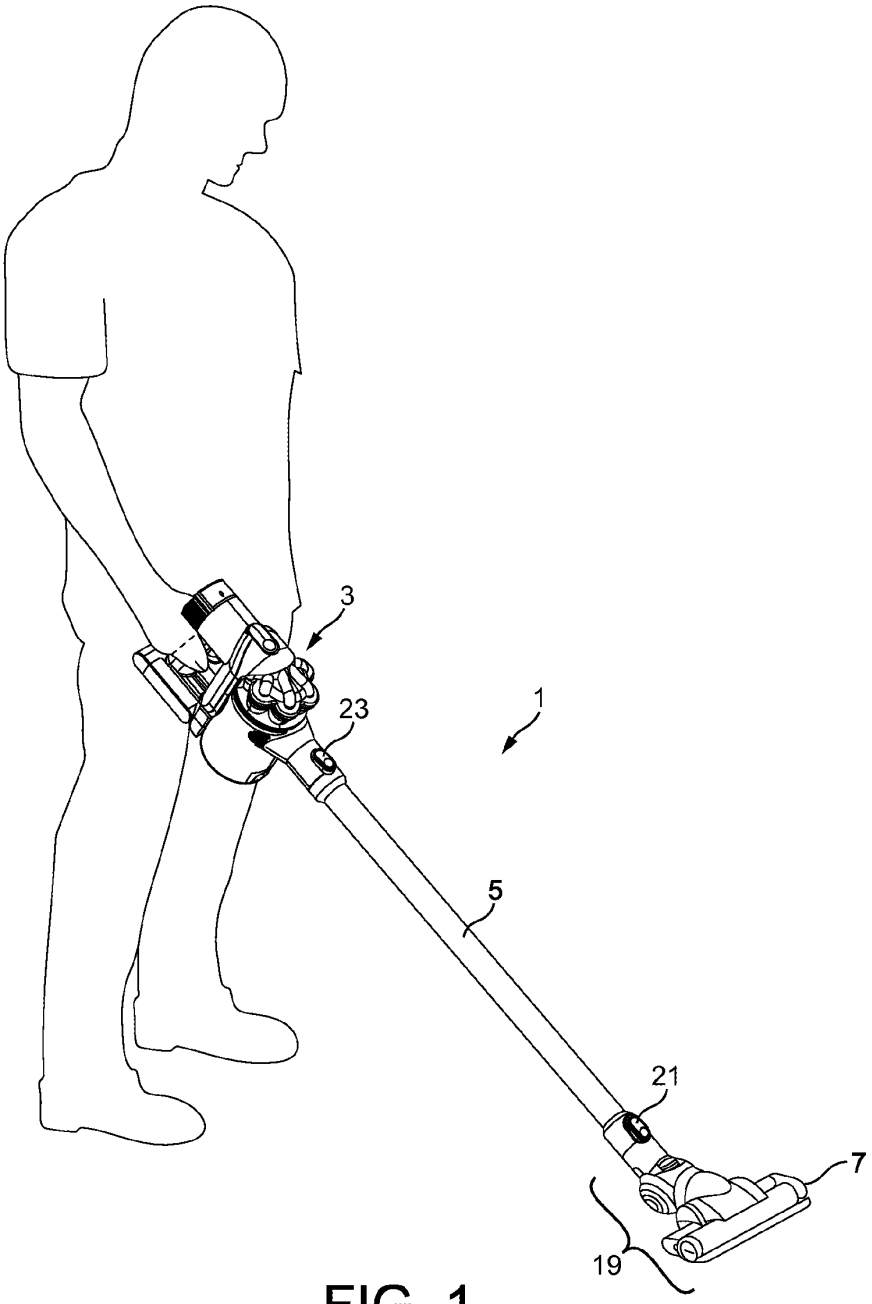


FIG. 1

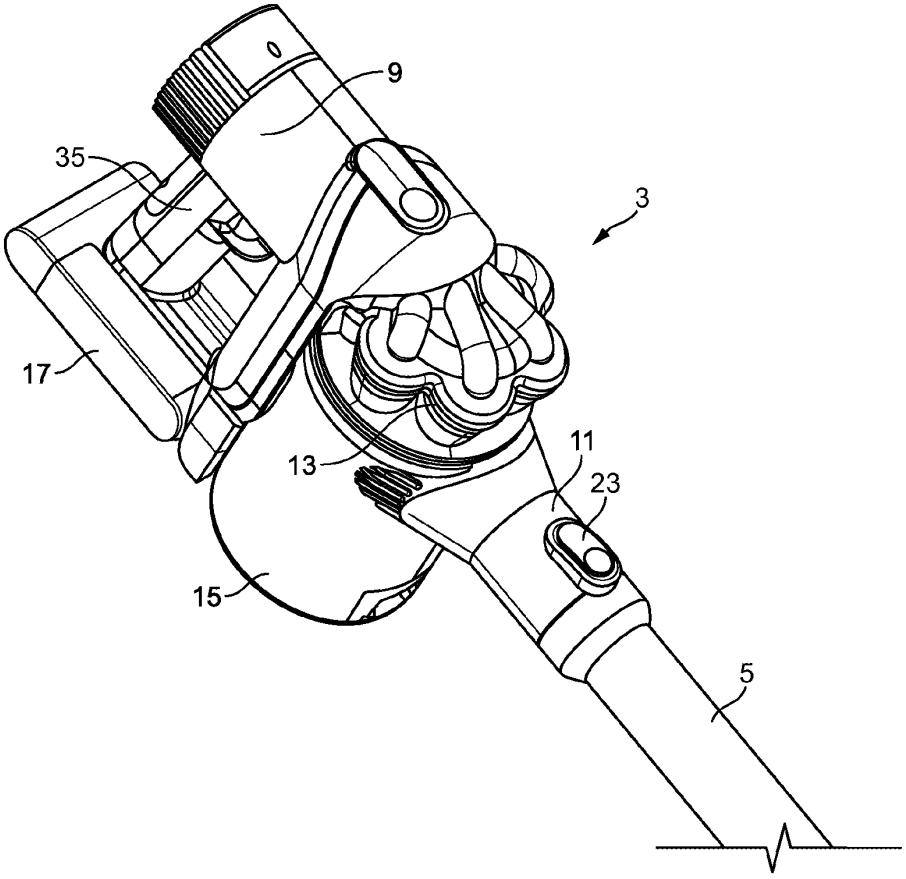


FIG. 2

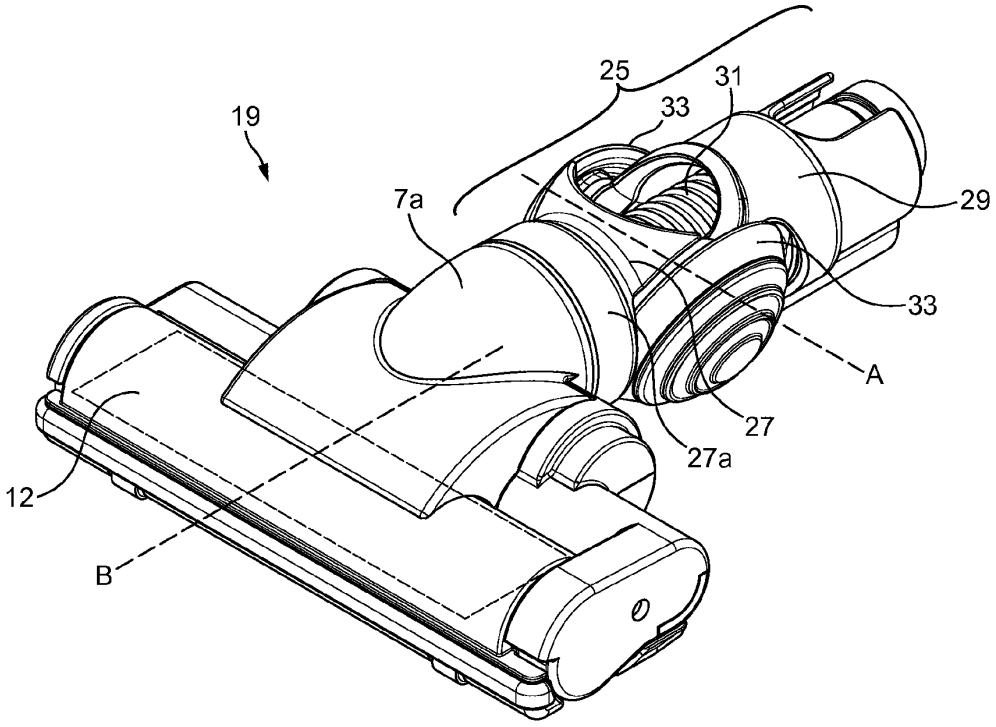


FIG. 3

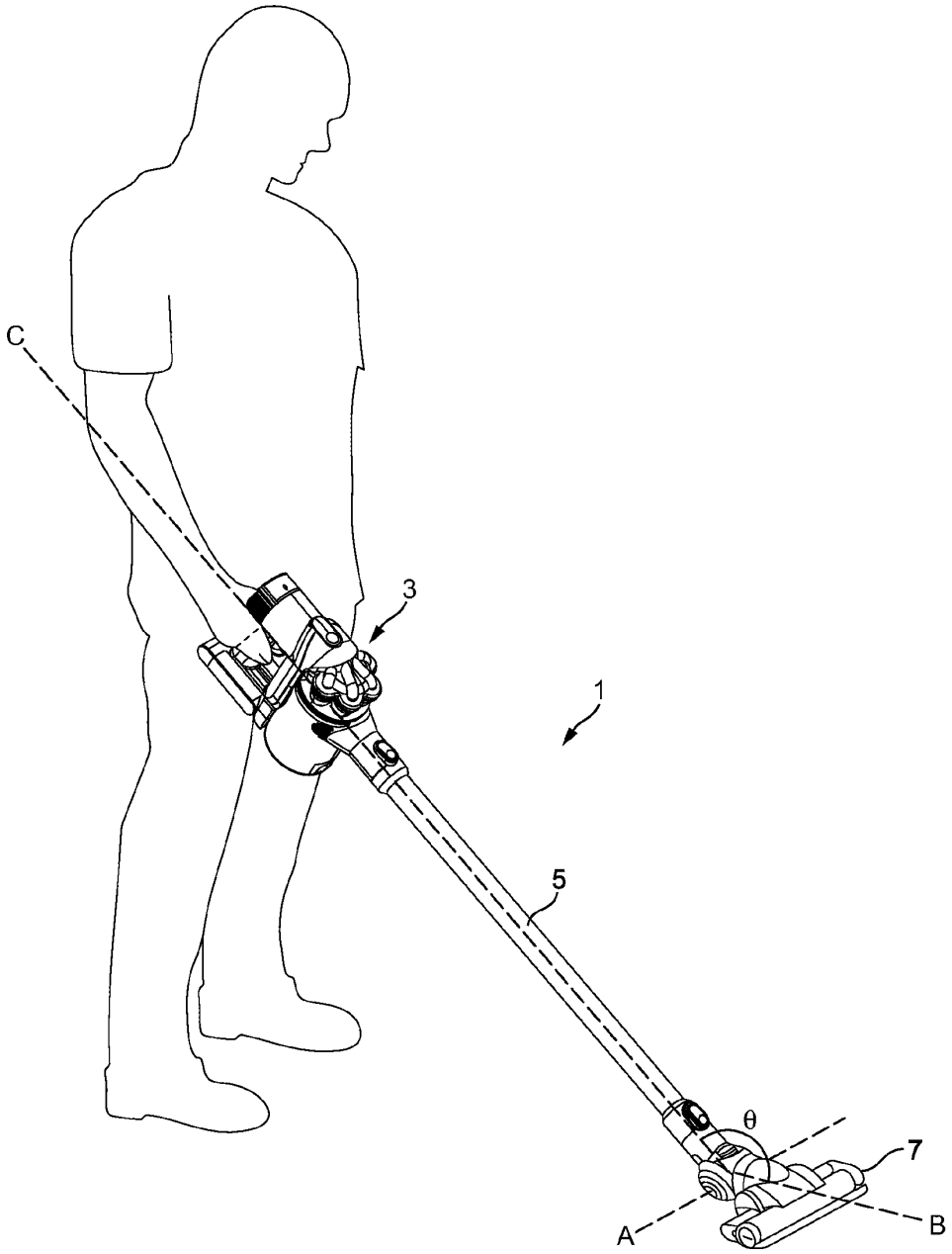


FIG. 4

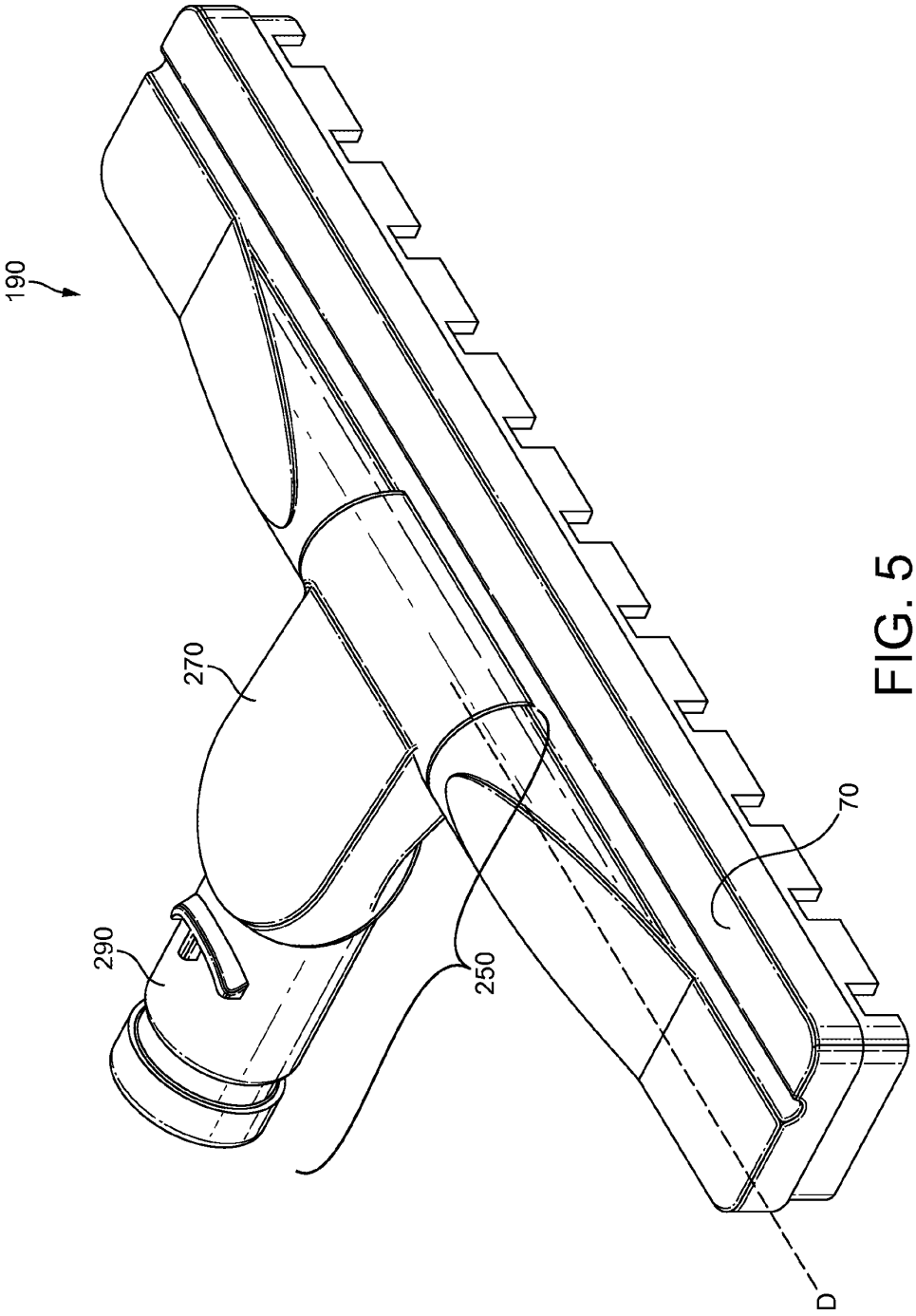


FIG. 5

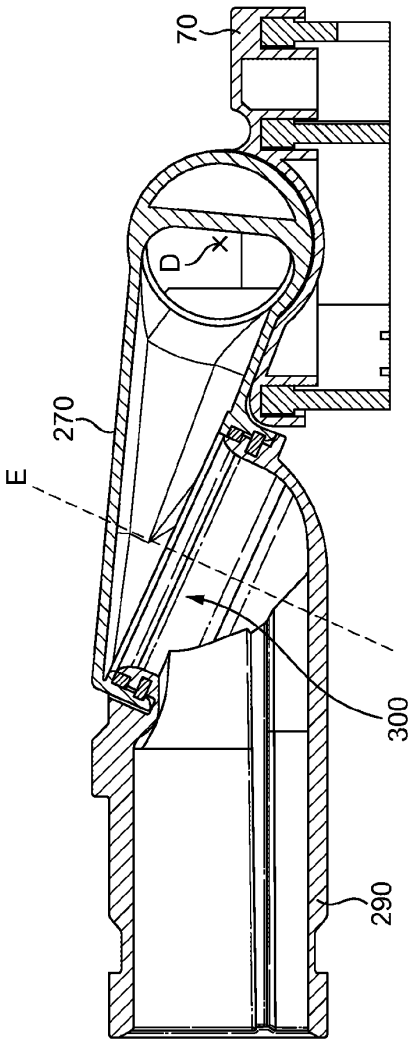


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2011/051697

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L5/24 A47L5/28 A47L9/02 A47L9/24 A47L5/22
ADD.

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)
A47L

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 practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of Box C.

[X] 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

"E" earlier document but published on or after the international filing date

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 December 2011	28/12/2011

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2011/051697

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2009/165242 A1 (LEE BYUNG-JO [KR] ET AL) 2 July 2009 (2009-07-02) paragraphs [0010] - [0022]	1-12

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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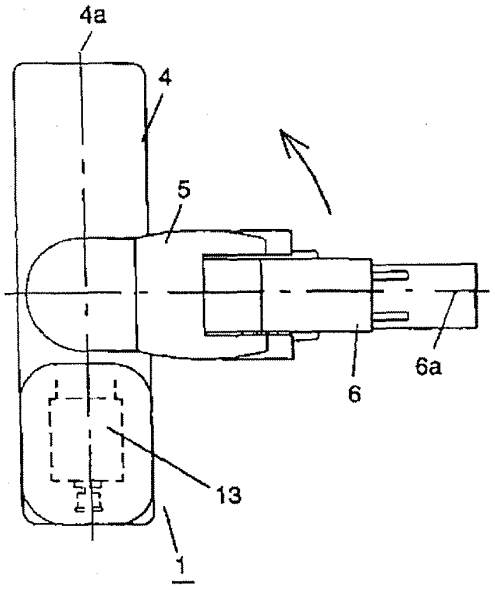
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(54) Vacuum-cleaner suction tool and vacuum cleaner using the same

(57) A vacuum-cleaner suction tool which comprises a sucking portion for sucking up dust on a surface to be cleaned, a joint portion having one end connected to the upper side of the sucking portion and the other end provided with a connection pipe, and an agitator disposed within the sucking portion for scraping dust off the surface, the opening, joint portion, and connection pipe each having a channel portion allowing sucked-up dust to pass therethrough, in which the joint portion is configured to be turnable, relative to the sucking portion, in a direction substantially horizontal to the surface to be cleaned to such an extent that the longitudinal central axis of the sucking portion becomes substantially parallel to the longitudinal central axis of the connection pipe, whereby the forward end of sucking portion, from left to right, can be brought into close contact with wall surfaces so that dust liable to collect at corners can be fully sucked up.

FIG. 2



EP 1 356 755 A2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to an overall structure of an electric vacuum cleaner, and more particularly to an improvement in usability of a suction tool used in the vacuum cleaner.

BACKGROUND OF THE INVENTION

[0002] A structure of conventional suction tool 1 will be described with reference to FIG. 14A and FIG. 14B. As disclosed in Japanese Patent Unexamined Publication No. 2002-102125, by operating handle 16 to apply turning forces thereto in leftward and rightward directions, suction tool 1 attached to the front end of handle 16 is turned around and brought from the state as shown in FIG. 14A into the state longitudinally oriented as shown in FIG. 14B, when viewed from the position of the user doing cleaning with handle 16 held in hand. Therefore, it becomes possible to advance suction tool 1 into a narrow space or to make cleaning at a portion close to a side wall.

[0003] At a position somewhat rearward from sucking portion 4, there is provided supporting portion 7 formed of a roller and the like for keeping sucking portion 4 horizontal to the surface to be cleaned while suction tool 1 is moved back and forth.

[0004] In the described conventional configuration, however, because the turning center of sucking portion 4 is greatly deviated from the center of sucking portion 4 and also because supporting portion 7 described above is needed to be provided at the rear of sucking portion 4, the width of suction tool 1 becomes great when it is oriented in the longitudinal direction and, hence, it has been only the front portion of suction tool 1 that is then reachable into a narrow space.

SUMMARY OF THE INVENTION

[0005] A vacuum-cleaner suction tool is provided which comprises a sucking portion having an opening for sucking up dust on a surface to be cleaned, a joint portion having one end thereof connected with the sucking portion at its upper portion and having the other end provided with a connection pipe, an agitator disposed within the sucking portion for scraping up dust, and a channel portion provided in the opening, the joint portion, and the connection pipe for transporting the sucked-up dust therethrough, in which the joint portion is turnable, relative to the sucking portion, in a direction substantially horizontal to a surface to be cleaned to such an extent that the longitudinal central axis of the sucking portion and the longitudinal central axis of the connection pipe become substantially parallel to each other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a side view of a vacuum-cleaner suction tool showing embodiment 1 of the present invention.

FIG. 2 is a top view of the vacuum-cleaner suction tool.

FIG. 3 is a front view of the vacuum-cleaner suction tool.

FIG. 4 is an internal structural drawing of the vacuum-cleaner suction tool.

FIG. 5 is another side view of the vacuum-cleaner suction tool.

FIG. 6 is another top view of the vacuum-cleaner suction tool.

FIG. 7 is an internal structural drawing of the vacuum-cleaner suction tool viewed from its bottom side.

FIG. 8 is another internal structural drawing of the vacuum-cleaner suction tool viewed from its bottom side.

FIG. 9 is a side view of a vacuum-cleaner suction tool showing embodiment 2 of the present invention.

FIG. 10 is another side view showing the vacuum-cleaner suction tool.

FIG. 11 is a detailed drawing of a sucking portion of the vacuum-cleaner suction tool.

FIG. 12 is a general drawing of a vacuum cleaner showing embodiment 3 of the present invention.

FIG. 13 is another general drawing of the vacuum cleaner.

FIG. 14A is a general drawing of a conventional vacuum-cleaner suction tool.

FIG. 14B is another general drawing of the conventional vacuum-cleaner suction tool.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0007] Embodiments 1 to 3 of the present invention will be described below with reference to the accompanying drawings.

(Embodiment 1)

[0008] Embodiment 1 will be described with reference to FIG. 1 to FIG. 8. FIG. 1 is a side view of a vacuum-cleaner suction tool.

[0009] Sucking portion 4 is provided, on its under side, with opening 12 for sucking up dust. To the upper side of sucking portion 4, one end of joint portion 5 is attached turnably in the direction substantially horizontal to surface to be cleaned 23. To joint portion 5, supporting portion 7 is attached. Supporting portion 7 is provided with roller 17, which has its surface formed of a soft material such as Elastomer, flexible resin such as polypropylene

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and vinyl chloride, or raised blanket and supports joint portion 5 by rolling over surface to be cleaned 23 by being placed in contact with the surface. Joint portion 5 has connection pipe 6 attached to the other end thereof. Incidentally, supporting portion 7 may be attached to connection pipe 6. There is formed channel portion 8 through which dust sucked up at opening 12 is transported to joint portion 5 and further to connection pipe 6.

[0010] FIG. 2, FIG. 3, and FIG. 4 are a top view, a front view, and an internal structural drawing of the vacuum-cleaner suction tool.

[0011] In the portion projecting upwardly from sucking portion 4, there is incorporated electric motor 13. By power of the motor, agitator 14 is rotatively driven via belt 24 so that dust attached to the surface to be cleaned such as a carpet can be forcedly scraped off the surface to be cleaned, and thereby sucking up of dust is performed. Since electric motor 13 is disposed above agitator 14, the width of sucking portion 4, i.e., the size from its front side to rear side, is made small. Further, longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are adapted to be arranged substantially perpendicular to each other.

[0012] FIG. 5 and FIG. 6 are a side view and a top view of the vacuum-cleaner suction tool when the joint portion 5 has turned, relative to the sucking portion 4, in a direction substantially horizontal to the surface to be cleaned such that the longitudinal central axis 4a of the sucking portion 4 and the longitudinal central axis 6a of the connection pipe 6 become substantially parallel to each other.

[0013] Joint portion 5 is attached to sucking portion 4 turnably, relative to the sucking portion, in a direction substantially horizontal to surface to be cleaned 23 to such an extent that longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 become parallel to each other (become coincident with each other, in the case of embodiment 1). Accordingly, by applying a turning force to joint portion 5 relative to sucking portion 4, it becomes possible to use suction tool 1 in its longitudical direction (in the direction of longitudinal central axis 4a of sucking portion 4). At this time, the outside shape of joint portion 5 and connection pipe 6 falls within the range of the width of sucking portion 4.

[0014] Further, when joint portion 5 has turned, relative to sucking portion 4, in the direction substantially horizontal to surface to be cleaned 23 such that longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 have become substantially parallel to each other (become concurrent, in the case of embodiment 1), supporting portion 7 is then positioned at the rear of sucking portion 4 (in the state where longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are substantially parallel to each other). Since, in addition, connection pipe 6 can be rotated, relative to joint portion 5, from a position in which longitudinal central axis 6a of connection pipe 6 is substantially vertical to surface to be cleaned 23 to a position in which longitudinal central axis 6a of connection pipe 6 is substantially parallel to surface to be cleaned 23, suction tool 1 is enabled to reach even into a space being low and narrow. Thus, a vacuum- cleaner suction tool enhanced in usability and excellent in dust collecting performance in any cleaning attitude can be provided.

[0015] Since the rotation at this time is made in a direction away from the side where heavy electric motor 13 is incorporated, sucking portion 4 is allowed to stably keep its position even if the rotating force is applied to joint portion 5 relative to sucking portion 4. Further, since electric motor 13 is disposed above agitator 14, the width of sucking portion 4 measured across its longitudinal central axis 4a, in the described condition, can be kept small.

[0016] FIG. 7 and FIG. 8 are internal structural drawings of the vacuum-cleaner suction tool viewed from its bottom side.

[0017] In two positions, an angular distance of 90° apart from each other, of the portion where joint portion 5 is connected to sucking portion 4, there are provided grooves 19. Further, there is provided retaining member 15 formed of a metallic or plastic plate spring which is adapted to be fitted into one or the other of grooves 19 for suppressing the turning of joint portion 5.

[0018] When joint portion 5 is turned, relative to sucking portion 4, in the direction substantially horizontal to surface to be cleaned 23 and, thereby, longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are caused to be substantially parallel to each other (to be concurrent with each other, in the case of the present embodiment), or longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are caused to be substantially perpendicular to each other, retaining member 15 is, then, put into one or the other of grooves 19, so that sucking portion 4 can maintain its present position even when it is subjected to an external force in some degree by collision with furniture or the like while the vacuum cleaner is being used.

[0019] Since supporting portion 7 is attached to joint portion 5, sucking portion 4 is prevented from lifting from the floor in the normal cleaning condition in which longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are substantially perpendicular to each other, so that high usability is obtained. Further, since supporting portion 7 is configured to be positioned on the rear side of sucking portion 4 when joint portion 5 connected with connection pipe 6 is turned, relative to sucking portion 4, in a direction substantially horizontal to surface to be cleaned 23, it is made possible to bring the forward end of sucking portion 4, from left to right, into close contact with wall surfaces. Hence, dust liable to collect at corners can be fully sucked up. Thus, vacuum-cleaner suction tool pro-

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viding high usability and excellent dust collecting performance in any cleaning attitude can be provided.

(Embodiment 2)

[0020] Embodiment 2 will now be described with reference to FIG. 9, FIG. 10, and FIG. 11. Components like those used in the above described embodiment 1 will be given like names and reference numerals and description thereof will be omitted.

[0021] Although supporting portion 7 is fixedly attached to one end of joint portion 5 in embodiment 1, supporting portion 7, in embodiment 2, is rotatably attached to one end of joint portion 5 by way of first rotation center 9 as shown in FIG. 9. Supporting portion 7 is further attached to connection pipe 6 by way of second rotation center 10 located at a position closer to sucking portion 4 than first rotation center 9. Incidentally, supporting portion 7 may be attached to connection pipe 6 the same as in embodiment 1. Since roller 17 is positioned closer to the side of sucking portion 4 than first rotation center 9, even if a force is applied to connection pipe 6 to push it down, the front portion of sucking portion 4 is prevented from lifting from the floor due to a rotational movement of supporting portion 7 carried on first rotation center 9.

[0022] In the above described configuration, when joint portion 5 has turned, relative to sucking portion 4, in a direction substantially horizontal to surface to be cleaned 23 and, thereby, longitudinal central axis 4a of sucking portion 4 has become substantially parallel to (concurrent with, in the present embodiment) longitudinal central axis 6a of connection pipe 6, supporting portion 7 turns in an upward direction from surface to be cleaned 23 so as to be positioned higher than sucking portion 4. In addition, since connection pipe 6 can be turned, relative to joint portion 5, from its state where longitudinal central axis 6a of connection pipe 6 is substantially vertical to surface to be cleaned 23 to its state where longitudinal central axis 6a of connection pipe 6 is substantially horizontal to surface to be cleaned 23, it becomes possible to insert suction tool 1 into a space being low and narrow. Thus, vacuum-cleaner suction tool providing high usability and excellent dust collecting performance in any cleaning attitude can be provided.

[0023] FIG. 11 shows internal structure of the first rotation center to which supporting portion 7 is connected.

[0024] There is further provided urging member 21 formed of spring or the like between supporting portion 7 and joint portion 5. Hence, supporting portion 7 is urged in the direction of sucking portion 4, while it is turnable in an upward direction from surface to be cleaned 23. Therefore, sucking portion 4 is prevented from lifting from the floor, as described above, due to turn of supporting portion 7 in the normal cleaning condition in which longitudinal central axis 4a of sucking portion 4 is substantially perpendicular to longitudinal central axis 6a of connection pipe 6, whereby usability of vacuum-cleaner suction tool 1 is enhanced. In addition, when joint portion 5 with connection pipe 6 attached thereto is turned, relative to sucking portion 4, in a direction substantially horizontal to surface to be cleaned 23, supporting portion 7 ensures sucking portion 4 to be secured in position, so that the front end of suction tool 1, from left to right, can be brought into close contact with wall faces, and hence dust liable to collect at corners can be fully sucked up. Thus, vacuum-cleaner suction tool providing high usability and high dust collecting performance in any cleaning attitude can be provided.

(Embodiment 3)

[0025] Embodiment 3 will be described with reference to FIG. 12 and FIG. 13. Components like those used in embodiments 1 and 2 will be denoted by like reference numerals and description thereof will be omitted.

[0026] Embodiment 3 is a vacuum cleaner having the vacuum-cleaner suction tool described in embodiments 1 and 2 connected thereto.

[0027] FIG. 12 and FIG. 13 show general drawings of a vacuum cleaner. The vacuum cleaner has dust collecting chamber 2 for collecting dust, channel portion 8 through which sucked-up dust is transported to dust collecting chamber 2, handle portion 16, power supplying battery 20, and electric fan 22 for generating a suction air flow. Electric fan 22 is communicating with suction tool 1 through channel portion 8.

[0028] In the state where longitudinal central axis 6a of connection pipe 6 is substantially parallel to surface to be cleaned 23, suction tool 1 can be advanced even into a space under a bed or a table as shown in FIG. 12. Hence, it is made possible to fully suck up dust on the surface to be cleaned. When longitudinal central axis 6a of connection pipe 6 is turned to a position in which it is substantially vertical to surface to be cleaned 23 as shown in FIG. 11, the cleaner in a non-cleaning condition can be conveniently placed or stored, for example, in a small space.

[0029] Though the vacuum cleaner of embodiment 3 has been described as a broom-type rechargeable vacuum cleaner, the described configuration is applicable to general vacuum cleaners irrespective of the types of the cleaner or systems of the power source.

Claims

1. A vacuum-cleaner suction tool comprising:

   a sucking portion having an opening for sucking up dust on a surface to be cleaned;
   a joint portion having one end thereof connected with said sucking portion at an upper portion thereof and the other end provided with a connection pipe;
   an agitator disposed within said sucking portion

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for scraping up dust, and
a channel portion provided in said opening, said joint portion, and said connection pipe for transporting sucked-up dust therethrough, wherein said joint portion is turnable, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned to such an extent that a longitudinal central axis of said sucking portion and a longitudinal central axis of said connection pipe become substantially parallel to each other.

2. The vacuum-cleaner suction tool according to claim 1, further comprising an electric motor within said sucking portion for driving said agitator, wherein
said electric motor is disposed above said agitator.

3. The vacuum-cleaner suction tool according to claim 1, further comprising, within the configuration allowing said joint portion to turn, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned, a retaining member,
said retaining member disallowing said joint portion to turn relative to said sucking portion when a turning force applied to said joint portion is not greater than a predetermined value and allowing said joint portion to turn relative to said sucking portion when the turning force applied to said joint portion is greater than the predetermined value.

4. The vacuum-cleaner suction tool according to claim 2, wherein,
said electric motor is disposed substantially at one end in the longitudinal direction of said sucking portion and
said joint portion comes to be positioned higher than said sucking portion on a side where said electric motor is not disposed when said joint portion has turned, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned and the longitudinal central axis of said sucking portion and the longitudinal central axis of said joint portion have become substantially parallel to each other.

5. The vacuum-cleaner suction tool according to any of claim 1 and claim 2, further comprising a supporting portion attached to one of said joint portion and said connection pipe for supporting one of said joint portion and said connection pipe by being placed in contact with the surface to be cleaned, wherein
said supporting portion is adapted to be positioned on a rear side of said sucking portion when said joint portion has turned, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned to such an extent that the longitudinal central axis of said sucking portion and the longitudinal central axis of said connection pipe become substantially parallel to each other.

6. The vacuum-cleaner suction tool according to any of claim 1 and claim 2, wherein
said connection pipe is configured to be turnable, relative to said joint portion, from a position in which the longitudinal central axis thereof is substantially parallel to the surface to be cleaned to a position in which the axis is substantially vertical to the surface to be cleaned.

7. The vacuum-cleaner suction tool according to claim 5, wherein
said supporting portion has its periphery covered with a soft material.

8. A vacuum-cleaner suction tool comprising:
a sucking portion having an opening for sucking up dust on a surface to be cleaned;
a connection pipe having a longitudinal central axis thereof arranged to be substantially perpendicular to a longitudinal central axis of said sucking portion;
a joint portion for connecting said sucking portion to said connection pipe;
a supporting portion attached to one of said joint portion and said connection pipe for supporting one of said joint portion and said connection pipe by being placed in contact with a surface to be cleaned; and
a channel portion provided in said opening, said joint portion, and said connection pipe for transporting sucked-up dust therethrough; wherein
said joint portion is configured to be turnable, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned and
said supporting portion is configured to be turnable in an upward direction from the surface to be cleaned.

9. The vacuum-cleaner suction tool according to claim 8, wherein said supporting portion is adapted to turn upwardly from the surface to be cleaned and come to be positioned higher than said sucking portion when said joint portion is turned, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned and the longitudinal central axis of said sucking portion and the longitudinal central axis of said connection pipe become substantially parallel to each other.

10. The vacuum-cleaner suction tool according to claim 8, further comprising a retaining member, wherein
said retaining member, in the configuration allowing said joint portion to turn, relative to said suck-

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ing portion, in a direction substantially parallel to the surface to be cleaned, disallows said joint portion to make a turn when a force applied to said joint portion to make a turn relative to said sucking portion is not greater than a predetermined value and allows said joint portion to make a turn when the force applied to said joint portion to make a turn relative to said sucking portion is greater than the predetermined value.

11. The vacuum-cleaner suction tool according to claim 8, wherein

said supporting portion is configured to be turnable in an upward direction from the surface to be cleaned, and

said vacuum-cleaner suction tool further comprises an urging member for urging said supporting portion toward said sucking portion.

12. A vacuum cleaner using a vacuum-cleaner suction tool, said suction tool comprising:

a sucking portion having an opening for sucking up dust on a surface to be cleaned;
a joint portion having one end thereof connected with said sucking portion at an upper portion thereof and having the other end provided with a connection pipe;
an agitator disposed within said sucking portion for scraping up dust; and
a channel portion provided in said opening, said joint 1 ion, and said connection pipe for transporting sucked-up dust therethrough,
said joint portion being turnable, relative to said sucking portion, in a direction substantially horizontal to a surface to be cleaned to such an extent that a longitudinal central axis of said sucking portion and a longitudinal central axis of said connection pipe become substantially parallel to each other. wherein
said channel portion of said suction tool is adapted to communicate with an electric fan for generating a suction air flow.

13. A vacuum cleaner using a vacuum-cleaner suction tool, said suction tool comprising:

a sucking portion having an opening for sucking up dust on a surface to be cleaned;
a connection pipe provided such that a longitudinal contral axis thereof becomes substantially perpendicular to a longitudinal central axis of said sucking portion;
a joint portion for connecting said sucking portion with said connection pipe;
a supporting portion attached to one of said joint portion and said connection pipe by being placed in contact with a surface to be cleaned; and
a channel portion provided in said opening. said joint portion, and said connection pipe for transporting the sucked-up dust therethrough,
said joint portion being turnable, relative to said sucking portion, in a direction substantially horizontal to a surface to be cleaned, and
said supporting portion being turnable in an upward direction from the surface to be cleaned, wherein
said channel portion of said suction tool is adapted to communicate with an electric fan for generating a suction air flow.

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FIG. 1

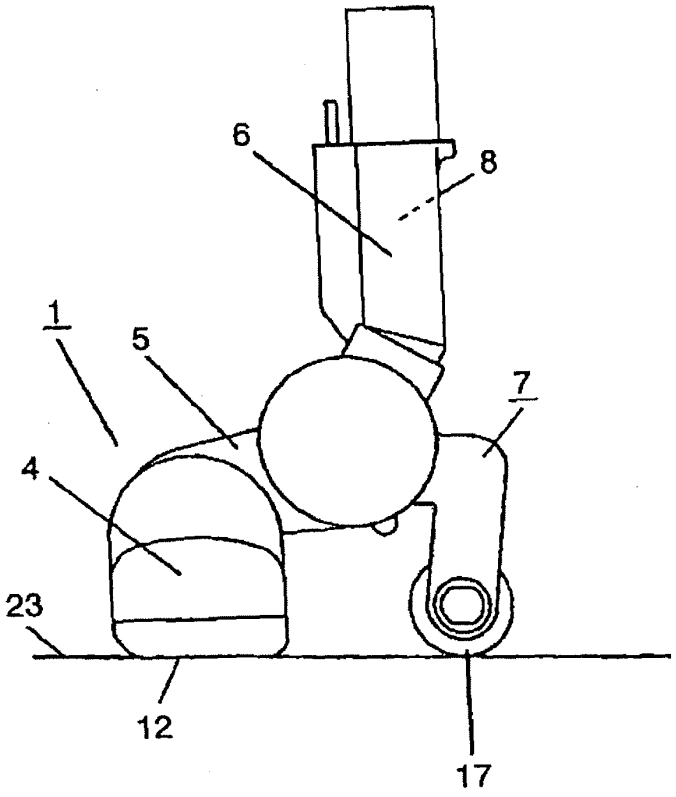


FIG. 2

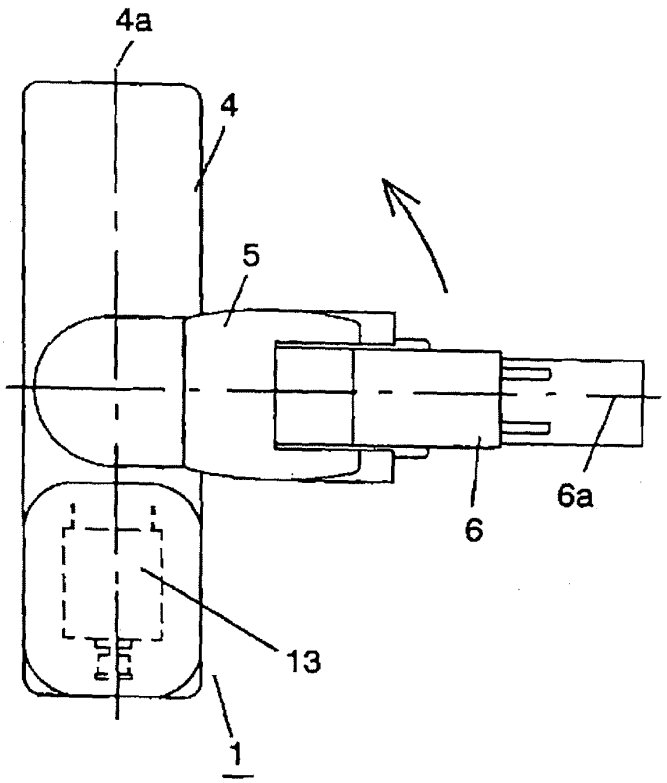


FIG. 3

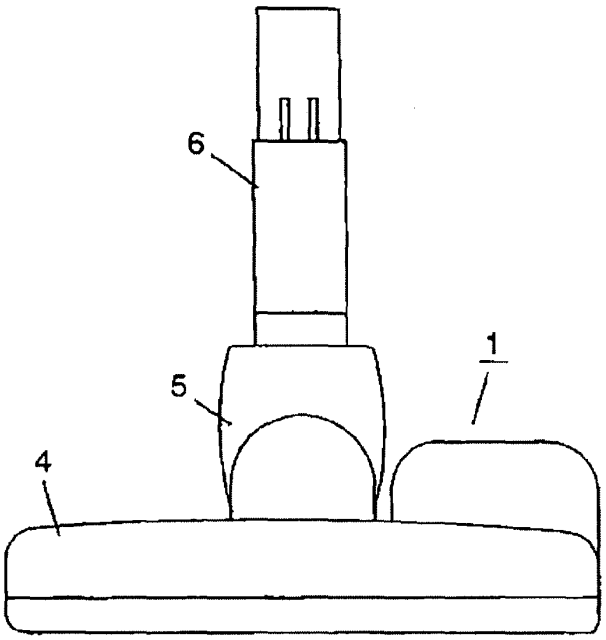
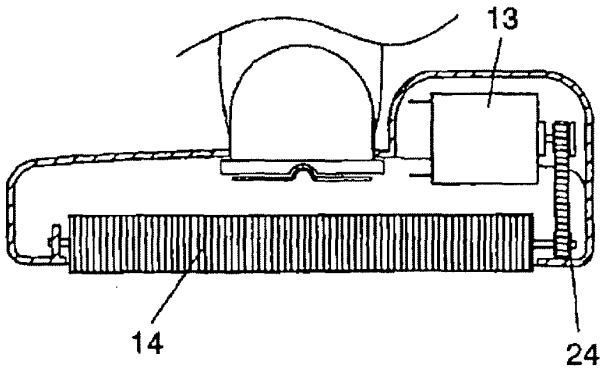
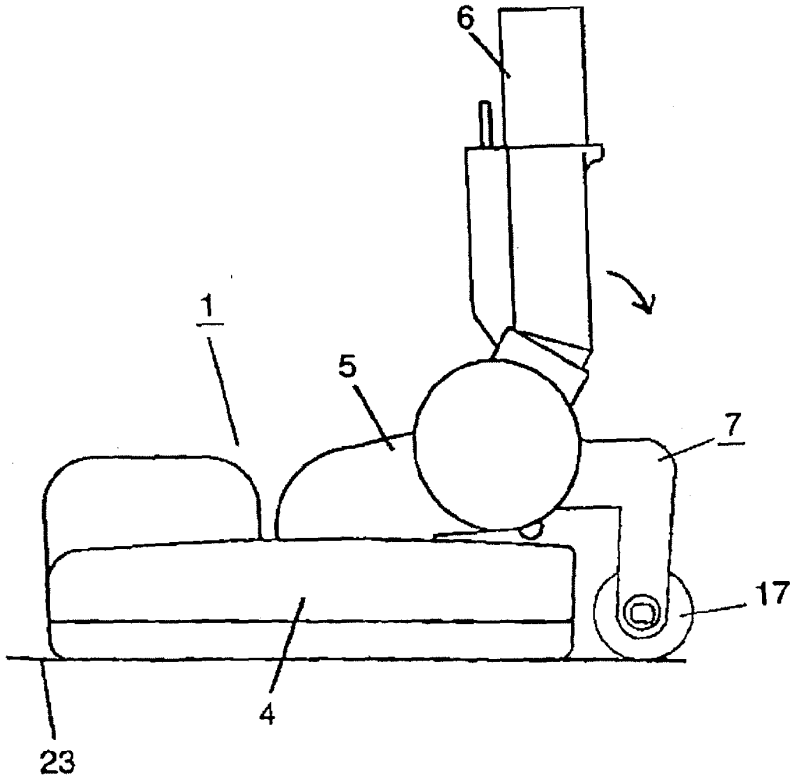


FIG. 4



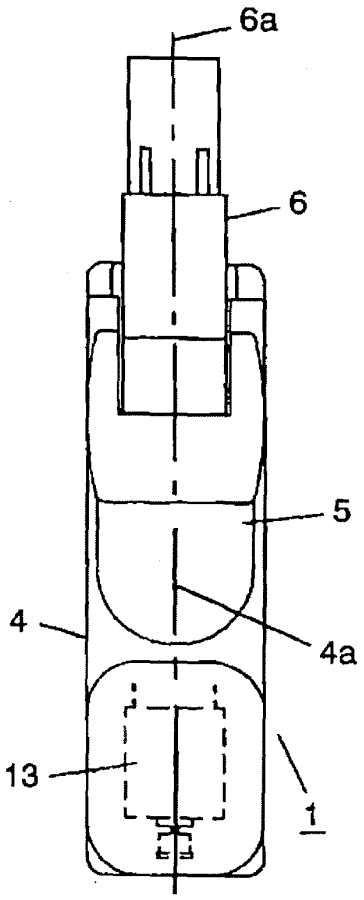
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FIG. 5



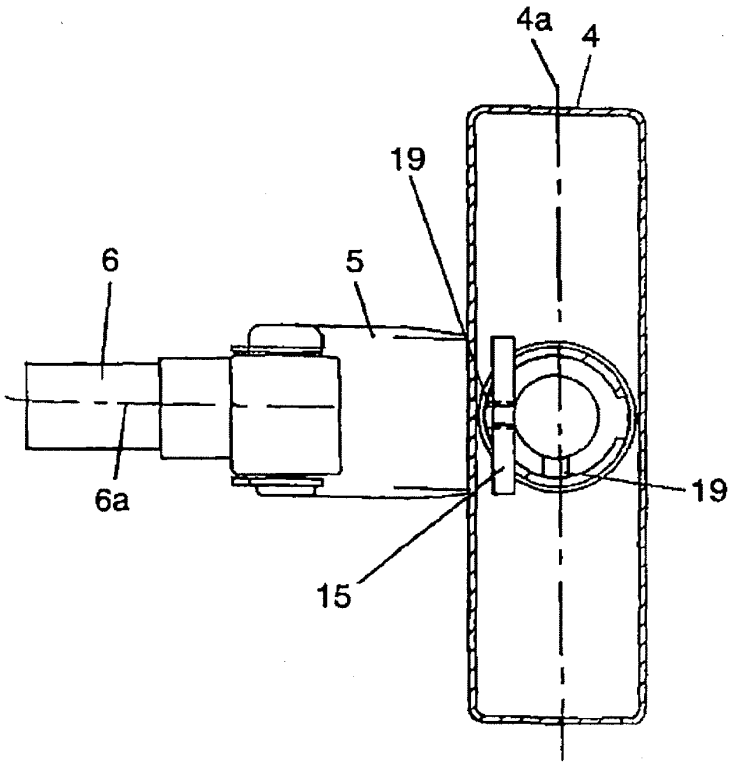
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FIG. 6



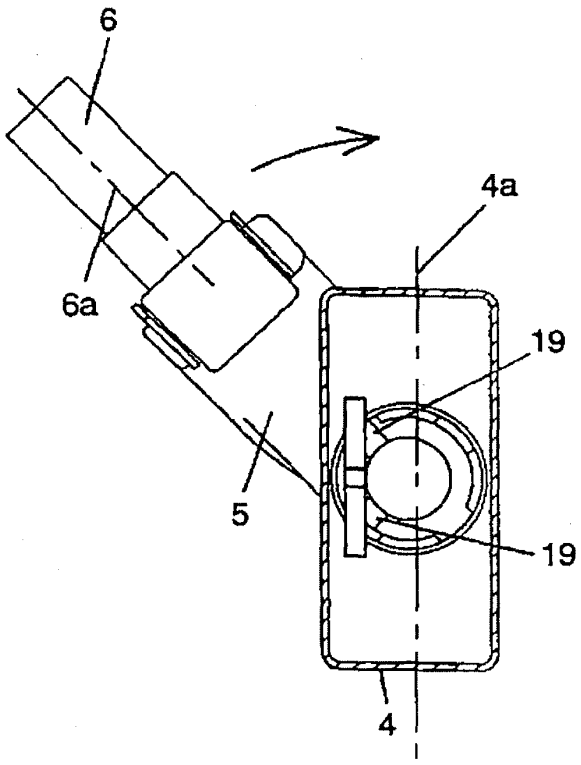
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Page 584

FIG. 7



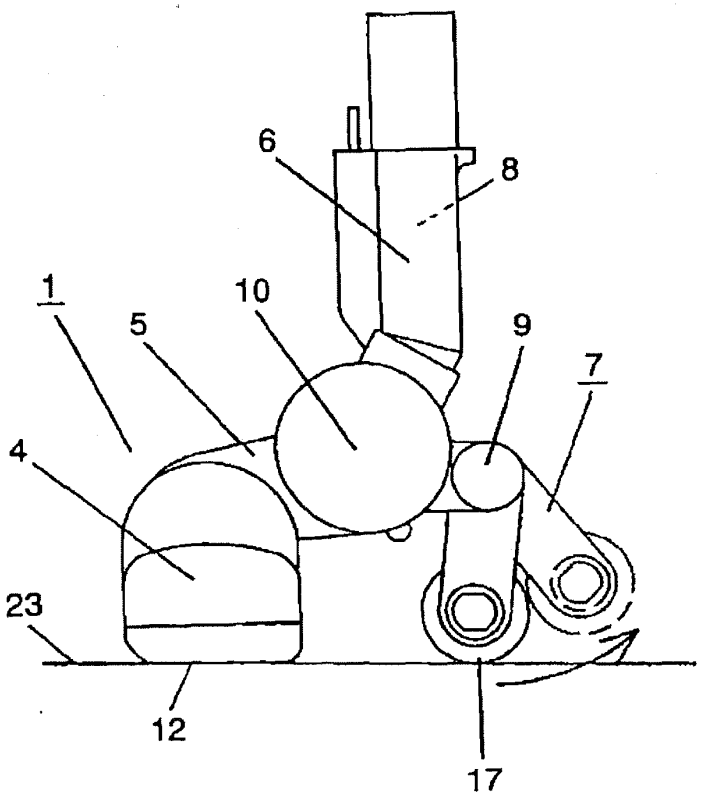
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FIG. 8



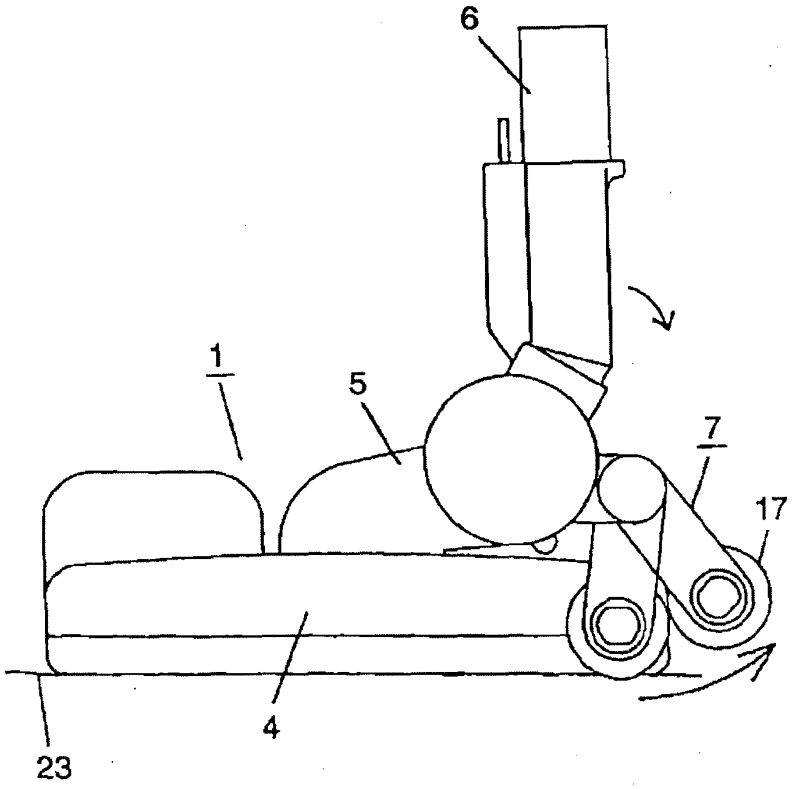
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FIG. 9



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FIG. 10



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FIG. 11

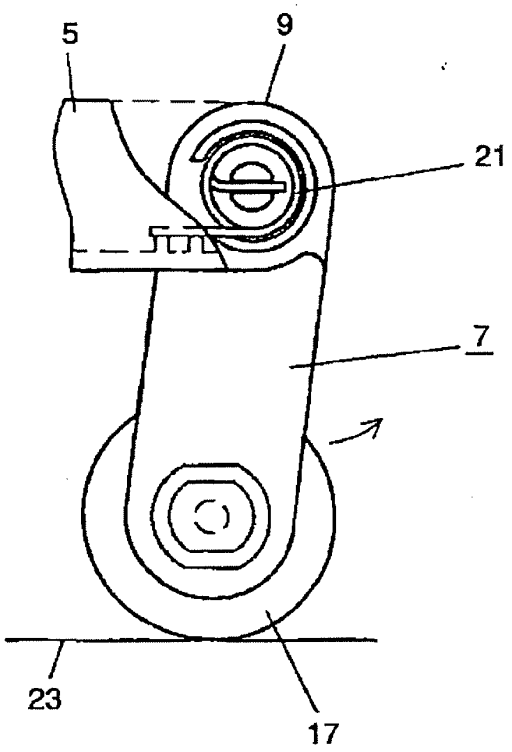
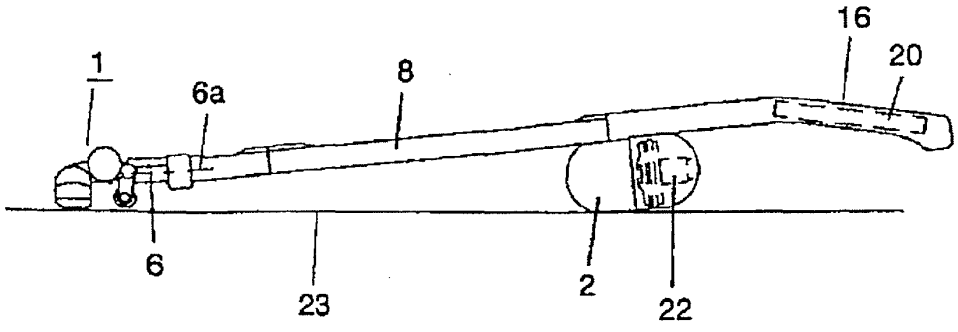
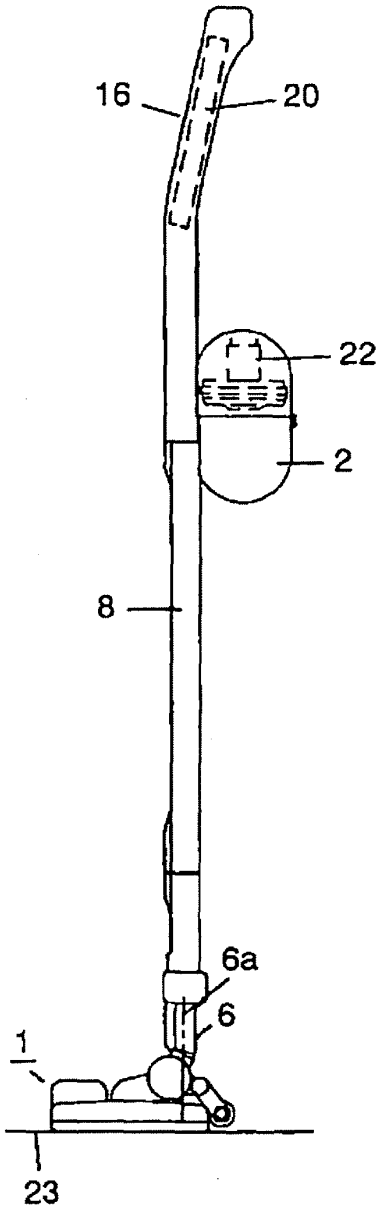


FIG. 12



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FIG. 13



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FIG. 14A

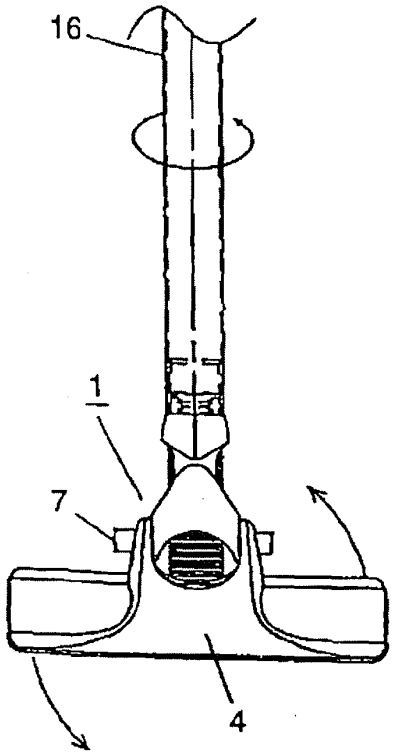
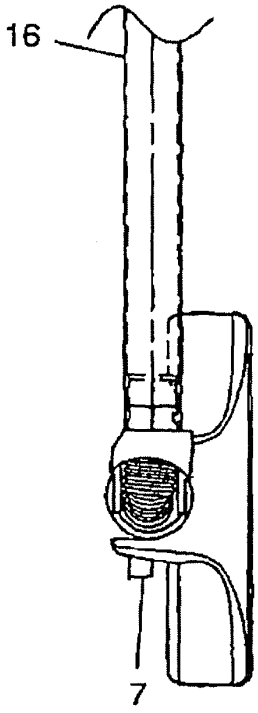


FIG. 14B



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13.09.2002 JP 2002268570

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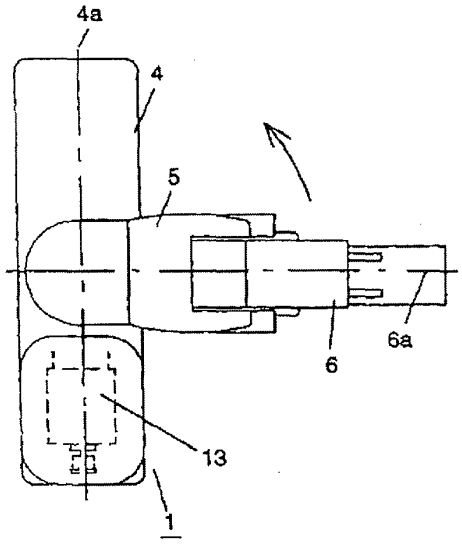
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(54) Vacuum-cleaner suction tool and vacuum cleaner using the same

(57) A vacuum-cleaner suction tool which comprises a sucking portion (4) for sucking up dust on a surface to be cleaned, a joint portion (5) having one end connected to the upper side of the sucking portion and the other end provided with a connection pipe (6), and an agitator disposed within the sucking portion for scraping dust off the surface, the opening, joint portion, and connection pipe each having a channel portion allowing sucked-up dust to pass therethrough, in which the joint portion (5) is configured to be turnable, relative to the sucking portion, in a direction substantially horizontal to the surface to be cleaned to such an extent that the longitudinal central axis (4a) of the sucking portion (4) becomes substantially parallel to the longitudinal central axis (6a) of the connection pipe (6), whereby the forward end of sucking portion, from left to right, can be brought into close contact with wall surfaces so that dust liable to collect at corners can be fully sucked up.

FIG. 2



EP 1 356 755 A3

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 00 8061

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	DE 100 17 705 A (WESSEL WERK GMBH) 18 October 2001 (2001-10-18) * column 2, line 59 - column 3, line 1; claim 1; figures 1-3 *	1,2,6,12	A47L9/04
Y	US 6 029 313 A (HO MICHAEL KIN-CHUNG ET AL) 29 February 2000 (2000-02-29) * column 2, line 17 - line 31; figure 3 *	1,2,6,12	
A	US 3 813 726 A (KOWALEWSKI J) 4 June 1974 (1974-06-04) * column 1, line 63 - column 2, line 49; figures 1-5 *	1,2,5,8, 13	
A	FR 2 511 593 A (DUEPRO AG) 25 February 1983 (1983-02-25)		
A	NL 1 013 825 C (BOS) 14 June 2001 (2001-06-14)		
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			A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 September 2003	Van Gelder, P

CATEGORY OF CITED DOCUMENTS

X particularly relevant if taken alone
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A technological background
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T theory or principle underlying the invention
E earlier patent document, but published on, or after the filing date
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L document cited for other reasons

& member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 00 8061

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

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Page 594

Japan Patent Office

Issued 23 May 1990

Design Gazette (S)

C3-410 D

788426 Design Application: S63-35264

Application date: 7 September 1988
Registered: 28 February 1990

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Designer: TANAKA Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: HIDAKA Masataka, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

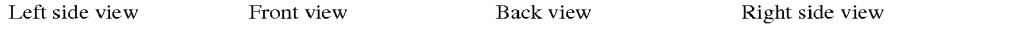
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Designer: KAKU Hiroyuki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Attorney: KURINO Shigetaka, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.



788426 (2) C3-410 D

Plan view

Perspective view

Bottom view

日本国特許庁

平成2年(1990)5月23日発行　**意匠公報**（S）　C3-410 D

788426

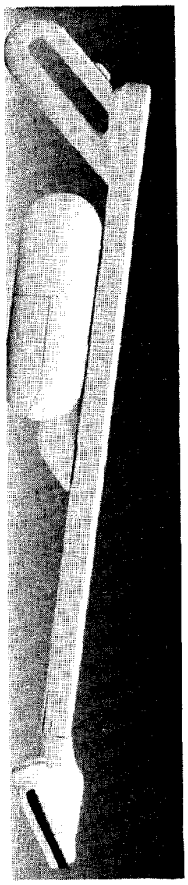
意願 昭63－35264　出願 昭63(1988)9月7日
登録 平2(1990)2月28日

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審査官　鍋田和宣

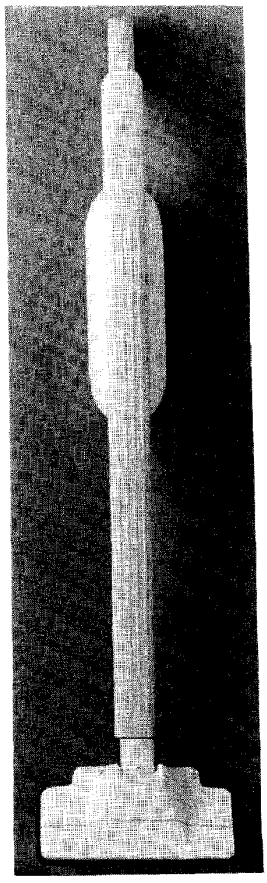
意匠に係る物品　電気掃除機

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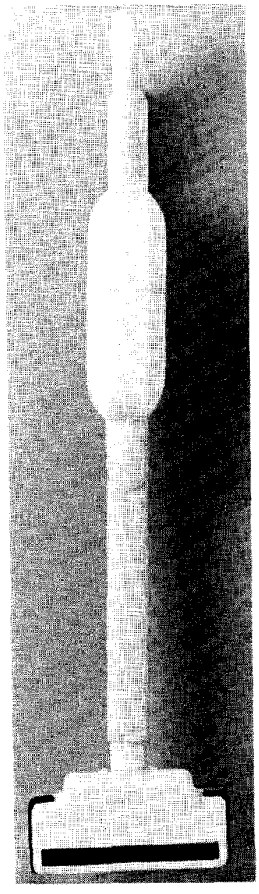
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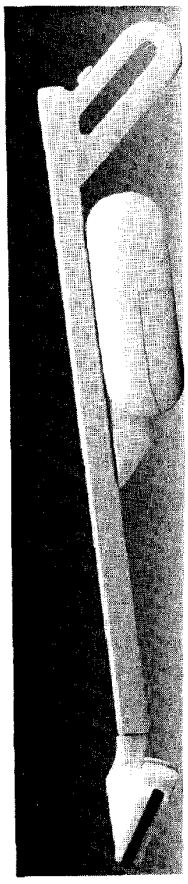
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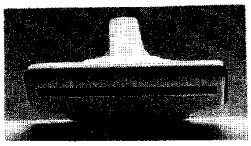


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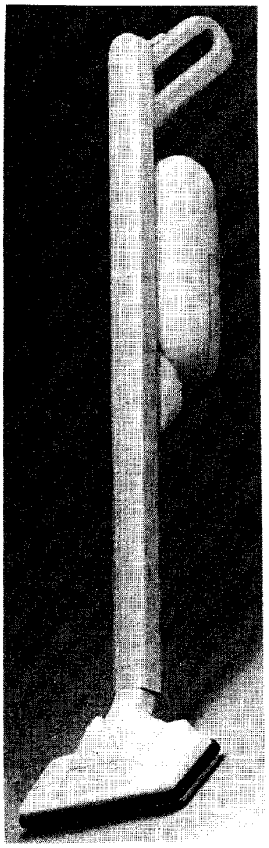
平面図



底面図



斜視図



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US 5035024 A

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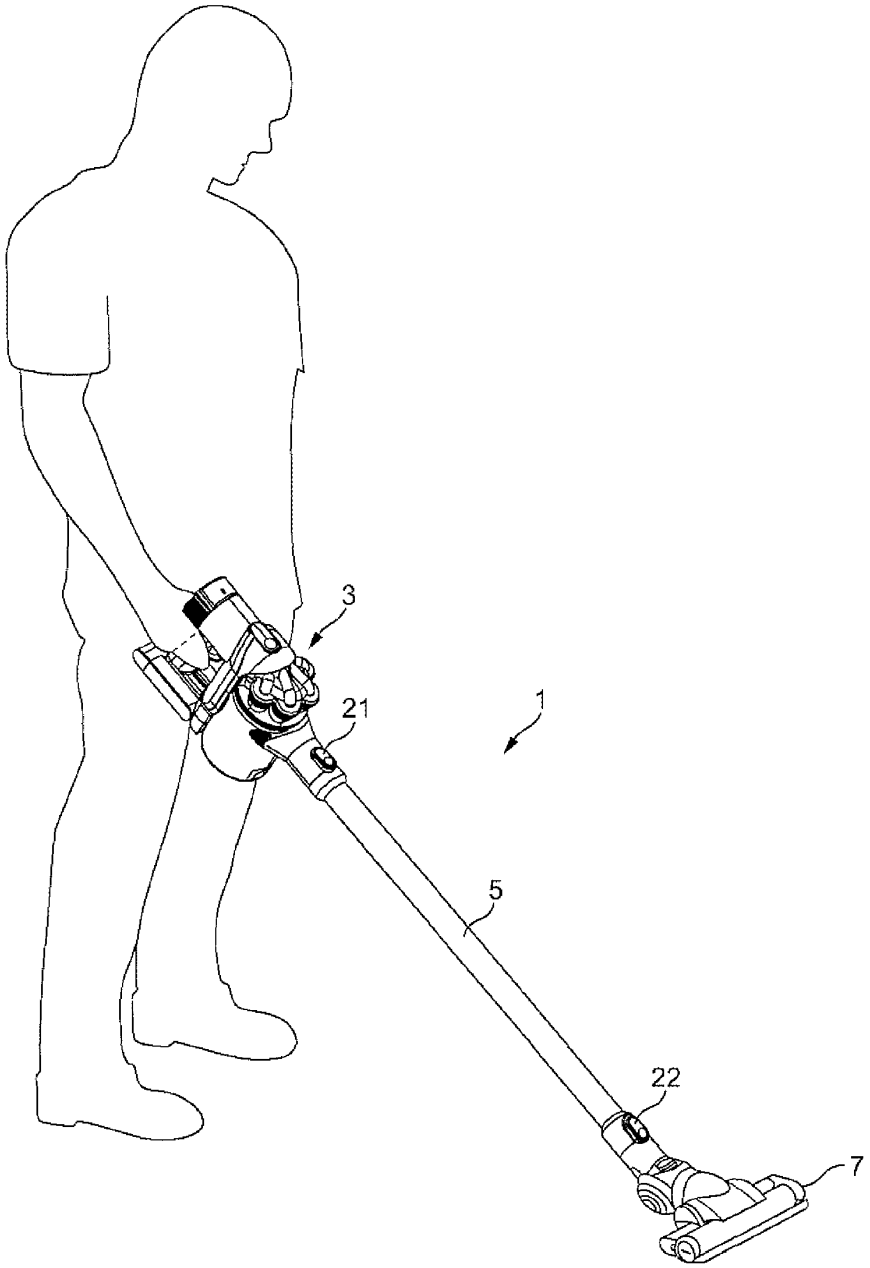


FIG. 1

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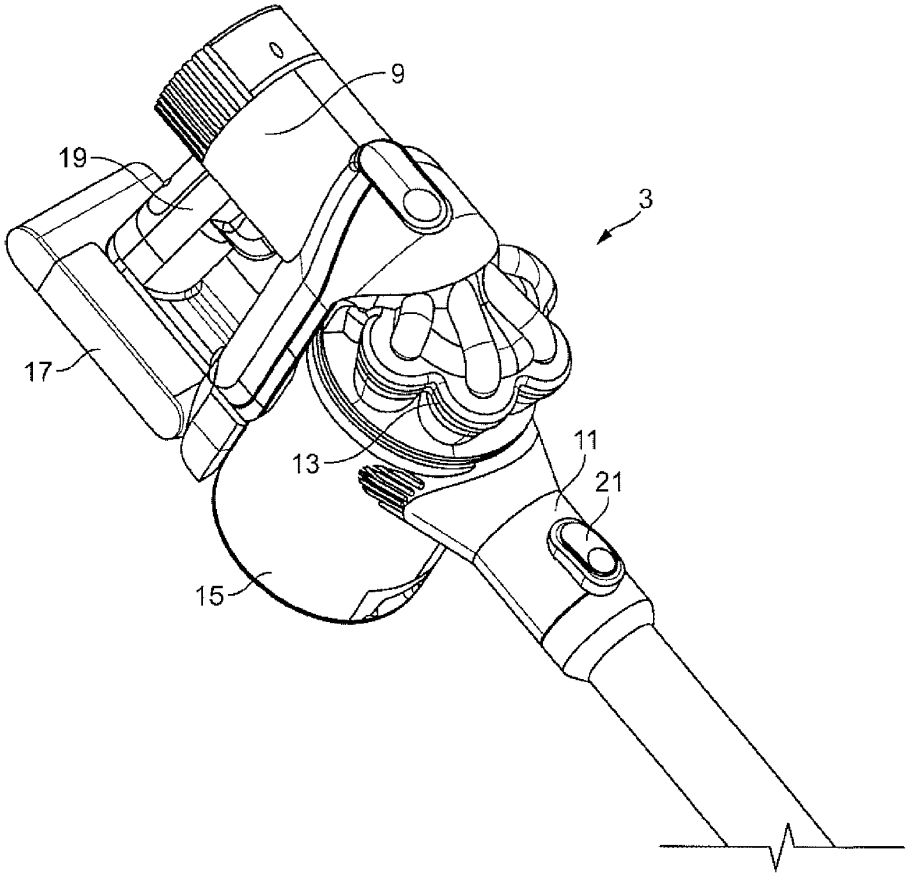


FIG. 2

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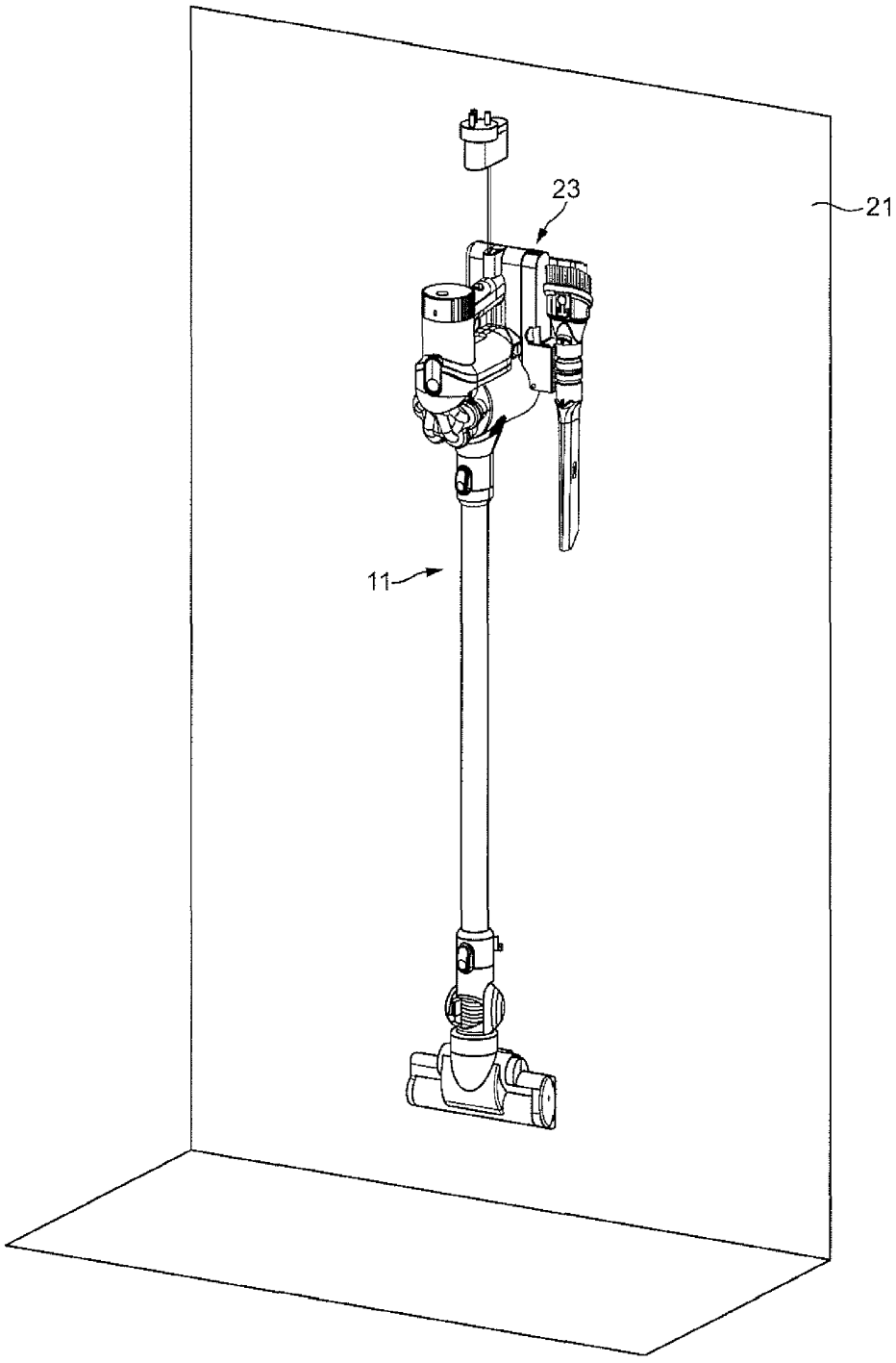


FIG. 3

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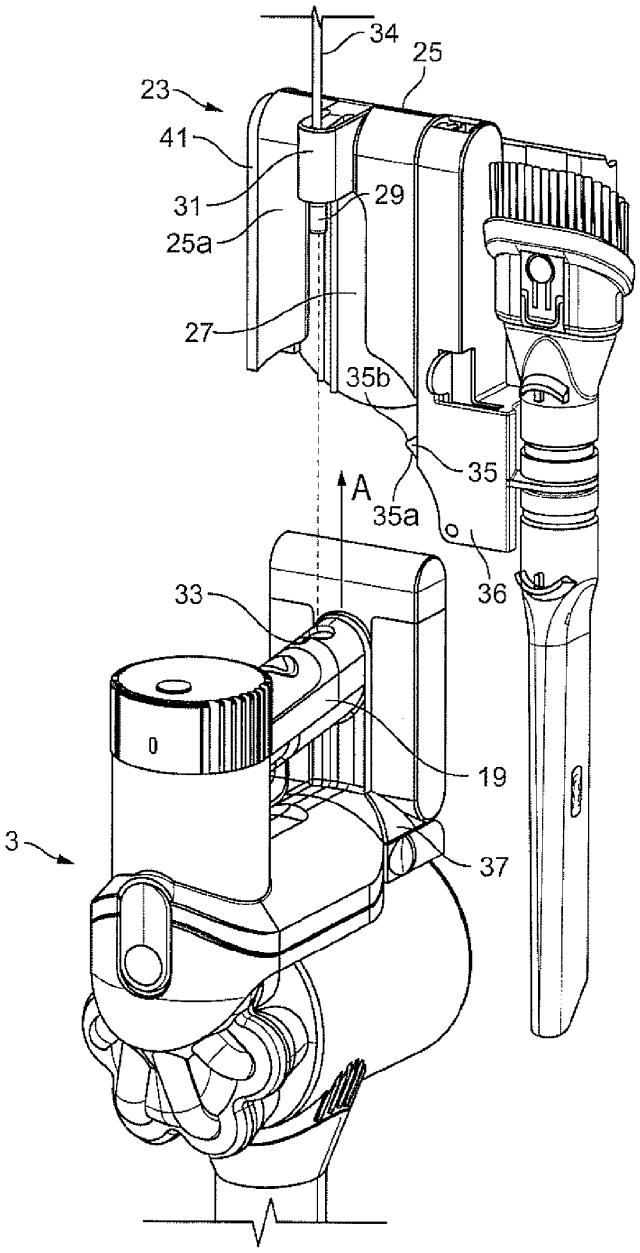


FIG. 4

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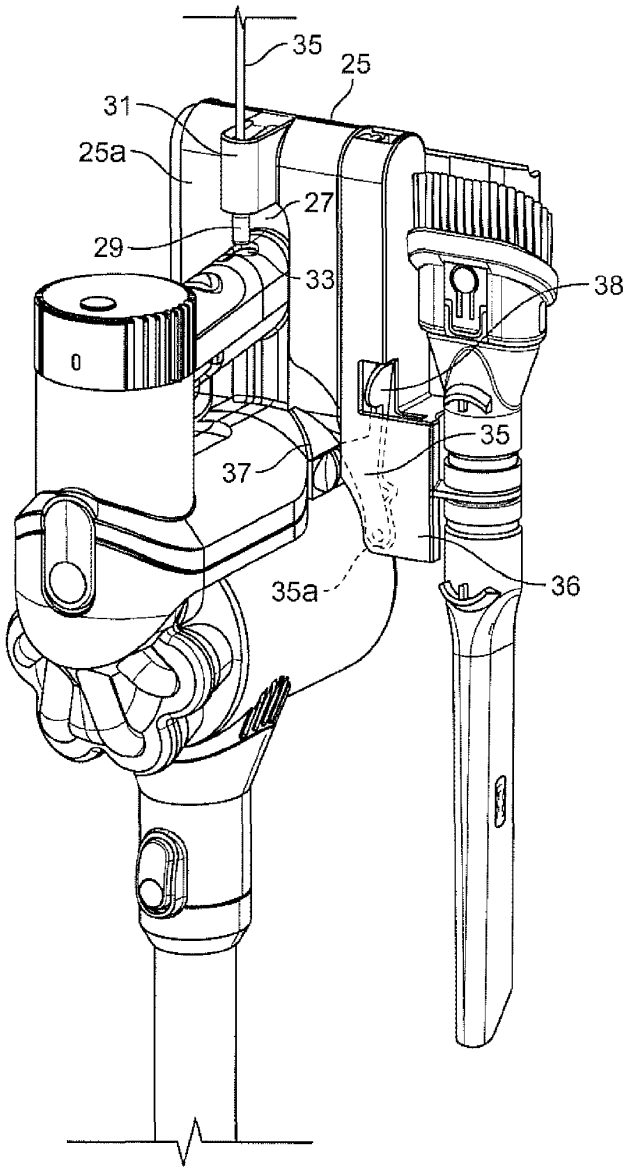


FIG. 5

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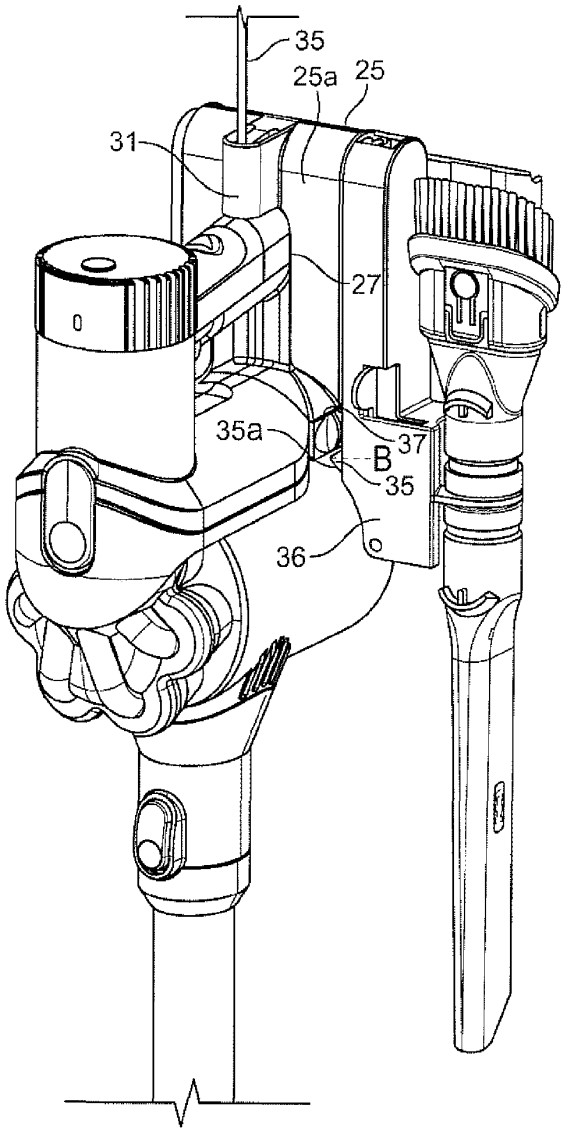


FIG. 6

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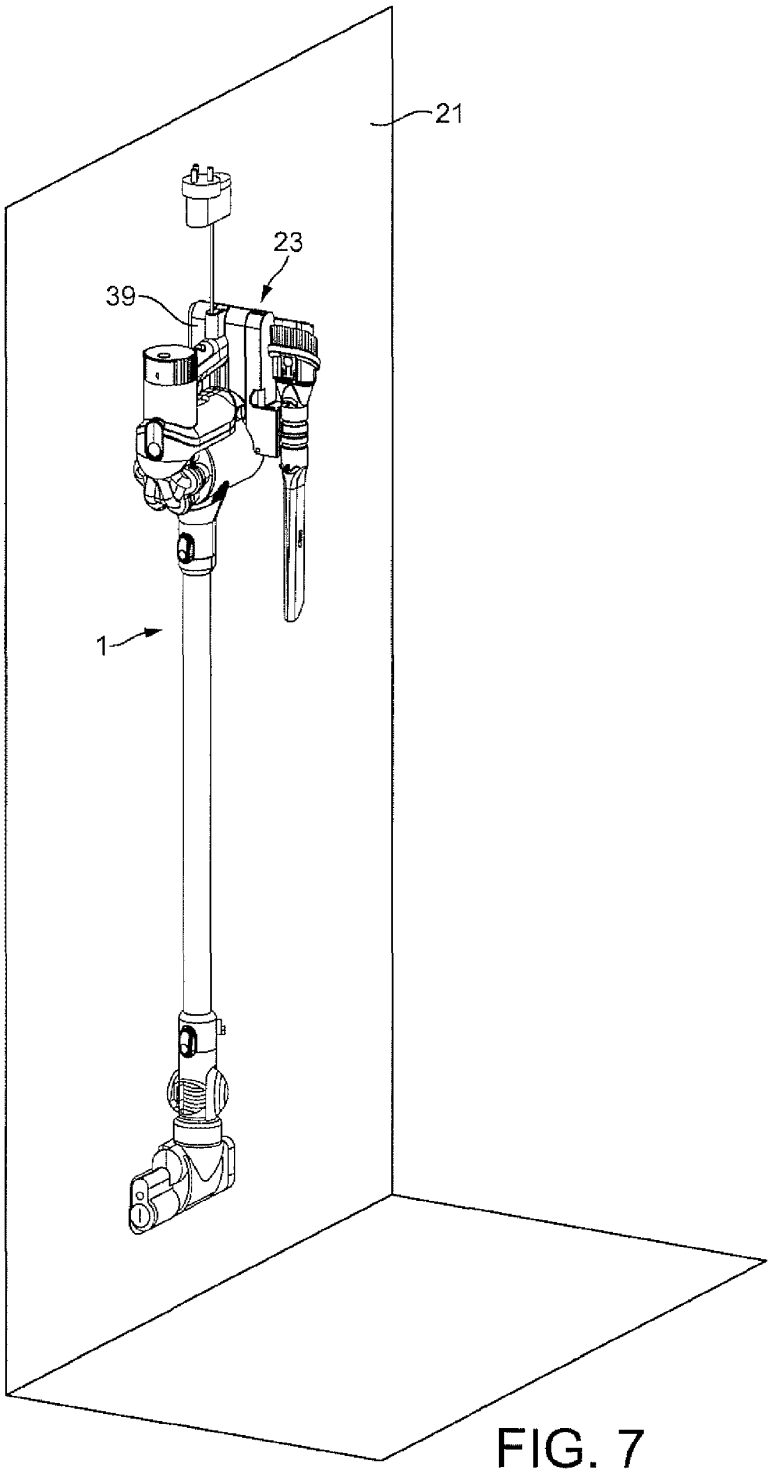


FIG. 7

A Vacuum Cleaner Arrangement

The present invention relates to the field of vacuum cleaners, and more specifically to 'stick vac' cleaners of the type generally comprising a handheld suction unit in combination with an elongate suction wand.

Broadly speaking, there are four types of vacuum cleaner: "upright" vacuum cleaners, "cylinder" cleaners (also referred to as "canister" cleaners), "handheld" vacuum cleaners and "stick" vacuum cleaners, the latter being popularly referred to as "stick-vac" cleaners, or simply "stick-vacs".

Upright cleaners and cylinder cleaners are well known. They tend to be mains-operated and are used for relatively heavy-duty cleaning applications.

Handheld vacuum cleaners are relatively small, highly portable vacuum cleaners, best suited to relatively low duty applications such as spot cleaning floors and upholstery in the home, interior cleaning of cars and boats etc. Unlike upright cleaners and cylinder cleaners, they are designed to be carried in the hand during use, and tend to be battery-operated.

Stick-vac cleaners essentially offer a lightweight, functional alternative to upright cleaners for relatively low duty floor-cleaning applications, such as cleaning up floor spills.

Broadly speaking, there are two types of stick-vac. The first type is, in a sense, an ultra slim-line upright cleaner, though usually "cordless" rather than mains-operated. An example of this type of stick-vac cleaner is shown in UK Patent Application No.

GB2377880A1, in this case additionally incorporating a removable, handheld vacuum-cleaning unit. Stick-vacs of this first type may be free-standing; otherwise, they tend to be stored simply by leaning the stick-vac against a wall when not in use (in the manner of a long-handle brush or broom).

The second type of stick-vac cleaner is a spin-off from the handheld vacuum cleaner, and comprises a handheld suction unit which is carried in the hand in the same way as a handheld vacuum cleaner, but in combination with a rigid, elongate suction wand which effectively reaches down to the floor so that the user may remain standing while cleaning a floor surface. A floor tool is typically attached to the end of the rigid, elongate suction wand, or alternatively may be integrated with the bottom end of the wand. Designs of this type of stick-vac cleaner are shown in USD298875, USD303173 and USD280033. In each case, the handheld suction unit incorporates the motor, the fan and some sort of separating apparatus, which may be a bag or a cyclonic separation system.

Stick-vac cleaners of the second type are predominantly multi-mode, hybrid machines: in such cases, the wand is removable and the handheld suction unit may then be used independently as a handheld vacuum cleaner, as desired. However, this is not an essential feature of these types of stick-vac cleaners and it is conceivable that the wand may be permanently attached to the handheld suction unit.

A feature which distinguishes stick-vacs of the second type from stick vacs of the first type is that the first type is "bottom heavy" – the motor is located low down in similar manner to a full-sized upright cleaner –whereas the second type is "top heavy" – the use of a handheld suction unit in combination with an elongate suction wand means that the motor (being inside the handheld suction unit) is located nearer the top end of the machine.

The "top heavy" distribution of weight in stick vacs of the second type means that they are not particularly convenient to store in stick-vac mode. If the stick-vac cleaner is leant against a wall in an upright position with the floor tool supported on the floor and the handheld suction unit resting against the wall, the relative weight of the handheld suction unit tends to make the stick-vac cleaner as a whole unstable. On the other hand, if the stick-vac cleaner is turned upside down and leant against the wall with the relatively heavy handheld vacuum cleaner supported on the floor, the relatively dirty lower end of the cleaner will consequently rest against the wall, which is undesirable. Also, when the stick-vac cleaner is stored in an upside down position rather than an upright position, the natural inclination is to grasp the stick-vac cleaner in the region of the relatively dirty lower end of the stick vac cleaner in order to turn the cleaner back round to the upright position for use.

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Consequently, conventional stick vac cleaners of the second type often tend to be stored on the floor or, where there is insufficient space to do so, tend to be partly disassembled for storage after use and then reassembled again when it is desired to use the machine in stick-vac mode. The need for disassembly and reassembly in particular discourages use of the machine in stick-vac mode.

According to the present invention, there is provided an arrangement comprising: a handheld suction unit in combination with an elongate suction wand to form a stick vac cleaner, the arrangement further comprising a wall-mountable docking station for supporting the stick vac cleaner on a wall in an upright, docked position when not in use, wherein the handheld cleaner is a battery-powered handheld cleaner incorporating a set of exterior charging contacts connected to an onboard rechargeable battery, and the docking station comprises a respective set of charging contacts for connection to a mains supply, the charging contacts on the docking station being arranged for engagement with said exterior charging contacts on the handheld cleaner to form a battery-charging circuit when the stick vac cleaner is in the upright, docked position.

By "upright position" is meant a position in which the elongate suction wand extends downwardly from the handheld suction unit towards the floor. Storing the stick vac cleaner in the upright position has the advantage that a user may conveniently grasp the hand held vacuum cleaner in order to disengage the stick-vac from the docking station, at which point the stick-vac is ready for use in the upright position: there is no tendency for the user to grasp the relatively dirty, lower end of the stick-vac in order to manipulate the stick-vac cleaner into the upright position for use. At the same time, the "top heavy" stick-vac cleaner is advantageously supported in a relatively stable, upright position by the docking station (which laterally supports the stick vac cleaner in the upright position).

In a particularly stable arrangement, the docking station is arranged releasably to lock the stick-vac in the upright, docked position i.e. so that the stick-vac cleaner is essentially fixed relative to the docking station in the upright, docked position.

The docking station may be arranged for engaging the handheld suction unit in order directly to support the hand held suction unit when the stick vac cleaner is in the upright, docked position. Consequently, because the centre of mass is dictated largely by the position of motor, which is inside the handheld suction unit, the center of mass of the stick vac cleaner will be relatively near to the point of support on the wall; this provides a particularly stable upright, docked position, and results in relatively low stresses on the docking station components.

The docking station advantageously charges the battery onboard the handheld unit when the stick vac cleaner is in the upright, docked position.

The charging contacts on the handheld suction unit may be arranged in any suitable manner. In some cases, it may be desirable to arrange the contacts on the handheld

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vacuum cleaner in a way which means that the contacts face upwards when the stick vac cleaner is in the upright position.

If the charging contacts on the handheld vacuum cleaner are arranged so that they face upwards when the stick vac cleaner is in the upright position, it has been found that there can be a tendency for the charging contacts to pull away from the respective contacts on the docking station, under the weight of the stick vac cleaner. To address this problem, the charging contacts on the docking station may be spring-biased for urging the charging contacts downwardly into engagement with said upward-facing charging contacts on the handheld vacuum cleaner.

The docking station may comprise a catch for engaging the handheld vacuum cleaner part to secure the stick-vac cleaner in the upright, docked position, the catch being arranged to hold the charging contacts on the handheld vacuum cleaner part in engagement with the charging contacts on the docking station. Thus, reliable contact is ensured for charging the battery when the stick-vac cleaner is in the upright, docked position.

The catch may be spring-loaded for urging the charging contacts on the handheld vacuum cleaner into engagement with the charging contacts on the docking station. This may be in addition to, or alternative to, the charging contacts on the docking station being spring-loaded as mentioned above.

Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a schematic view showing a stick vac cleaner in use;

Figure 2 is a close-up perspective view of part of the stick vac cleaner in Figure 1;

Figure 3 is a perspective view showing a stick vac cleaner supported on a wall by a docking station;

Figure 4 is a close-up, perspective view of the docking station and part of the stick vac cleaner, prior to docking of the stick vac cleaner;

Figure 5 is a close-up, perspective view of the docking station and part of the stick vac cleaner, during docking of the stick vac cleaner;

Figure 6 is a close-up perspective view showing the docking station and part of the stick vac cleaner, in the upright docked position.

Figure 7 is a perspective view showing a stick vac cleaner supported in an alternative orientation, but still in an upright position, by a docking station.

Figure 1 shows a stick-vac cleaner 1 comprising a hand held suction unit, in the form of a handheld vacuum cleaner 3, an elongate wand 5 and a floor tool 7.

Referring to Figure 2, the handheld vacuum cleaner 3 comprises a motor-driven fan which is arranged inside a motor casing 9 for drawing air in through a suction nozzle 11 positioned at the front of the hand held vacuum cleaner 3. Dirty air drawn in through the suction nozzle 11 is ducted under the fan-generated suction pressure through a cyclonic separation system 13, where dirt is separated from the air, before the relatively clean air is then exhausted back to atmosphere via one or more fine-particulate filters (not visible). The dirt which is separated from the airflow inside the cyclonic separating system 13 is collected in a bin 15 for disposal. The hand held vacuum cleaner 3 is powered by a multi-cell rechargeable battery which is housed in a battery pack 17.

In use, the handheld vacuum cleaner 3 is carried in the hand using a handle 19.

The handheld cleaner 3 is relatively compact. Nevertheless, to promote a balanced feel in the hand, the heavier components such as the motor and the battery pack 17 are deliberately located relatively close to the handle 19 and the relatively light components such as the bin 15 are located further away from the handle 19. Thus, the bulk of the mass of the handheld cleaner 3 is distributed towards the rear of the handheld cleaner 3.

The elongate wand 5 is connected to the suction nozzle 11, and the floor tool 7 is in turn connected to the lower end of the wand 5. Dirty air is drawn in through a suction opening on the underside of the floor tool 5 and passes to the suction nozzle 11 via the wand 5.

A catch 21 is provided for disconnecting the wand 5 from the handheld cleaner 3, so that the handheld cleaner 3 can be used as a handheld cleaner rather than as part of the stick-vac cleaner 1. A catch 22 is also provided for disconnecting the floor tool 7 from the wand 5, so that rather than being used as part of the stick-vac cleaner 1, the handheld cleaner 3 and wand 5 can alternatively be used in combination with some other suction tool to form a "long-reach" handheld vacuum cleaner for cleaning into the upper corners of a room etc.

The stick-vac cleaner 1 is "top-heavy", and conventionally this type of stick vac cleaner has been awkward to store when it is not in use. If the stick vac cleaner 1 is propped up against a wall in the upright position, with the floor tool 7 supported on the floor and the handheld cleaner 3 resting against the wall, the stick-vac cleaner 1 as a whole tends to be relatively unstable; on the other hand, if the stick vac cleaner 1 is propped up against a wall upside down, with the handheld cleaner 3 supported on the floor and the floor tool 7 resting against the wall, the inclination is for a user to grasp the relatively dirty floor 7 tool in order to manipulate the stick-vac cleaner 1

back to the upright position for use. The relatively dirty floor tool 7 may also mark the wall.

Figure 3 illustrates an arrangement for conveniently storing the stick-vac cleaner 1 when it is not in use, in which the stick-vac cleaner 1 is supported in an upright position on a wall 21 by a wall-mounted docking station 23.

The docking station 23 is shown in more detail in Figures 4 to 6, which illustrate the stick-vac cleaner immediately prior to docking, during docking and in the docked position, respectively.

The stick vac cleaner 1 docks with the docking station 23 via the battery pack 17, which slots upwardly (in the direction A in Figure 4) into a docking cradle 25 shaped to receive the battery pack 17 in a close sliding fit. The front wall 25a of the docking cradle 25 incorporates a blind slot 27 extending back from the entrance of the cradle 25: this blind slot 27 accommodates the handle 19 as the battery pack is inserted upwardly into the docking cradle 25.

A set of charging contacts is provided on the docking station 23 in the form of a charging jack 29, which clips into a jack holder 31 positioned adjacent the end of the slot 27. The charging jack 29 connects to a mains supply via a plug-in power cord 34 and is arranged for engagement with a corresponding set of charging contacts on the handheld cleaner 3 in the docked position, via a charging socket 33 on the back of the handle 19. Engagement of the charging jack 29 with the charging socket 33 completes a battery charging circuit for charging the stick-vac cleaner 1 in the docked position.

A catch 35 is provided to lock the stick-vac cleaner 1 securely in the docked position shown in Figure 6.

The catch 35 is pivotally mounted on a catch housing 36 fitted to the side of the docking cradle 25 and is spring-biased towards a locking position shown in Figure 4. During docking of the stick vac cleaner 1, the catch 35 cooperates with a corresponding catch portion 37 on the handheld cleaner 3, which engages with a first cam surface 35a on the underside of the catch 35 to pivot the catch 35 away from the locking position shown in Figure 4 and into the position shown in Figure 5. As the handheld cleaner 3 is moved from the position shown in Figure 5 to the docked position shown in Figure 6, the catch portion 37 eventually clears the catch 35, which is then spring-biased back towards the locking position, and into locking engagement against the underside of the catch portion 37 to hold the stick vac cleaner 1 in the docked position.

When it is docked with the docking station 23, the stick vac cleaner 1 is laterally supported in the upright position by the side walls of the docking cradle 25. In addition, the side walls of the docking cradle 25 advantageously provide direct lateral support for the relatively heavy handheld cleaner 3.

The weight of the stick vac cleaner 1 is effectively supported on the catch 35. Again, the catch 35 advantageously directly supports the relatively heavy handheld cleaner 3.

The manufacturing tolerances are controlled so that the catch 35 holds the charging socket 33 in engagement with the jack 29 in the docked position. Thus the battery onboard the handheld cleaner is reliably charged when the stick vac cleaner 1 is in the upright, docked position.

Control of manufacturing tolerances may be particularly important in an arrangement such as the one shown in Figures 1 to 6, because the charging socket 33 faces upwards when the stick vac cleaner is in the upright, docked position so the weight of the stick vac cleaner tends to pull the socket 33 away from the jack 29.

The potentially negative effects of manufacturing tolerance on charging reliability can be mitigated by spring loading the charging contacts on the docking station. For example, in an alternative embodiment (not shown), the jack holder 31 may be spring-biased downwardly for ensuring positive engagement of the charging jack 29 with the charging socket 33.

In order to remove the stick-vac cleaner 1 from the docked position, a user simply releases the catch 35 using a manual release lever 37 and slides the stick vac cleaner downwardly until the battery pack 17 disengages from the docking cradle 25. The stick vac cleaner is then advantageously in the upright position ready for use.

In order to reduce the tendency for the catch 35 to jam in the locked position under the weight of the stick-vac cleaner 1, which might hinder manual release of the catch 35, the top side 35b of the catch 35 is ramped appropriately (see Figure 4). Alternatively, the top side of the catch 35 may be flat (indicated very schematically by the dotted line B in Figure 6), which has the advantage that the top side cannot then transmit any accidental lateral release force to the catch 35, for example as a result of the handheld cleaner 3 being knocked by a user in the docked position. If the weight of the stick vac cleaner 1 tends to jam the catch 35, it may be possible nevertheless to use a flat profile catch, but provide a small amount of play to allow a user to lift the stick vac cleaner 1 off the catch 35 prior to manual release of the catch; however, care may need to be taken to ensure that there is not sufficient play to allow the socket 33 to pull away from the jack 29 when the stick vac cleaner is in the upright, docked position shown in Figure 6.

This docking station 23 can be secured to the wall 21 using wall-fixing screws (not shown) which are screwed into the wall 21 through countersunk clearance holes (not visible) in the rear wall 25a of the cradle 25. Any other suitably strong conventional

wall-fixings may be used to mount the docking station 23 on the wall 21, including surface fasteners such as adhesive pads or the like.

In this case, the stick-vac cleaner 1 is stored in a fully upright, docked position, with the wand 5 effectively "hanging" vertically downwards. However, this is not considered necessary to obtain the advantages of the invention, provided that the stick-vac cleaner is stored in an upright position.

Figure 7 shows the docking station 23 mounted on the wall 21 in an alternative orientation, using a mounting bracket 39 which is secured to the wall 21 (e.g. using screws) and which is arranged to engage with a mounting lug 41 (Figure 4) on the docking cradle 25 to support the docking station 23 on the wall.

The catch housing 36 incorporates mounting points for a crevice tool and an upholstery brush, which are retained on the catch housing in a friction-fit.

CLAIMS

1. An arrangement comprising: a handheld suction unit in combination with an elongate suction wand to form a stick vac cleaner, the arrangement further comprising a wall-mountable docking station for supporting the stick vac cleaner on a wall in an upright, docked position when not in use, wherein the handheld cleaner is a battery-powered handheld cleaner incorporating a set of exterior charging contacts connected to an onboard rechargeable battery, and the docking station comprises a respective set of charging contacts for connection to a mains supply, the charging contacts on the docking station being arranged for engagement with said exterior charging contacts on the handheld cleaner to form a battery-charging circuit when the stick vac cleaner is in the upright, docked position.

2. An arrangement according to claim 1, wherein the docking station is arranged for engaging the handheld vacuum cleaner part of the stick vac cleaner in order directly to support the hand held vacuum cleaner part of the stick vac cleaner in said upright, docked position.

3. An arrangement according to claim 1, wherein the external charging contacts on the handheld vacuum cleaner are positioned so that they face upwards when the stick vac cleaner is in the upright, docked position, and the charging contacts on the docking station are spring-biased for urging the charging contacts downwardly into engagement with said upward-facing charging contacts on the handheld vacuum cleaner.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 10452-179	**FOR FURTHER ACTION** See item 4 below	
International application No. PCT/CA2007/002211	International filing date *(day/month/year)* 11 December 2007 (11.12.2007)	Priority date *(day/month/year)* 12 December 2006 (12.12.2006)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant GBD CORP.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 June 2009 (16.06.2009)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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P.O. Box 401
40 King Street West
TORONTO, Ontario
Canada, M5H 3Y2

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 21 April 2008 (21-04-2008)

Applicant's or agent's file reference
10452-179

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2007/002211	11 December 2007 (11-12-2007)	12 December 2006 (12-12-2006)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***A47L 9/00*** (2006.01) , ***A47L 11/30*** (2006.01) , ***A47L 9/10*** (2006.01) , ***A47L 9/16*** (2006.01)

Applicant
GBD CORP. ET AL

1. This opinion contains indications relating to the following items :

[X]	Box No. I	Basis of the opinion
[ ]	Box No. II	Priority
[ ]	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
[ ]	Box No. IV	Lack of unity of invention
[X]	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
[ ]	Box No. VI	Certain documents cited
[ ]	Box No. VII	Certain defects in the international application
[ ]	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**
If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	15 April 2008 (15-04-2008)	Siavash Mohajer 819- 934-3466

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CA2007/002211

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   [X] the international application in the language in which it was filed

   [ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of :

   a. type of material

      [ ] a sequence listing

      [ ] table(s) related to the sequence listing

   b. format of material

      [ ] on paper

      [ ] in electronic form

   c. time of filing/furnishing

      [ ] contained in the international application as filed.

      [ ] filed together with the international application in electronic form

      [ ] furnished subsequently to this Authority for the purposes of search.

4. [ ] In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments :

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-4, 7, 8, 10-13, 16-18, 21, and 23-26	YES
	Claims	1, 5, 6, 9, 14, 15, 19, 20, and 22	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-26	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	None	NO

2. Citations and explanations :

D1: EP 0 489 468 A1 (WEISTRA, M.) 10 JUNE 1992 (10.06.1992)
D2: US 2006/0207055 A1 (IVARSSON, B. et al.) 21 SEPTEMBER 2006 (21.09.2006)

D1 disclosed a surface cleaning apparatus comprising a fluid flow path extending from a dirt inlet (15) to a clean fluid outlet (19) and a fluid flow motor (4) positioned in the fluid flow path (col. 3, line 56 - col. 4, line 1); a cyclonic cleaning stage (3) provided in the fluid flow path and comprising a cyclone chamber (10); at least one dirt chamber (5b) in fluid communication with the cyclone chamber and positioned below the cyclone chamber (figs. 1, 3, and 4), the dirt chamber having an upper portion proximate the cyclone chamber, a lower portion, a central axis extending vertically between the upper portion and the lower portion, and a dirt chamber inlet (11) spaced from the central axis (figs. 1 and 4).

D2 disclosed an upright vacuum comprising a plurality of cyclones in parallel (paragraphs 007-009).

Novelty:
Claims 2-4, 7, 8, 10-13, 16-18, 21, and 23-26 are novel and do comply with Article 33(2) of the PCT. Document D1 is considered the closest prior art. The subject matter of claims 2-4 and 16-18 differ from D1 in that although off-center, D1 does not teach or fairly suggest the relative location of the dirt chamber inlet with respect to dirt chamber. With regards to claims 7 and 21, D1 fails to disclose a plate positioned inside the dirt chamber. With regards to claims 8 and 23, D1 does not disclose a perimeter on the upper portion of the dirt chamber. With regards to claims 10-13, D1 fails to disclose the shape and size of the applicant's apparatus. With regards to claims 24-26, D1 fails to disclose a combination of cyclonic stages either in parallel or series.

Claims 1, 5, 6, 9, 14, 15, 19, 20, and 22 are not novel and do not comply with Article 33(2) of the PCT. D1 disclosed the subject matter of claims 1, 14, and 15. With regards to claims 5, 6, 19, 20, and 22, it can be seen in figures 1 and 4 that the cyclonic cleaning stage comprises a dirt outlet positioned at the dirt chamber inlet (11), which is defined in an upper surface of the dirt chamber. Additionally, the dirt chamber inlet is created by an opening in a plate that is adjacent to the cyclonic cleaning stage and the dirt chamber. With regards to claim 9, it can be seen from figures 1 and 4 that the longitudinal axis of the cyclone chamber is spaced apart from the central axis of the dirt chamber.

Inventive Step:

Since claims 1, 5, 6, 9, 14, 15, 19, 20, and 22 are not novel, they also do not involve an inventive step. As such, they do not comply with Article 33(3) of the PCT.

Claims 2-4, 8, 10-13, 16-18, 23, and 24 do not comply with Article 33(3) of the PCT. The subject matter of these claims would have been obvious to a person skilled in the art or science to which they pertain, having regard to D1 in view of common knowledge in the art. Claims 2-4, 8, 10-13, 16-18, and 23 merely recite design features and do not involve an inventive step over D1. The problems solved by said claims would have been obvious to a person skilled in the art having prior knowledge of D1. With regards to claim 24, it would have been obvious to a person skilled in the art to create multiple cyclonic stages in an iterative way to further filter dirty air. Multiple instances of the alleged invention can be connected together to achieve this.

Continued in Supplemental Box on page 4...

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of : Box No. V

Claims 7, 21, 25, and 26 do not comply with Article 33(3) of the PCT. The subject matter of these claims would have been obvious to a person skilled in the art or science to which they pertain, having regard to D1 in view of D2. D1 disclosed the subject matter of the above claims with the exception of the plate being located inside the dirt chamber and multiple cyclones being connected together in parallel. D2 disclosed both of these features. The structure (112, 118, 104') acts as the plate of claims 7 and 21 and is located inside the dirt chamber. Therefore, it would have been obvious for a person skilled in the art having prior knowledge of D1 and D2 to arrive at the subject matter of the above claims.

Industrial Applicability:
The subject matter of claims 1-26 is considered to be industrially applicable and thus complies with the requirements of Article 33(4) of the PCT.

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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR
P.O. Box 401
40 King Street West
TORONTO, Ontario
Canada, M5H 3Y2

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 21 April 2008 (21-04-2008)

Applicant's or agent's file reference
10452-179

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2007/002211	11 December 2007 (11-12-2007)	12 December 2006 (12-12-2006)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***A47L 9/00*** (2006.01) , ***A47L 11/30*** (2006.01) , ***A47L 9/10*** (2006.01) , ***A47L 9/16*** (2006.01)

Applicant
GBD CORP. ET AL

1. This opinion contains indications relating to the following items :

[X]	Box No. I	Basis of the opinion
[ ]	Box No. II	Priority
[ ]	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
[ ]	Box No. IV	Lack of unity of invention
[X]	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
[ ]	Box No. VI	Certain documents cited
[ ]	Box No. VII	Certain defects in the international application
[ ]	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**
If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

dd ent July 01/08 NK
dd ent Oct 12/08 NK

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	15 April 2008 (15-04-2008)	Siavash Mohajer 819- 934-3466

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CA2007/002211

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   [X] the international application in the language in which it was filed

   [ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of :

   a. type of material

      [ ] a sequence listing

      [ ] table(s) related to the sequence listing

   b. format of material

      [ ] on paper

      [ ] in electronic form

   c. time of filing/furnishing

      [ ] contained in the international application as filed.

      [ ] filed together with the international application in electronic form

      [ ] furnished subsequently to this Authority for the purposes of search.

4. [ ] In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments :

Dyson Ex1004
Page 626

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-4, 7, 8, 10-13, 16-18, 21, and 23-26	YES
	Claims	1, 5, 6, 9, 14, 15, 19, 20, and 22	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-26	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	None	NO

2. Citations and explanations :

D1: EP 0 489 468 A1 (WEISTRA, M.) 10 JUNE 1992 (10.06.1992)
D2: US 2006/0207055 A1 (IVARSSON, B. et al.) 21 SEPTEMBER 2006 (21.09.2006)

D1 disclosed a surface cleaning apparatus comprising a fluid flow path extending from a dirt inlet (15) to a clean fluid outlet (19) and a fluid flow motor (4) positioned in the fluid flow path (col. 3, line 56 - col. 4, line 1); a cyclonic cleaning stage (3) provided in the fluid flow path and comprising a cyclone chamber (10); at least one dirt chamber (5b) in fluid communication with the cyclone chamber and positioned below the cyclone chamber (figs. 1, 3, and 4), the dirt chamber having an upper portion proximate the cyclone chamber, a lower portion, a central axis extending vertically between the upper portion and the lower portion, and a dirt chamber inlet (11) spaced from the central axis (figs. 1 and 4).

D2 disclosed an upright vacuum comprising a plurality of cyclones in parallel (paragraphs 007-009).

Novelty:
Claims 2-4, 7, 8, 10-13, 16-18, 21, and 23-26 are novel and do comply with Article 33(2) of the PCT. Document D1 is considered the closest prior art. The subject matter of claims 2-4 and 16-18 differ from D1 in that although off-center, D1 does not teach or fairly suggest the relative location of the dirt chamber inlet with respect to dirt chamber. With regards to claims 7 and 21, D1 fails to disclose a plate positioned inside the dirt chamber. With regards to claims 8 and 23, D1 does not disclose a perimeter on the upper portion of the dirt chamber. With regards to claims 10-13, D1 fails to disclose the shape and size of the applicant's apparatus. With regards to claims 24-26, D1 fails to disclose a combination of cyclonic stages either in parallel or series.

Claims 1, 5, 6, 9, 14, 15, 19, 20, and 22 are not novel and do not comply with Article 33(2) of the PCT. D1 disclosed the subject matter of claims 1, 14, and 15. With regards to claims 5, 6, 19, 20, and 22, it can be seen in figures 1 and 4 that the cyclonic cleaning stage comprises a dirt outlet positioned at the dirt chamber inlet (11), which is defined in an upper surface of the dirt chamber. Additionally, the dirt chamber inlet is created by an opening in a plate that is adjacent to the cyclonic cleaning stage and the dirt chamber. With regards to claim 9, it can be seen from figures 1 and 4 that the longitudinal axis of the cyclone chamber is spaced apart from the central axis of the dirt chamber.

Inventive Step:

Since claims 1, 5, 6, 9, 14, 15, 19, 20, and 22 are not novel, they also do not involve an inventive step. As such, they do not comply with Article 33(3) of the PCT.

Claims 2-4, 8, 10-13, 16-18, 23, and 24 do not comply with Article 33(3) of the PCT. The subject matter of these claims would have been obvious to a person skilled in the art or science to which they pertain, having regard to D1 in view of common knowledge in the art. Claims 2-4, 8, 10-13, 16-18, and 23 merely recite design features and do not involve an inventive step over D1. The problems solved by said claims would have been obvious to a person skilled in the art having prior knowledge of D1. With regards to claim 24, it would have been obvious to a person skilled in the art to create multiple cyclonic stages in an iterative way to further filter dirty air. Multiple instances of the alleged invention can be connected together to achieve this.

Continued in Supplemental Box on page 4...

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box No. V

Claims 7, 21, 25, and 26 do not comply with Article 33(3) of the PCT. The subject matter of these claims would have been obvious to a person skilled in the art or science to which they pertain, having regard to D1 in view of D2. D1 disclosed the subject matter of the above claims with the exception of the plate being located inside the dirt chamber and multiple cyclones being connected together in parallel. D2 disclosed both of these features. The structure (112, 118, 104') acts as the plate of claims 7 and 21 and is located inside the dirt chamber. Therefore, it would have been obvious for a person skilled in the art having prior knowledge of D1 and D2 to arrive at the subject matter of the above claims.

Industrial Applicability:
The subject matter of claims 1-26 is considered to be industrially applicable and thus complies with the requirements of Article 33(4) of the PCT.

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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR
P.O. Box 401
40 King Street West
TORONTO, Ontario
Canada, M5H 3Y2

RECEIVED
APR 29 2008
BERESKIN & PARR

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 21 April 2008 (21-04-2008)
Applicant's or agent's file reference 10452-179	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/CA2007/002211	International filing date *(day/month/year)* 11 December 2007 (11-12-2007)

Applicant
GBD CORP. ET AL

OO ext June 21/08 NR

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19 :
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46) :

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that :

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for the international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Carole Millaire 819- 994-6587

Form PCT/ISA/220 (October 2005) *(See notes on accompanying sheet)*

NOTES TO FROM PCT/ISA/220

These Notes are intended to give instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide,* Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)) :

The amendments must be submitted with a letter.
The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").
The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;
(ii) the claim is cancelled;
(iii) the claim is new;
(iv) the claim replaces one or more claims as filed;
(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter :

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 10452-179	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below
International application No. **PCT/CA2007/002211**	International filing date *(day/month/year)* 11 December 2007 (11-12-2007)	(Earliest)Priority date *(day/month/year)* 12 December 2006 (12-12-2006)
Applicant GBD CORP. ET AL		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I

2. [ ] **Certain claims were found unsearchable** (see Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows :

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2b

[ ] as suggested by the applicant

[X] as selected by this Authority, because the applicant failed to suggest a figure

[ ] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

Dyson Ex1004
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/002211

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***A47L 9/00*** (2006.01) , ***A47L 11/30*** (2006.01) , ***A47L 9/10*** (2006.01) , ***A47L 9/16*** (2006.01)
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 (2006.01): A47L/all, B01D 45/all,
USC: 55/all, 15/all

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

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Delphion, Canadian Patent Database, WEST (cyclone, dirt chamber, axis, off-center OR offset, inlet)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP 0 489 468 A1 (WEISTRA, M.) 10 JUNE 1992 (10.06.1992) *Entire Document*	1-6, 8-20, and 22-24 7, 21, 25, and 26
Y	US 2006/0207055 A1 (IVARSSON, B. et al) 21 SEPTEMBER 2006 (21.09.2006) *Paragraphs 007-009 & Figure 1, 4, 6, and 7*	7, 21, 25, and 26
A	US 5,287,591 A (RENCH, G. et al) 22 FEBRUARY 1994 (22.02.1994) *Figures 1 & 3*	1-26
A	US 5,307,538 A (RENCH, G. et al) 03 MAY 1994 (03.05.1994) *Figures 1 & 3*	1-26
A	US 5,363,535 A (RENCH, G. et al) 15 NOVEMBER 1994 (15.11.1994) *Figures 1 & 3*	1-26
A	US 3,543,325 A (HAMRICK, J.) 01 DECEMBER 1970 (01.12.1970) *Figure 8*	1-26

[X] Further documents are listed in the continuation of Box C. [X] 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
"E" earlier application or patent but published on or after the international filing date
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"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 when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 March 2008 (18-03-2008)	21 April 2008 (21-04-2008)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Siavash Mohajer 819- 934-3466

Dyson Ex1004
Page 633

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,523,936 A (DISANZA, W.) 18 JUNE 1985 (18.06.1985) *Figure 2*	1-26

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2007/002211

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
EP0489468 A1	10-06-1992	JP6052749U U	19-07-1994
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		USRE32788E E	22-11-1988

Dyson Ex1004
Page 635

Electronic Acknowledgement Receipt

EFS ID:	21031355
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Linda Johnson Hodge/Robert Enojado
Filer Authorized By:	Linda Johnson Hodge
Attorney Docket Number:	P46540
Receipt Date:	22-DEC-2014
Filing Date:	18-SEP-2014
Time Stamp:	15:42:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	P46540_IDS.pdf	57749 76c7ce2ed7e0f200b3a278d4d7a1e5713de48b6b	no	6

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49	Foreign Reference	P46540_GB2409404_W1.pdf	3227294 2dccb2c6a155e9fc8ba78cb11970b22ade575ae0	no	24
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50	Foreign Reference	P46540_WO2012042240_X1.pdf	2998858 92c50c5c4dfeee4e6318e331868e345a17819b25	no	23
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52	Foreign Reference	P46540_JP788426_Z1.pdf	424638 8659f4aa57d5993abcc5bd69baa5b32894463d19	no	4
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53	Foreign Reference	P46540_GB2478599_A2.pdf	2570414 0c201d6ccc326aa1cec2a7d819b5f138deef7c42	no	20
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54	Non Patent Literature	P46540_ParticularsofClaim_NPL1.pdf	6970790 35b235f91d630a8486d3b2cd3aeae7e7edd96263	no	37
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55	Non Patent Literature	P46540_Makita_NPL2.pdf	8999748 06301775587128 8f213c52c34347283e364e20b0	no	32

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56	Non Patent Literature	P46540_CanadianOfficeAction772010_NPL3.pdf	85599 f76fd005dc1447bc4fd1b25800f6b5f3534437cc	no	2
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57	Non Patent Literature	P46540_IPRP_WrittenOpinion_12122006_NPL4.pdf	883385 ac838d41ec47be988962e3b20e2dddb640e2d734	no	16
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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New International Application Filed with the USPTO as a Receiving Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/489,646	09/18/2014	Wayne Ernest CONRAD	P46540

CONFIRMATION NO. 6255

7055
GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

PUBLICATION NOTICE

OC000000072645494

Title:SURFACE CLEANING APPARATUS

Publication No.US-2015-0000077-A1
Publication Date:01/01/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors :	Wayne Ernest CONRAD	Conf. No.:	6255
Appl. No. :	14/489,646	Examiner:	Not Yet Assigned
Filed :	September 18, 2014	Group Art Unit:	1776
For :	SURFACE CLEANING APPARATUS		

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In accordance with the duty of disclosure under 37 CFR § 1.56 and §§ 1.97 – 1.98, Applicant(s) wish to bring the following information to the attention of the Examiner.

Applicant(s) wish to make of record the documents listed on the attached form 1449. Copies of the listed documents are attached, where required, as are noted English translations, or partial translations of pertinent portions, and/or English language abstracts, of any non-English language references. The relevance of any document cited in any International/Foreign Search Report or Written Opinion is indicated in the Search Report or Written Opinion.

CERTIFICATION

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. This certification does not apply to any document previously cited in the present application.

☐ Moreover, this communication was not received by any individual designated in §1.56 (c) more than thirty days prior to the filing of the Information Disclosure Statement.

FEES

☐ A payment in the amount required under 37 CFR §1.17(p) is provided herewith.

DEPOSIT ACCOUNT

In the event that any additional fees are due with respect to this paper, the Commissioner is hereby authorized to charge such fees to Deposit Account No. 19-0089 of the undersigned.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Wayne Ernest CONRAD

/Linda J. Hodge/
Linda J. Hodge
Reg. No. 47,348

Branko Pejic
Reg. No. 60255

April 1, 2015
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

FORM 1449 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. P46540	Application No. 14/489,646
	Applicant G.B.D. CORP.	
	Filing Date September 18, 2014	Group 1776

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	A	5379483	01/10/1995	PINO			
	B	8347455	01/08/2013	DYSON et al.			
	C	8302250	11/06/2012	DYSON et al.			
	D	8387204	03/05/2013	DYSON			
	E	8236077	08/07/2012	GOMICIAGA -PEREDA et al.			
	F	8156609	04/17/2012	MILNE et al.			
	G	7931716	04/26/2011	OAKHAM			
	H	8117712	02/21/2012	Dyson			
	I	2009/0313958	12/24/2009	GOMICIAGA -PEREDA et al.			

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		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANS-LATION YES	FAMILY MEMBER YES	ENGLISH ABSTRACT YES
	a	202005020767	08/10/2006	GERMANY			X		
	b	2251178	07/01/1992	UNITED KINGDOM					
	c	60-220027	11/02/1985	JAPAN			X		
	d	63-246116	10/13/1988	JAPAN			X		
	e								
	f								
	g								

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	1	What's the Best vacuum.com Forum discussion "Dyson DC16 Root 6 Hand Held Vacuum Cleaner; http://www.abbysguide.com/vacuum/legacy/cgi-bin/yabb/2618~YaBB.html; dated October 21, 2006.
	2	

EXAMINER	DATE CONSIDERED

*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

********** Cover Page **********

Delivery Information

Time of Request: Wednesday, March 11, 2015 14:09:44
Client ID/Project Name: OX
Number of Lines: 190
Job Number: 2827:504237041

Research Information

Source: DE
Search Terms: (pub-id(DE202005020767U1))

1 of 1 DOCUMENT

DE202005020767U1 2006-08-10 Suction nozzle for low power upright vacuum cleaner, has suction passage delimited by front wall and rear wall such that front wall forms arc of circle symmetric with respect to middle of passage (en)

English Abstract:

The nozzle has a soleplate (26) to be moved on a surface to be cleaned, by wheels (36). The soleplate is covered by a cap and has a suction passage (28) opened towards the surface and extends on the length of the nozzle by connecting two lateral edges of the nozzle. The passage is delimited by a front wall (38) and a rear wall (39) such that the front wall forms an arc of circle symmetric with respect to middle of the passage. An independent claim is also included for wastes collecting electric apparatus of upright vacuum cleaner type.

Normalized Assignees: SEB

Standardized Assignees: SEB

Original Assignees: SEB S.A., French Republic

Attorneys: Prinz und Partner GbR, 80335 München

Application Number: DE202005020767

Application/Filing Date: 2005-04-29

Priority Number and Date: FR04006167A 2004-06-08; EP05356070A 2005-04-29

Classifications:
CPC: A47L5/28 (2013-01-01; I 2013-01-01; B, H, EP)
CPC: A47L9/02 (2013-01-01; I 2013-01-01; B, H, EP)
CPC: A47L9/2878 (2013-01-01; I 2013-01-01; B, H, EP)
ECLA: A47L9/28P4; A47L5/28; A47L9/02
IPC[8]: A47L9/02 (2006-01-01; A, F, I, 2006-05-05; B, H, DE)

Patent References Cited-Forward:

Publication Number
EP2449935A1
DE102011077293A1

English Description:

[0001] The available invention concerns a vacuum cleaner suction device and in particular an improvement of the efficiency during the waste collection by such a suction device. [0002] The available invention refers to vacuum cleaners of small achievement, how those, which are held over a handle in the hand and over a suction device connected with the body of the vacuum cleaner on the ground to rest upon. In that the far following description are characteristic such devices with the term „Handstaubsauger ". [0003] Handstaubsauger exhibit frequently batteries, with which their use can be simplified, which limit however the available achievement still more. [0004] In numerous block letters are handvacuum cleaner-described, particularly regarding the certain structure of the substantial building groups and/or the specific arrangement of the cleaning accessories. [0005] For example a Handstaubsauger is descriptive in the EP 1,033,101, with

which the handle is fold upable. [0010] Will obtained the available invention with the help of a vacuum cleaner suction device of essentially rectangular form with a sole, which is intended in addition, by means of wheels or skids on one surface which can be cleaned to be moved whereby the sole is taken off by a hood and exhibits a Saugkanal, which to the surface which can be cleaned is open and over the width of the suction device extended, whereby it interconnects the two side edges of the suction device, as well as with a pipe for connection with the body of the vacuum cleaner, which in the back is arranged at the suction device, whereby the pipe is connected with this by a line for instance in the center of the Saugkanals, by the fact characterized that the Saugkanal is limited by a Vorderwand and a rear wall and that the Vorderwand forms a circular arc symmetrical regarding the center of the channel. [0011] If the suction device is pushed forward onto surfaces by the kind of a carpet, on the one hand the Flor of the carpet can be subjected by a movement exhibiting a lateral component differently due to the circular arc form of the Vorderwand, which limits the Saugkanal, and on the other hand it can be avoided that a frontal „attack " - edge precedes, which can make a moving more difficult of the suction device on such surfaces. [0006] Only few block letters are concerned however with the vacuum cleaner suction device of these devices, which witnesses of the fact that regarding the improvement and/or optimization of this waste collecting means little research is operated. [0007] So description those US 5.107.567 a Handstaubsauger attached to electricity mains, whereby the suction device of this vacuum cleaner exhibits a centric Saugöffnung, which is bound by a brush at a side, which is operated with on height of the hood of the suction device pedal present. The suction device is provided with small wheels. With an improved execution form the brush is arranged in the Saugkanal and exhibits the suction device large wheels, with which it can be more easily moved. [0008] However no referring to efforts or to an optimization of the characteristics of the suction device to the increase of the suction efficiency of the product is to be found. [0009] One of the tasks of the invention consists of suggesting a vacuum cleaner suction device for Niederleistungs Handstaubsauger whose efficiency for the available achievement was optimized, in order to improve the yield during the waste collection with such devices. [0012] The same organization exhibits the Saugkanal limiting rear wall in favourable way, by forming a circular arc symmetrical regarding the Vorderwand. [0013] Since the Saugkanal extends over the width of the suction device, it is necessary to optimize the size of its surface, which is with the floor which can be cleaned in contact. A too large surface would make it more difficult to move the suction device. Thus the radius of curvature, which the suction channel delimitation front wall and/or - rear wall exhibits, amounts to more as 500 mm and preferably less than 1000 mm. [0014] In the context of the same considerations the efficiency of the suction device arranged at a Handstaubsauger exhibits good values under consideration of its small achievement, if those amounts to width of the Saugkanals on height of the side edges of the suction device less than 15 mm and amounts to the width of the Saugkanals in its center from 20 to mm. [0015] For the increase of the efficiency during the waste collection on floors of the kind of a carpet the Vorderwand and the rear wall, which limit the Saugkanal, stand out regarding the SohDE 20 2005 020,767 U1 2006.08.10 le. These walls form stripping rails, which make possible when their over driving the grounds mentioned in certain way that on the one hand the Teppichbodenflor is scraped and on the other hand the dust is discharged, if the Flor returns to the admission by the walls to its position. [0016] Another, im übrigen little examined parameters is the depth of the Saugkanals in the suction device. With consideration of the characteristics of the product and above all small engine performance good power ratings were obtained, as the depth of the channel was gradually changed from the edges to the center. The best results were received if the Saugkanal exhibits a depth increasing from the side edges to the center, whereby the depth on height of the edges amounts to less than 2 mm and amounts to foremost within the range of the center, connection with the line, from 5 to 8 mm. [0017] The available invention can be used at the best in connection with electrical waste catching equipment of the kind of a Handstaubsaugers, with a housing, in which in particular an engine and a dropping running device are taken up, whereby the equipment has a handle, which end in a handle, as well as a suction device connected by a pipe with the housing of the vacuum cleaner, whereby the pipe with the dropping running device is located in flow connection, whereby the suction device exhibits at least one that characteristics managing specified. [0018] Favourable way amounts to the electrical achievement of the engine of the equipment less than 500 W, whereby the characteristics of the suction device were compiled particularly for low achievements. [0019] So that the equipment is to be used more easily, its engine is fed by batteries, which are accommodated in the housing of the equipment, whereby the equipment is independent and does not have to its use to electricity mains to be attached. [0020] The invention becomes better understandable on the basis the following description with reference to the attached designs; in it show: [0021] FjgLi a schematic opinion of a Handstaubsaugers according to invention

generally speaking, [0022] Fig. 2 a perspective opinion of the vacuum cleaner suction device in accordance with the invention, [0023] Fig. 3 an opinion of the suction device from downside, [0024] Fig. 4 an opinion along the axle A-A von Fig. 3. [0025] Fig. 5 an opinion along the axle B-B von Fsei. 3. [0026] Fig. 6 a slightly perspective side view of the suction device, [0027] Fig. 7 a perspective front view of the suction device, without the protection hood, [0028] Fia 8 and Fig. 9 side views of the suction device with drawn in brush and/or driven out brush. [0029] In Fig. 1 represented vacuum cleaners 1 is of the kind of a Handstaubsaugers and exhibits thus a housing 2 upward extended by a handle 4. The housing contains into actually well-known way an engine 6 and with the engine in flow connection standing waste separates device 10. with the represented example acts it during the dropping running device around a Staubbeutel; in the context of the invention however also a separating equipment, working by means of inertia or cyclone effect, can be considered. The separating equipment is taken up in a herausnehmbaren container 12, in order to facilitate the cleaning or the exchange of the dropping running device. [0030] The engine can be supplied via the net with river or preferably by loadable batteries 8. the achievement of the vacuum cleaner provided with batteries in the represented form amounts to 300 W. the start-up of the vacuum cleaner is guaranteed by a switch 14, which preferably lies in the proximity of the handle 4. [0031] The housing 2 is by means of a pipe 16, which stands with the dropping running device in flow connection, connected with a suction device 20. This pipe is attached over a knee pipe 18 attached articulated at the suction device at the suction device. [0032] The suction device 20 is symmetrical concerning the axle x-x' the pipe 18. It exhibits a sole 26 taken off by a hood 24, those in Fsei. 6 to see good is and are attached to the four wheels 36, so that the suction device can be moved more easily. The sole exhibits itself an opening, which is turned to the surface which can be cleaned and which Saugkanal 28 forms, that from a side edge of the suction device on the other hand extended, whereby it is limited by two walls, a Vorderwand 38 and a rear wall 39, which the edges of the channel form. Over a line 29, those in the Fig. 5 and Fig. 7 to see is and over an opening the 30 in the center of the Saugkanals in these essentially flows, is flowmoderately connected with the knee pipe 18 the channel. DE 20 2005 020,767 U1 2006.08.10 [0033] furthermore the suction device exhibits two thread tearing strips 32, which are arranged on both sides the Saugkanals. Beyond that a brush 34, which essentially extends over the width of the suction device, in the proximity of the front edge of the suction device is arranged. With an operating pedal 22, which is on height of the hood of the suction device, the brush can be brought in and/or lowered with the help of an operating plate 23, which has a lever force on the brush 34, regarding the sole of the suction device. [0034] The available invention refers primarily to the characteristics of the Saugkanals 28 in connection with the small achievement of the engine. [0035] One of the characteristics of this channel is the increase of its cross section of the side edge of the suction device out up to their center and for opening 30. Into the Fig. 3 and Fig. 4 the increase the width can be also reconstructed and/or the depth of the channel. [0036] Thus lies in Fig. 3 with 1 designated width of the Saugkanals on height of the side edges of the suction device in the order of magnitude of 13 mm. In the proximity width of the same channel in the order of magnitude of 22 mm, the named L, is appropriate for the opening 30. [0037] Besides those increases width of the Saugkanals by the circular arc form of the Vorderwand 38 of the channel constantly gradually, which makes in particular better air flows possible in the channel. [0038] As in Fig. 4 to see good is, increases besides the depth of the Saugkanals on the basis of one of the side edges of the suction device for centric opening 30 by a gradual inclination of the wall limiting the channel in its depth ever more. On height of the edges the opening is thus in the order of magnitude of 2 mm, with an easy rise because of the edges of approximately 1 mm, while in the proximity of the opening 30 depth of the Saugkanals the named h amounts to 6 mm. [0039] With this „very good results can three-dimensional " increase of the cross section be obtained during the waste collection, since thereby air speeds can be completely gradually increased to height of the edges of the suction device, which favours a gathering of the waste. [0040] In addition the turbulences arising in the Saugkanal can be substantially reduced by this gradual cross section increase. For the restriction of the air turbulences besides the connection between the Saugkanal and the line 29 over the opening 30 was compiled, essentially as the radii of curvature 43 were increased the connection of forming walls. [0041] Additionally the two walls 38, 39 stand slightly over the sole out and provide thereby before sucking for a stripping effect on the ground. From the Fig. it is well evident to 8 that the walls of the Saugkanals. With the suggested example are the walls 38, 39 nevertheless, if the suction device stands on the wheels, 0.5 to 1 mm distant from the ground; the stripping effect develops thus only on floors of the kind of a carpet, where the wheels sink easily into the ground. [0042] A further characteristic of the suction device in the presented form concerns the stripping brush 34, which is arranged in the proximity of the front edge of the suction device and exhibits recesses, which make that stripping

ranges alternate 44 with openings 40, 42, the ranges for sucking in for rougher dropping hurry possible represent, whereby the middle opening is larger 42 than the openings 40. If the brush drove out, if the suction device drives over the ground, the ground which can be cleaned and in particular the fibers cannot thus only be subjected to carpets, but be aspirated by the openings 40, 42 also rougher dropping hurry, thus such, which would move the brush over before itself, if the openings were missing. [0043] Beyond that becomes, as in the Fig. 8 and Fig. shown 9, if the brush 34 is driven out by means of a turn of the operating pedal 22, the front part of the suction device raised; the front wheels 36 do not rest upon any longer the ground and the suction device stand then in the back on the wheels and in front on the brush. Any wedging rougher dropping hurry is avoided by this raising of the suction device (i.e. those, which penetrate 40, 42 by the openings into the Saugkanal), whereby it more easily will to take them over the different lines out of the suction device.

Number of Claims: 9

ENGLISH CLAIMS:

1. Vacuum cleaner suction device (20) by essentially rectangular form, with a sole (26), which in addition is intended, by means of wheels (36) or skids on one surface which can be cleaned to be moved, whereby the sole (26) is taken off by a hood (24) and a Saugkanal (28) exhibits, to the one which can be cleaned the surface is open and itself over the width of the suction device (20) extended, whereby it interconnects the two side edges of the suction device, as well as with a pipe (18) for connection with the body of the vacuum cleaner, which is arranged in the back at the suction device (20), whereby the pipe over a line (29) for instance in the DE 20 2005 020,767 U1 2006.08.10 in the middle of the Saugkanals (28) connected with this is characterized, by the fact that the Saugkanal (28) is limited by a Vorderwand (38) and a rear wall (39) and that the Vorderwand (38) forms one regarding the center of the channel (28) symmetrical circular arcs.

2. Vacuum cleaner suction device (20) according to the preceding requirement, by the fact characterized that the Saugkanal (28) limiting rear wall (39) forms for one regarding the Vorderwand (38) symmetrical circular arcs.

3. Vacuum cleaner suction device (20) after one of the preceding requirements, by the fact characterized that the radius of curvature, which the suction channel delimitation front wall and/or - rear wall exhibits, more as 500 mm and preferably less than 1000 mm amounts to.

4. Vacuum cleaner suction device (20) after one of of the preceding requirements, by the fact characterized that those width (1) of the Saugkanals (28) on height of the side edges of the suction device (20) less than 15 mm amounts to and the fact that those width (L) of the Saugkanals (28) in its center from 20 to mm amounts to.

5. Vacuum cleaner suction device (20) according to the preceding requirement, by the fact characterized that the Vorderwand (38) and the rear wall (39), which the Saugkanal (28) limit, regarding the sole (26).

6. Vacuum cleaner suction device (20) after one of of the preceding requirements, by the fact characterized that the Saugkanal (28) increasing a depth of the side edges of the suction device (20) to the center (h) exhibits, whereby the depth (h) on height of the edges less than 2 mm amounts to and within the range of the center, before the connection with the line (29), from 5 to 8 mm amounts to.

7. Electrical waste catching equipment (1) of the kind of a Handstaubsaugers, with a housing (2), in which in particular an engine (6) and a dropping running device (10) is taken up, whereby the equipment (1) a handle, which in a handle (4) ends, as well as one over a pipe (16) with the housing (2) of the equipment (1) connected suction device (20) has, whereby the pipe (16) with the dropping running device (10) in flow connection stands, by the fact characterized that the suction device (20) is trained in accordance with one of the requirements 1 to 6.

8. Electrical waste catching equipment (1) according to the preceding requirement, by the fact characterized that the electrical achievement of the engine (6) less than 500 W amounts to.

9. Electrical waste catching equipment (1) according to the preceding requirement, by the fact characterized that the engine (6) of batteries (8) is fed, which in the housing (2) of the equipment is accommodated.

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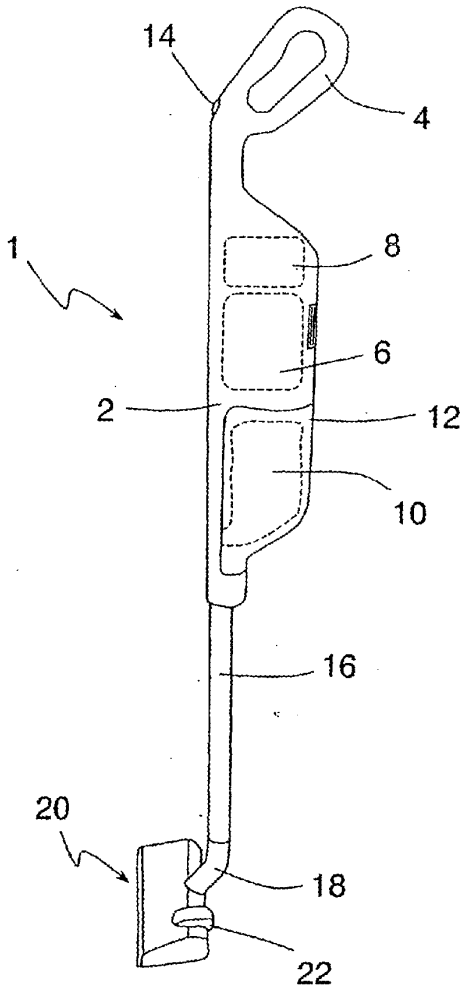
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(54) Bezeichnung: **Staubsauger-Saugvorrichtung**

(57) Hauptanspruch: Staubsauger-Saugvorrichtung (20) von im wesentlichen rechteckiger Form, mit einer Sohle (26), die dazu vorgesehen ist, mittels Rädern (36) oder Kufen auf einer zu reinigenden Fläche bewegt zu werden, wobei die Sohle (26) von einer Haube (24) abgedeckt ist und einen Saugkanal (28) aufweist, der zu der zu reinigenden Fläche hin offen ist und sich über die Breite der Saugvorrichtung (20) erstreckt, wobei er die beiden Seitenränder der Saugvorrichtung miteinander verbindet, sowie mit einem Rohr (18) zur Verbindung mit dem Körper des Staubsaugers, das hinten an der Saugvorrichtung (20) angeordnet ist, wobei das Rohr über eine Leitung (29) etwa in der Mitte des Saugkanals (28) mit diesem verbunden ist, dadurch gekennzeichnet, dass der Saugkanal (28) von einer Vorderwand (38) und einer Rückwand (39) begrenzt ist und dass die Vorderwand (38) einen in Bezug auf die Mitte des Kanals (28) symmetrischen Kreisbogen bildet.



Beschreibung

[0001] Die vorliegende Erfindung betrifft eine Staubsauger-Saugvorrichtung und insbesondere eine Verbesserung der Effizienz bei der Abfallsammlung durch eine solche Saugvorrichtung.

[0002] Die vorliegende Erfindung bezieht sich auf Staubsauger von geringer Leistung, wie diejenigen, die über einen Stiel in der Hand gehalten werden und über eine mit dem Körper des Staubsaugers verbundene Saugvorrichtung auf dem Boden aufliegen. In der weiter folgenden Beschreibung sind derartige Geräte mit dem Begriff „Handstaubsauger" bezeichnet.

[0003] Handstaubsauger weisen häufig Batterien auf, mit denen sich ihr Gebrauch vereinfachen lässt, die jedoch die verfügbare Leistung noch mehr begrenzen.

[0004] In zahlreichen Druckschriften sind Handstaubsauger beschrieben, vor allem hinsichtlich der bestimmten Struktur der wesentlichen Baugruppen bzw. der spezifischen Anordnung der Reinigungszubehörteile.

[0005] Beispielsweise ist in der EP 1 033 101 ein Handstaubsauger beschrieben, bei dem der Stiel zusammenklappbar ist.

[0006] Nur wenige Druckschriften befassen sich jedoch mit der Staubsauger-Saugvorrichtung dieser Geräte, was davon zeugt, dass in Bezug auf die Verbesserung und/oder Optimierung dieses Abfallsammelmittels wenig Forschung betrieben wird.

[0007] So beschreibt die US 5,107,567 einen an das Stromnetz angeschlossenen Handstaubsauger, wobei die Saugvorrichtung dieses Staubsaugers eine mittige Saugöffnung aufweist, die an einer Seite von einer Bürste berandet ist, die mit einem auf Höhe der Haube der Saugvorrichtung befindlichen Fußhebel betätigt wird. Die Saugvorrichtung ist mit kleinen Rädern versehen. Bei einer verbesserten Ausführungsform ist die Bürste im Saugkanal angeordnet und weist die Saugvorrichtung große Räder auf, mit denen sie leichter fortbewegt werden kann.

[0008] Es sind jedoch keinerlei Hinweise auf Bestrebungen oder auf eine Optimierung der Merkmale der Saugvorrichtung zur Erhöhung der Saugeffizienz des Produkts zu finden.

[0009] Eine der Aufgaben der Erfindung besteht darin, eine Staubsauger-Saugvorrichtung für Niederleistungs-Handstaubsauger vorzuschlagen, deren Effizienz für die verfügbare Leistung optimiert wurde, um die Ausbeute bei der Abfallsammlung bei derartigen Geräten zu verbessern.

[0010] Die vorliegende Erfindung wird mit Hilfe einer Staubsauger-Saugvorrichtung von im wesentlichen rechteckiger Form erzielt, mit einer Sohle, die dazu vorgesehen ist, mittels Rädern oder Kufen auf einer zu reinigenden Fläche bewegt zu werden, wobei die Sohle von einer Haube abgedeckt ist und einen Saugkanal aufweist, der zu der zu reinigenden Fläche hin offen ist und sich über die Breite der Saugvorrichtung erstreckt, wobei er die beiden Seitenränder der Saugvorrichtung miteinander verbindet, sowie mit einem Rohr zur Verbindung mit dem Körper des Staubsaugers, das hinten an der Saugvorrichtung angeordnet ist, wobei das Rohr über eine Leitung etwa in der Mitte des Saugkanals mit diesem verbunden ist, dadurch gekennzeichnet, dass der Saugkanal von einer Vorderwand und einer Rückwand begrenzt ist und dass die Vorderwand einen in Bezug auf die Mitte des Kanals symmetrischen Kreisbogen bildet.

[0011] Wenn die Saugvorrichtung auf Oberflächen von der Art eines Teppichbodens nach vorne geschoben wird, lässt sich aufgrund der Kreisbogenform der Vorderwand, die den Saugkanal begrenzt, einerseits der Flor des Teppichbodens durch eine eine seitliche Komponente aufweisende Bewegung unterschiedlich beaufschlagen, und andererseits kann vermieden werden, dass eine frontale „Angriffs"-Kante vorausgeht, die das Fortbewegen der Saugvorrichtung auf derartigen Oberflächen erschweren kann.

[0012] Die den Saugkanal begrenzende Rückwand weist in vorteilhafter Weise die gleiche Gestaltung auf, indem sie einen in Bezug auf die Vorderwand symmetrischen Kreisbogen bildet.

[0013] Da sich der Saugkanal über die Breite der Saugvorrichtung erstreckt, ist es erforderlich, die Größe seiner Fläche, die mit dem zu reinigenden Fußboden in Berührung ist, zu optimieren. Eine zu große Fläche würde es nämlich erschweren, die Saugvorrichtung fortzubewegen. So beträgt der Krümmungsradius, den die Saugkanalbegrenzungs-Vorderwand und/oder -Rückwand aufweist, mehr als 500 mm und vorzugsweise weniger als 1000 mm.

[0014] Im Rahmen der gleichen Erwägungen weist die Effizienz der an einem Handstaubsauger angeordneten Saugvorrichtung unter Berücksichtigung seiner geringen Leistung gute Werte auf, wenn die Breite des Saugkanals auf Höhe der Seitenränder der Saugvorrichtung weniger als 15 mm beträgt und die Breite des Saugkanals in seiner Mitte von 20 bis 25 mm beträgt.

[0015] Zur Erhöhung der Effizienz bei der Abfallsammlung auf Fußböden von der Art eines Teppichbodens stehen die Vorderwand und die Rückwand, die den Saugkanal begrenzen, in Bezug auf die Soh-

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le hervor. Diese Wände bilden in gewisser Weise Abstreifschienen, die bei ihrem Überfahren der genannten Böden ermöglichen, dass einerseits der Teppichbodenflor geschabt wird und andererseits der Staub ausgestoßen wird, wenn der Flor nach der Beaufschlagung durch die Wände in seine Stellung zurückkehrt.

[0016] Ein anderer, im übrigen wenig untersuchter Parameter ist die Tiefe des Saugkanals in der Saugvorrichtung. Unter Berücksichtigung der Merkmale des Produkts und vor allem der geringen Motorleistung wurden gute Leistungswerte erzielt, indem die Tiefe des Kanals von den Rändern zur Mitte hin allmählich verändert wurde. Die besten Ergebnisse wurden dann erhalten, wenn der Saugkanal eine von den Seitenrändern zur Mitte hin zunehmende Tiefe aufweist, wobei die Tiefe auf Höhe der Ränder weniger als 2 mm beträgt und im Bereich der Mitte, vor der Verbindung mit der Leitung, von 5 bis 8 mm beträgt.

[0017] Die vorliegende Erfindung lässt sich am besten in Verbindung mit einem elektrischen Abfallauffanggerät von der Art eines Handstaubsaugers anwenden, mit einem Gehäuse, in dem insbesondere ein Motor und eine Abfalltrennvorrichtung aufgenommen sind, wobei das Gerät einen Stiel, der in einem Handgriff endet, sowie eine über ein Rohr mit dem Gehäuse des Staubsaugers verbundene Saugvorrichtung hat, wobei das Rohr mit der Abfalltrennvorrichtung in Strömungsverbindung steht, wobei die Saugvorrichtung wenigstens eines der vorstehend genannten Merkmale aufweist.

[0018] Vorteilhafterweise beträgt die elektrische Leistung des Motors des Gerätes weniger als 500 W, wobei die Merkmale der Saugvorrichtung speziell für niedrige Leistungen erarbeitet wurden.

[0019] Damit das Gerät leichter zu benutzen ist, wird sein Motor von Batterien gespeist, die im Gehäuse des Geräts untergebracht sind, wodurch das Gerät unabhängig ist und zu seiner Verwendung nicht ans Stromnetz angeschlossen werden muss.

[0020] Die Erfindung wird anhand der folgenden Beschreibung unter Bezugnahme auf die beigefügten Zeichnungen besser verständlich; darin zeigen:

[0021] Fig. 1 eine schematische Ansicht eines erfindungsgemäßen Handstaubsaugers im ganzen,

[0022] Fig. 2 eine perspektivische Ansicht der Staubsauger-Saugvorrichtung gemäß der Erfindung,

[0023] Fig. 3 eine Ansicht der Saugvorrichtung von unten,

[0024] Fig. 4 eine Ansicht entlang der Achse A-A von Fig. 3,

[0025] Fig. 5 eine Ansicht entlang der Achse B-B von Fig. 3,

[0026] Fig. 6 eine geringfügig perspektivische Seitenansicht der Saugvorrichtung,

[0027] Fig. 7 eine perspektivische Vorderansicht der Saugvorrichtung, ohne die Schutzhaube,

[0028] Fig. 8 und Fig. 9 Seitenansichten der Saugvorrichtung mit eingezogener Bürste bzw. ausgefahrener Bürste.

[0029] Der in Fig. 1 dargestellte Staubsauger **1** ist von der Art eines Handstaubsaugers und weist somit ein durch einen Handgriff **4** nach oben verlängertes Gehäuse **2** auf. Das Gehäuse enthält in an sich bekannter Weise einen Motor **6** und eine mit dem Motor in Strömungsverbindung stehende Abfalltrennvorrichtung **10**. Bei dem dargestellten Beispiel handelt es sich bei der Abfalltrennvorrichtung um einen Staubbeutel; im Rahmen der Erfindung kann jedoch auch eine mittels Trägheit oder Zyklonwirkung arbeitende Trennvorrichtung in Betracht gezogen werden. Die Trennvorrichtung ist in einem herausnehmbaren Behälter **12** aufgenommen, um die Reinigung oder den Austausch der Abfalltrennvorrichtung zu erleichtern.

[0030] Der Motor kann über das Netz mit Strom versorgt sein oder vorzugsweise mit Hilfe von wiederaufladbaren Batterien **8**. Die Leistung des mit Batterien versehenen Staubsaugers in der dargestellten Form beträgt 300 W. Die Inbetriebnahme des Staubsaugers ist durch einen Schalter **14** sichergestellt, der vorzugsweise in der Nähe des Handgriffs **4** liegt.

[0031] Das Gehäuse **2** ist mittels eines Rohres **16**, das mit der Abfalltrennvorrichtung in Strömungsverbindung steht, mit einer Saugvorrichtung **20** verbunden. Dieses Rohr ist über ein an der Saugvorrichtung gelenkig angebrachtes Knierohr **18** an der Saugvorrichtung angeschlossen.

[0032] Die Saugvorrichtung **20** ist bezüglich der Achse x-x' des Rohres **18** symmetrisch. Sie weist eine von einer Haube **24** abgedeckte Sohle **26** auf, die in Fig. 6 gut zu sehen ist und an der vier Räder **36** angebracht sind, damit sich die Saugvorrichtung leichter fortbewegen lässt. Die Sohle weist eine Öffnung auf, die der zu reinigenden Oberfläche zugewandt ist und den Saugkanal **28** bildet, der sich von einem Seitenrand der Saugvorrichtung zum anderen erstreckt, wobei er von zwei Wänden, einer Vorderwand **38** und einer Rückwand **39**, begrenzt ist, die die Ränder des Kanals bilden. Über eine Leitung **29**, die in den Fig. 5 und Fig. 7 zu sehen ist und die über eine Öffnung **30** im wesentlichen in der Mitte des Saugkanals in diesen mündet, ist der Kanal strömungsmäßig mit dem Knierohr **18** verbunden.

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[0033] Die Saugvorrichtung weist ferner zwei Fadenreißstreifen **32** auf, die beiderseits des Saugkanals angeordnet sind. Darüber hinaus ist eine Bürste **34**, die sich im wesentlichen über die Breite der Saugvorrichtung erstreckt, in der Nähe des vorderen Randes der Saugvorrichtung angeordnet. Mit einem Bedienungs-Fußhebel **22**, der auf Höhe der Haube der Saugvorrichtung liegt, kann die Bürste mit Hilfe einer Betätigungsplatte **23**, die auf die Bürste **34** eine Hebelwirkung hat, in bezug auf die Sohle der Saugvorrichtung eingefahren bzw. abgesenkt werden.

[0034] Die vorliegende Erfindung bezieht sich in erster Linie auf die Merkmale des Saugkanals **28** in Verbindung mit der geringen Leistung des Motors.

[0035] Eines der Merkmale dieses Kanals ist die Zunahme seines Querschnitts vom Seitenrand der Saugvorrichtung aus bis zu deren Mitte und zur Öffnung **30**. In den Fig. 3 und Fig. 4 kann die Zunahme der Breite bzw. der Tiefe des Kanals auch nachvollzogen werden.

[0036] So liegt in Fig. 3 die mit **1** bezeichnete Breite des Saugkanals auf Höhe der Seitenränder der Saugvorrichtung in der Größenordnung von 13 mm. In der Nähe der Öffnung **30** liegt die mit L bezeichnete Breite desselben Kanals in der Größenordnung von 22 mm.

[0037] Zudem nimmt die Breite des Saugkanals durch die Kreisbogenform der Vorderwand **38** des Kanals stetig allmählich zu, was insbesondere bessere Luftströmungen im Kanal ermöglicht.

[0038] Wie in Fig. 4 gut zu sehen ist, erhöht sich überdies die Tiefe des Saugkanals ausgehend von einem der Seitenränder der Saugvorrichtung zur mittigen Öffnung **30** hin durch eine allmähliche Neigung der den Kanal in seiner Tiefe begrenzenden Wand **40** immer mehr. Auf Höhe der Ränder liegt die Öffnung somit in der Größenordnung von 2 mm, mit einem leichten Anstieg an den Rändern von ungefähr 1 mm, während in der Nähe der Öffnung **30** die mit h bezeichnete Tiefe des Saugkanals 6 mm beträgt.

[0039] Mit dieser „dreidimensionalen" Erhöhung des Querschnitts lassen sich sehr gute Ergebnisse bei der Abfallsammlung erzielen, da dadurch die Luftgeschwindigkeiten auf Höhe der Ränder der Saugvorrichtung ganz allmählich erhöht werden können, was das Aufsammeln des Abfalls begünstigt.

[0040] Außerdem können die im Saugkanal auftretenden Turbulenzen durch diese allmähliche Querschnittserhöhung erheblich verringert werden. Zur Einschränkung der Luftverwirbelungen wurde überdies die Verbindung zwischen dem Saugkanal und der Leitung **29** über die Öffnung **30** erarbeitet, im wesentlichen indem die Krümmungsradien **43** der die Verbindung bildenden Wände erhöht wurden.

[0041] Zusätzlich stehen die beiden Wände **38**, **39** geringfügig über die Sohle hervor und sorgen damit vor dem Saugen für eine Abstreifwirkung auf dem Boden. Aus der Fig. 6 ist gut ersichtlich, dass die Wände des Saugkanals hervorstehen. Bei dem vorgeschlagenen Beispiel sind die Wände **38**, **39** dennoch, wenn die Saugvorrichtung auf den Rädern steht, 0,5 bis 1 mm vom Boden entfernt; die Abstreifwirkung entsteht also nur auf Fußböden von der Art eines Teppichbodens, wo die Räder leicht in den Boden einsinken.

[0042] Eine weitere Besonderheit der Saugvorrichtung in der vorgestellten Form betrifft die Abstreifbürste **34**, die in der Nähe des Vorderrandes der Saugvorrichtung angeordnet ist und Aussparungen aufweist, die ermöglichen, dass sich Abstreifbereiche **44** mit Öffnungen **40**, **42** abwechseln, die Bereiche zum Ansaugen gröberer Abfallteile darstellen, wobei die mittlere Öffnung **42** größer ist als die Öffnungen **40**. Wenn die Bürste ausgefahren ist, können, wenn die Saugvorrichtung über den Boden fährt, somit nicht nur der zu reinigende Boden und insbesondere die Fasern von Teppichböden beaufschlagt werden, sondern durch die Öffnungen **40**, **42** auch gröbere Abfallteile eingesaugt werden, also solche, die die Bürste vor sich herschieben würde, wenn die Öffnungen nicht vorhanden wären.

[0043] Darüber hinaus wird, wie in den Fig. 8 und Fig. 9 gezeigt, wenn die Bürste **34** mittels einer Drehung des Bedienungs-Fußhebels **22** ausgefahren wird, der vordere Teil der Saugvorrichtung angehoben; die vorderen Räder **36** liegen nicht mehr auf dem Boden auf und die Saugvorrichtung steht dann hinten auf den Rädern und vorne auf der Bürste. Durch dieses Anheben der Saugvorrichtung wird jegliches Verkeilen gröberer Abfallteile vermieden (d.h. derjenigen, die durch die Öffnungen **40**, **42** in den Saugkanal eindringen), wobei es dadurch leichter wird, sie über die verschiedenen Leitungen aus der Saugvorrichtung zu entnehmen.

Schutzansprüche

1. Staubsauger-Saugvorrichtung (**20**) von im wesentlichen rechteckiger Form, mit einer Sohle (**26**), die dazu vorgesehen ist, mittels Rädern (**36**) oder Kufen auf einer zu reinigenden Fläche bewegt zu werden, wobei die Sohle (**26**) von einer Haube (**24**) abgedeckt ist und einen Saugkanal (**28**) aufweist, der zu der zu reinigenden Fläche hin offen ist und sich über die Breite der Saugvorrichtung (**20**) erstreckt, wobei er die beiden Seitenränder der Saugvorrichtung miteinander verbindet, sowie mit einem Rohr (**18**) zur Verbindung mit dem Körper des Staubsaugers, das hinten an der Saugvorrichtung (**20**) angeordnet ist, wobei das Rohr über eine Leitung (**29**) etwa in der

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Mitte des Saugkanals (**28**) mit diesem verbunden ist, **dadurch gekennzeichnet**, dass der Saugkanal (**28**) von einer Vorderwand (**38**) und einer Rückwand (**39**) begrenzt ist und dass die Vorderwand (**38**) einen in Bezug auf die Mitte des Kanals (**28**) symmetrischen Kreisbogen bildet.

2. Staubsauger-Saugvorrichtung (**20**) nach dem vorhergehenden Anspruch, dadurch gekennzeichnet, dass die den Saugkanal (**28**) begrenzende Rückwand (**39**) einen in Bezug auf die Vorderwand (**38**) symmetrischen Kreisbogen bildet.

3. Staubsauger-Saugvorrichtung (**20**) nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass der Krümmungsradius, den die Saugkanalbegrenzungs-Vorderwand und/oder -Rückwand aufweist, mehr als 500 mm und vorzugsweise weniger als 1000 mm beträgt.

4. Staubsauger-Saugvorrichtung (**20**) nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Breite (**1**) des Saugkanals (**28**) auf Höhe der Seitenränder der Saugvorrichtung (**20**) weniger als 15 mm beträgt und dass die Breite (L) des Saugkanals (**28**) in seiner Mitte von 20 bis 25 mm beträgt.

5. Staubsauger-Saugvorrichtung (**20**) nach dem vorhergehenden Anspruch, dadurch gekennzeichnet, dass die Vorderwand (**38**) und die Rückwand (**39**), die den Saugkanal (**28**) begrenzen, in Bezug auf die Sohle (**26**) hervorstehen.

6. Staubsauger-Saugvorrichtung (**20**) nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass der Saugkanal (**28**) eine von den Seitenrändern der Saugvorrichtung (**20**) zur Mitte hin zunehmende Tiefe (h) aufweist, wobei die Tiefe (h) auf Höhe der Ränder weniger als 2 mm beträgt und im Bereich der Mitte, vor der Verbindung mit der Leitung (**29**), von 5 bis 8 mm beträgt.

7. Elektrisches Abfallauffanggerät (**1**) von der Art eines Handstaubsaugers, mit einem Gehäuse (**2**), in dem insbesondere ein Motor (**6**) und eine Abfalltrennvorrichtung (**10**) aufgenommen sind, wobei das Gerät (**1**) einen Stiel, der in einem Handgriff (**4**) endet, sowie eine über ein Rohr (**16**) mit dem Gehäuse (**2**) des Geräts (**1**) verbundene Saugvorrichtung (**20**) hat, wobei das Rohr (**16**) mit der Abfalltrennvorrichtung (**10**) in Strömungsverbindung steht, dadurch gekennzeichnet, dass die Saugvorrichtung (**20**) gemäß einem der Ansprüche 1 bis 6 ausgebildet ist.

8. Elektrisches Abfallauffanggerät (**1**) nach dem vorhergehenden Anspruch, dadurch gekennzeichnet, dass die elektrische Leistung des Motors (**6**) weniger als 500 W beträgt.

9. Elektrisches Abfallauffanggerät (**1**) nach dem vorhergehenden Anspruch, dadurch gekennzeichnet, dass der Motor (**6**) von Batterien (**8**) gespeist ist, die im Gehäuse (**2**) des Geräts untergebracht sind.

Es folgen 5 Blatt Zeichnungen

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Anhängende Zeichnungen

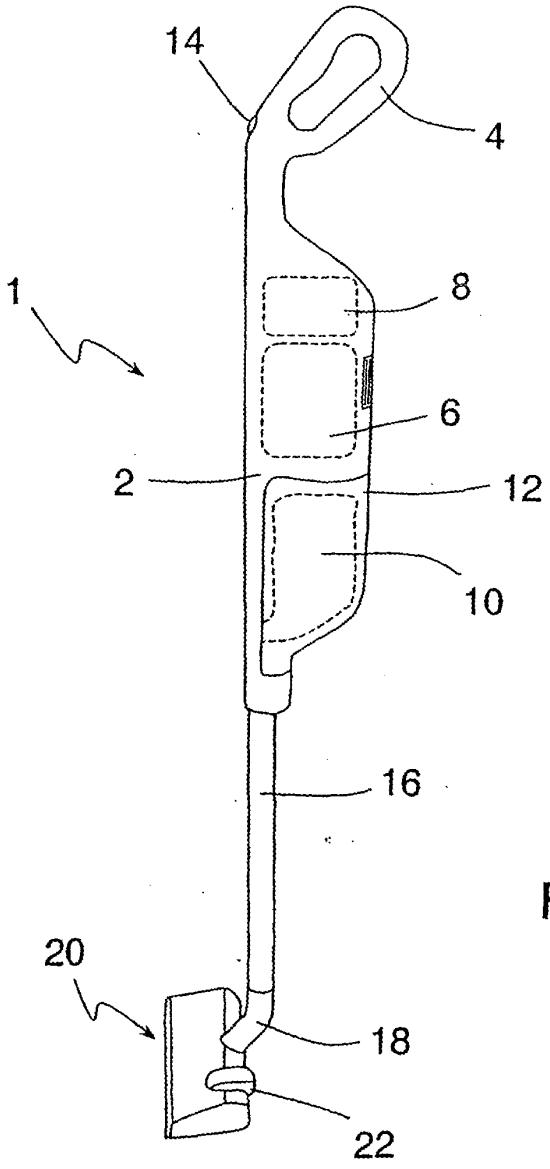


FIG.1

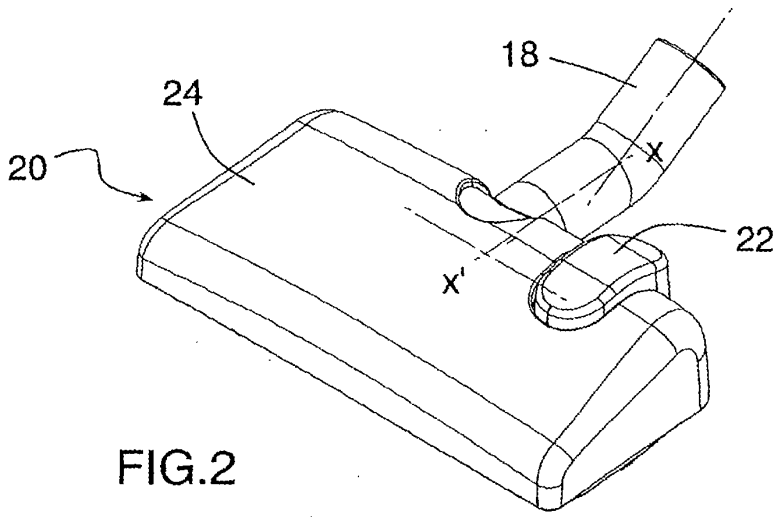

18
24
20
X
22
X'

FIG.2

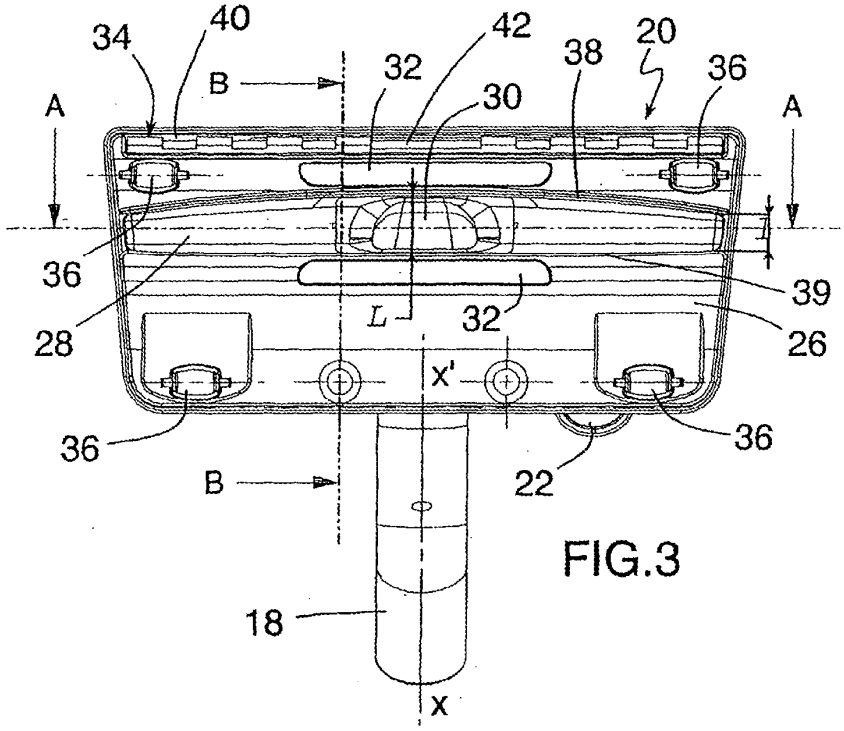

34
40
42
20
38
36
B
32
30
A
A
36
39
L
32
28
26
X'
36
36
B
22
18
X

FIG.3

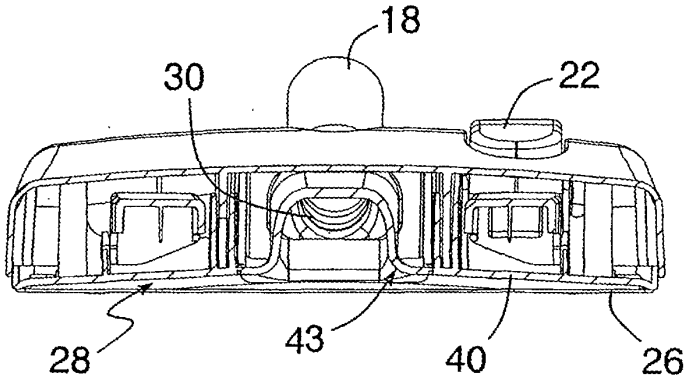


FIG.4

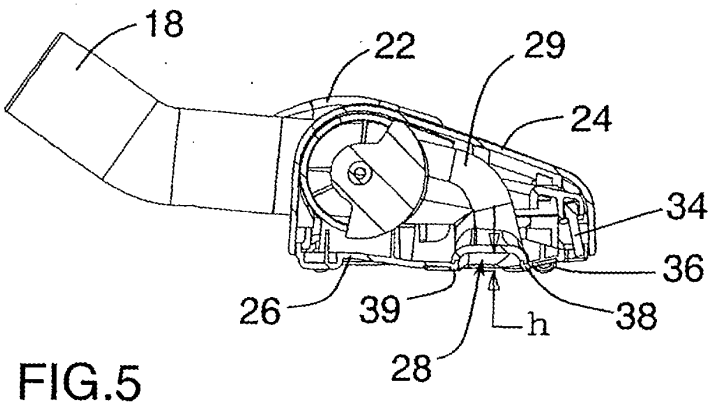


FIG.5

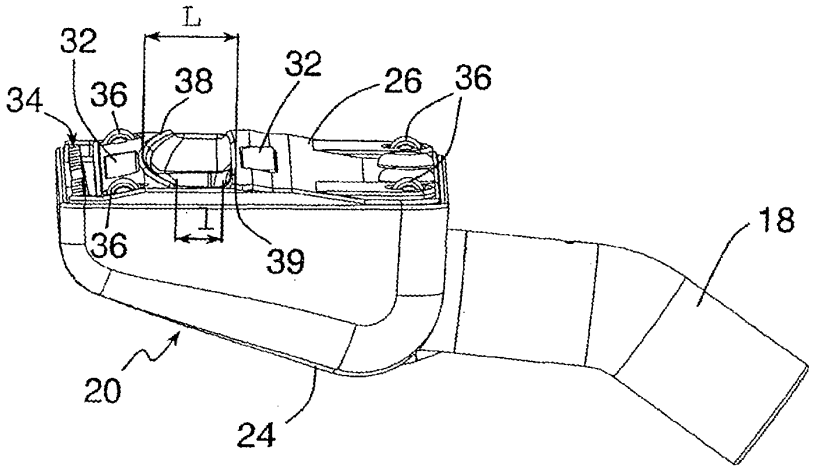


FIG.6

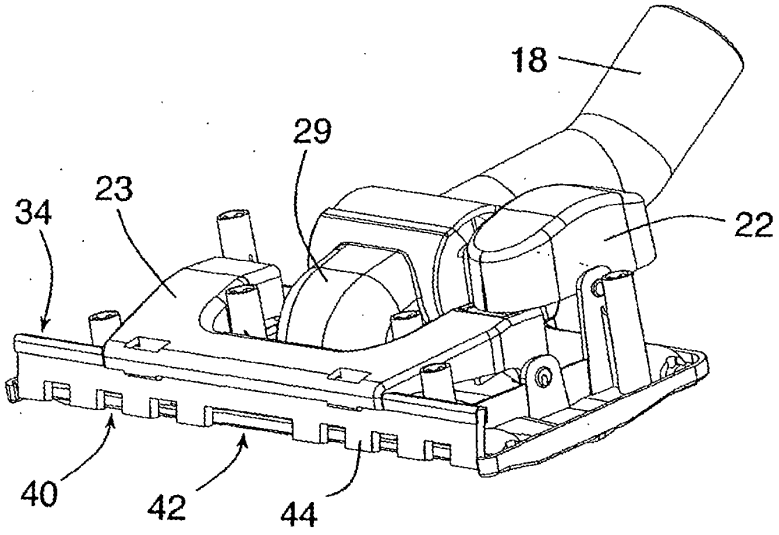


FIG.7

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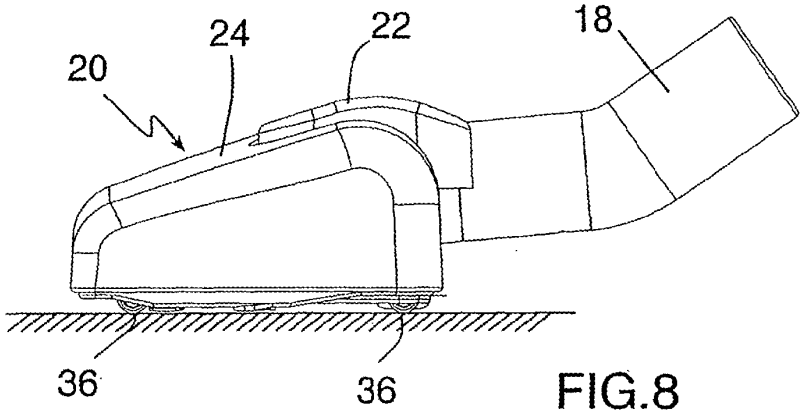


FIG.8

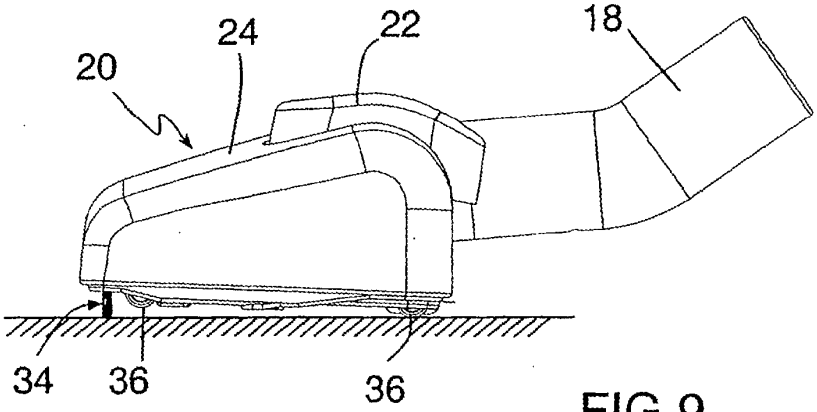


FIG.9

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A47L 5/14

(52) UK CL (Edition K)
A4F FD FD11 FFB101 FFB126 FFB201 FFB203

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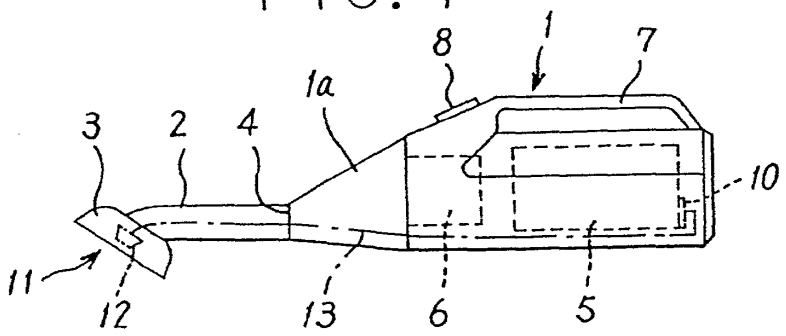
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United Kingdom

(54) Vacuum cleaner

(57) A vacuum cleaner with an improved dust suction efficiency comprises an enclosure 1 containing a suction fan motor 5 and having a suction port to which a suction head 3 is connected and an exhaust port 10 to which an auxiliary suction enhancer 11, 13 with ejection ports 12 to eject the air discharged from the exhaust port is connected. The suction head of the vacuum cleaner draws in the dust swept by the air from the ejection ports to a place where the suction can be accomplished with greater ease.

FIG. 1



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FIG. 1

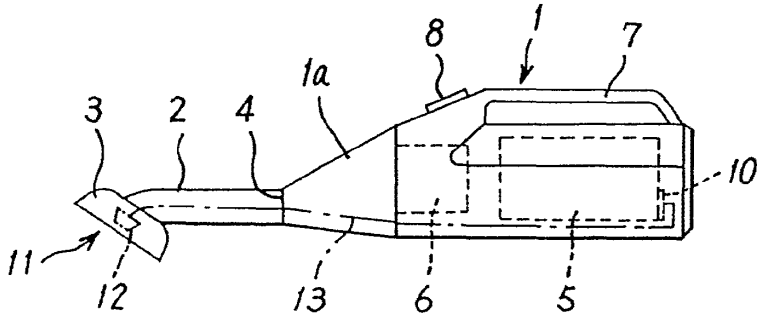


FIG. 2

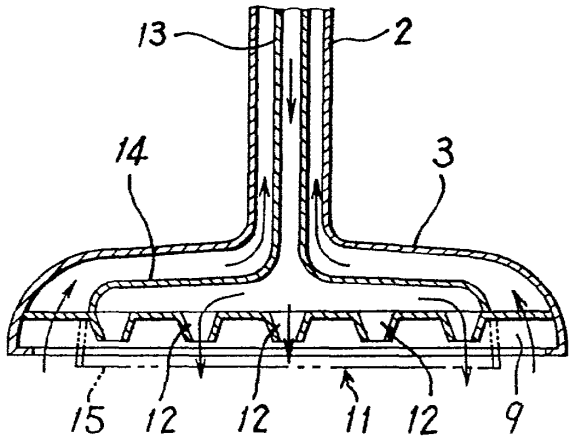


FIG. 3

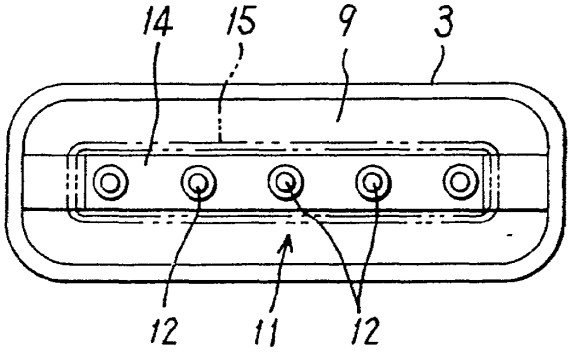


FIG. 4

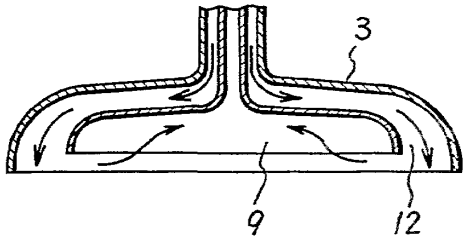


FIG. 5

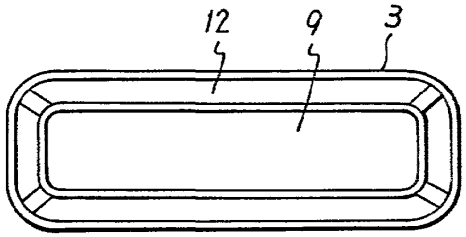


FIG. 6

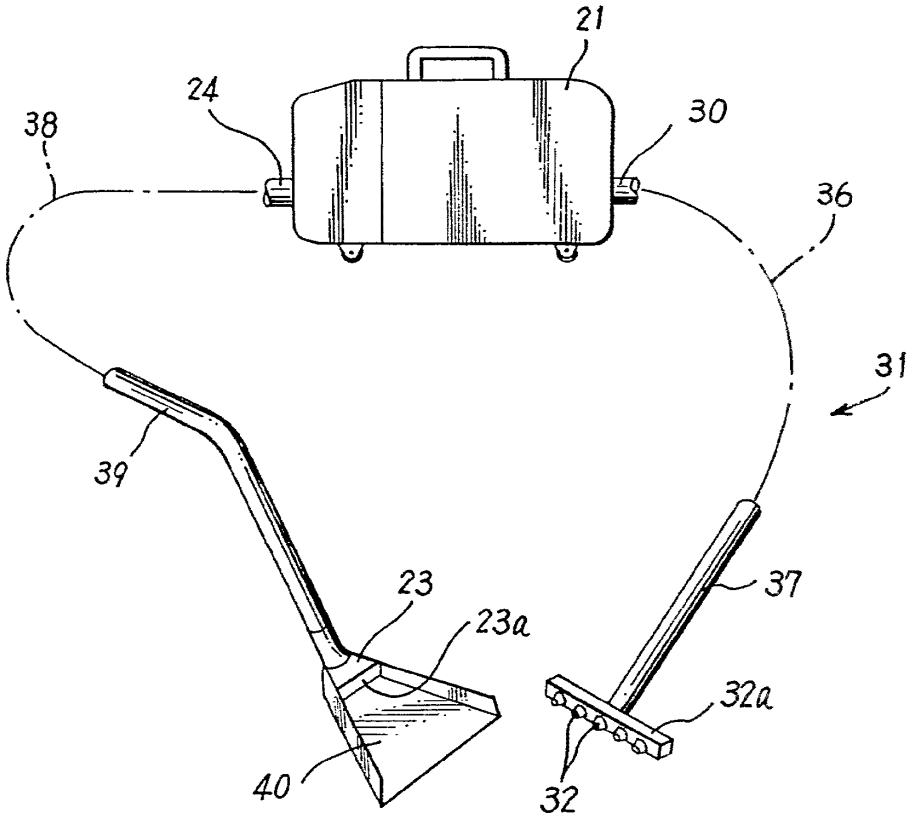


FIG. 7

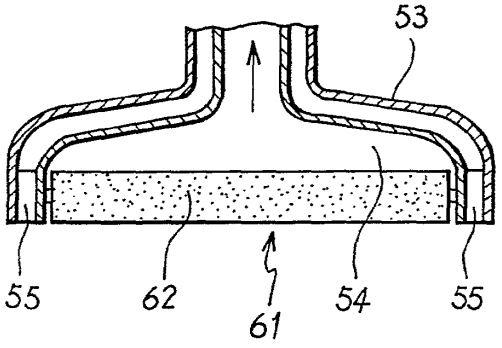
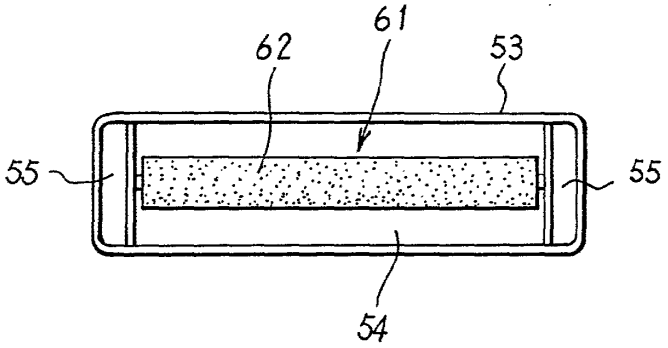


FIG. 8



VACUUM CLEANER

This invention relates to vacuum cleaners.

Conventional vacuum cleaners comprise an enclosure containing a suction fan motor, a suction head connected to the suction port in the enclosure through a connecting hose or pipe, and a dust bag to collect the dust sucked through the suction head.

Depending as they do on suction alone, conventional cleaners have not been as efficient as is desired in the removal of dust from the deeper parts of carpets, tatami (straw-mat floor coverings used in Japanese houses) or other surfaces; or of collecting heavier dusts e.g. sand or other similar substances. Of course, such a deficiency in operation has been particularly pronounced with smaller, less powerful hand-pushed vacuum cleaners such as are commonly used in domestic circumstances.

The suction and hence cleaning efficiency of vacuum cleaners can be increased by use of more powerful fan motors, but only at the expense of increased machine size, noise and cost.

The object of this invention is to provide a vacuum cleaner that can more effectively remove dust from the deeper parts of carpets, tatami or like surfaces, as well as heavier dust containing sand or other similar substances.

In order to achieve the above object, a vacuum cleaner according to this invention, which essentially comprises an enclosure containing a suction fan motor, having a suction port to which a suction head is connected, a dust bag to collect the dust sucked in through the suction

head, and an exhaust port to discharge the air separated from the collected dust, has, in addition, an auxiliary suction enhancer to enhance the collection of dust by the cleaner and comprising air ejection means connected to receive air discharged from said exhaust port and adapted to blow said air onto a surface being vacuumed so that dust is swept to a place where collection by the suction head can be accomplished with greater ease.

With this vacuum cleaner, the suction head draws in the dust that has been blown up by the exhaust air ejected from the air ejection means of the auxiliary suction enhancer. By thus making use of the exhaust air leaving the cleaner, even the dust in deeper parts of carpets, tatami or like surfaces and heavier dusts containing e.g. sand or other similar substances can be sucked in with greater certainty without having to increase the suction power of the fan motor.

In one preferred embodiment of this invention, the air ejection means of the auxiliary suction enhancer comprise one or more air ejection ports which open into the suction head so that the suction port in the suction head directly draws in the dust blown up by the air from the ejection port.

The ejection port(s) thus opening into the suction head may be provided either in a central region of the suction port, or so as to surround the suction port.

If desired, a fixed dust-raking brush may be provided on the suction head. A fixed brush surrounding the air ejection ports is particularly effective.

In a particular embodiment of the invention a mobile auxiliary suction enhancer that can move independently of

the suction head may be connected to the exhaust port in the enclosure through a flexible hose. In this case it is advantageous to provide also a dust receiving member in the suction head, to collect the dust blown by the air from the ejection ports.

In an alternative form of the invention, the auxiliary suction enhancer may consist of a mobile brush provided on the suction head and arranged to be rotated or vibrated by air from the exhaust port.

Embodiments of the present invention will now be described in more detail with reference to the accompanying drawings, in which:

Fig. 1 is a somewhat schematic side elevational view of one preferred embodiment of a vacuum cleaner embodying this invention;

Fig. 2 is an enlarged cross-sectional view of a suction head which incorporates an auxiliary suction enhancer of this invention;

Fig. 3 is a bottom view of the suction head shown in Fig. 2;

Fig. 4 is a cross-sectional view of another suction head in accordance with this invention;

Fig. 5 is a bottom view of the suction head shown in Fig. 4;

Fig. 6 is a side elevation of another preferred embodiment of this invention;

Fig. 7 is a cross-sectional view of a suction head in yet another embodiment of this invention; and

Fig. 8 is a bottom view of the suction head shown in Fig. 7.

Fig. 1 shows a domestic vacuum cleaner according to this invention which comprises an enclosure 1 with a detachable front case 1a, a detachable pipe 2 connected to a suction port 4 of the front case 1a, and a suction head 3 attached to the forward end of the pipe 2. The enclosure 1 contains a fan motor 5 having a suction fan and a dust bag 6 made of a filtering material. When the suction fan motor 5 is operated, the suction head 3 draws in dust, which is then filtered and collected by the dust bag 6. Reference numeral 7 designates a handle, 8 an operation switch, and 10 an exhaust port.

To the exhaust port 10 of the enclosure 1 is connected an auxiliary suction enhancer 11 that helps the suction of dust by the suction head 3 by making use of the air discharged from the exhaust port 10. The auxiliary suction enhancer 11 has air ejection means in the form of ports 12 opening into the central region of the suction port 9 of the suction head 3 as shown in Figs. 2 and 3. The ejection ports 12 are connected to the exhaust port 10 by means of an air duct 13. The air blown from the ejection ports 12 helps to dislodge dust present in the deeper parts of carpets, tatami or the like, and thereby facilitate its removal by the suction head 3.

The size, number and position of the ejection ports 12 opening into the suction head 3 are not especially critical, and the optimum size, number and position of these ports can be selected according to the shape and size of the suction head 3. In an alternative arrangement, illustrated in Figs. 4 and 5, the ejection ports 12 may be provided outside the suction port 9 in such a manner as to surround it; in the illustrated

arrangement there is a single, annular ejection port 12. It is also within the scope of the invention to provide several different replaceable suction heads 3 having ejection ports 12 of different numbers and/or arrangement selected for different uses of the vacuum cleaner.

The air duct 13 which leads the exhaust air to the ejection port(s) 12 may be either extended outside the enclosure to the suction head 3 or contained in the enclosure 1 and pipe 2. In the latter case, it is preferable to divide the air duct 13 into two parts that are separately contained in the enclosure 1 and pipe 2, respectively, with provision made so that the bisected parts of the air duct 13 are automatically connected when the enclosure 1 and pipe 2 are connected together.

Also, either all or part of the exhaust air from the exhaust port 10 may be led to the ejection port(s) 12 at a fixed rate, or some means may be incorporated to control the amount of the air ejected from the ejection port(s) 12, e.g. by adjusting the opening of the ejection port(s) 12 and/or the cross-sectional area of the air duct 13. Provision may also be made to adjust the direction of the ejection ports 12.

A fixed dust-raking brush 15 may be attached to the suction head 3 as shown by a dot-dash line in Figs. 2 and 3. The raking action of the fixed brush 15 and the air from the ejection ports 12 synergistically enhances the suction of dust through the suction port 9. In the illustrated embodiment the fixed brush 15 is attached to a base 14 in such a manner as to surround all air ejection ports 12 provided thereon, but the fixed brush 15 may be attached in many other ways, such as on either side of the row of the ejection ports 12, or between the individual ejection ports 12, or around the suction port 9.

If a fixed brush is attached to the suction head 3 shown in Figs. 4 and 5 it should preferably be provided in such a manner as to surround either a part or the whole of the ejection port 12. The fixed brush may also be attached to the middle of the suction port 9, or alternatively a rotatable brush of the type that rotates with the rotation of the wheels of the vacuum cleaner when the suction head 3 is moved back and forth, may be provided in the middle of the suction port 9.

When the fan motor 5 operates, the suction head 3 draws in dust through the suction port 9. The dust is then filtered and collected by the dust bag 6. The air discharged from the exhaust port 10 flows out through the ejection port(s) 12 opening into the suction head 3 to force dust out of the deeper parts of carpets, tatami or like materials to the surface of the carpet or the like where it can then be collected by the suction head 3.

The illustrated embodiments of the invention are domestic, hand-pushed vacuum cleaners, but of course this invention is applicable to other types of vacuum cleaners as well.

Fig. 6 shows another preferred embodiment of this invention, in which the auxiliary suction enhancer 31 is separated from the suction head 23. In this case the auxiliary suction enhancer 31 is made up of an inflexible pipe 37 connected to the exhaust port 30 of an enclosure 21 through a flexible hose 36 and a member 32a having one or more ejection ports 32 and attached to the forward end of the pipe 37. To the suction port 24 of the enclosure 21 of the vacuum cleaner is connected an inflexible pipe 39 through a flexible hose 38, with a suction head 23 with a suction port 23a being attached to the forward end of the inflexible pipe 39. To the suction head 23 in

turn is attached a fan-shaped dustpan 40 that receives the dust blown by the air from the ejection ports 32 of the auxiliary suction enhancer 31. The dustpan 40 may be detachable.

When using the vacuum cleaner just described, the user holds the pipe 39 connected to the suction head 23 in one hand and the pipe 37 connected to the ejection ports 32 in the other hand, sweeping dust with the air from the ejection ports 32 and collecting the dust with the dustpan 40 connected to the suction head 23 for suction through the suction port 23a therein. This vacuum cleaner is particularly suited for the removal of heavier dusts containing sand or other similar substances from, for example, the inside of automobiles.

Various types of dust-raking brushes can, if desired, be attached to the air-ejecting member 32a of this embodiment of vacuum cleaner. Also, the shape of the suction head 23 is not limited to that illustrated, but may be varied as desired.

Figs. 7 and 8 show the construction of suction head 53 in yet another preferred embodiment of this invention. Inside the suction port 54 thereof, as an auxiliary suction enhancer 61, is provided a rotating brush 62 that sweeps dust when rotated by the force of the exhaust air. More specifically, the rotating brush 62 is rotated by an impeller or other similar drive unit 55 that converts the energy of the air from the exhaust port into a rotational motion.

A movable brush that vibrates up and down or back and forth when powered by the exhaust air may be used in place of the rotating brush 62.

Although Figs. 7 and 8 show only the suction head of the vacuum cleaner according to this form of the invention it will be appreciated that the construction of the vacuum cleaner as a whole can, for instance, be similar to that of Fig. 1.

CLAIMS:

1. In a vacuum cleaner having an enclosure containing a suction fan motor, having a suction port to which a suction head is connected, a dust bag to collect the dust sucked in through the suction head, and an exhaust port to discharge the air separated from the collected dust, the improvement which comprises:

an auxiliary suction enhancer to enhance the collection of dust by the cleaner and comprising air ejection means connected to receive air discharged from said exhaust port and adapted to blow said air onto a surface being vacuumed so that dust is swept to a place where collection by the suction head can be accomplished with greater ease.

2. A vacuum cleaner according to Claim 1, in which said air ejection ports means comprises one or more air ejection ports which open into the suction head.

3. A vacuum cleaner according to Claim 2, in which the air ejection port or ports in the auxiliary suction enhancer open into a control region of the suction port in the suction head.

4. A vacuum cleaner according to Claim 2, in which the air ejection port or ports in the auxiliary suction enhancer surround the suction port in the suction head.

5. A vacuum cleaner according to any preceding claim, in which a fixed dust-raking brush is attached to the suction head.

6. A vacuum cleaner according to Claim 5 when appendant to Claim 3, in which the fixed dust-raking brush is provided in such a manner as to surround the ejection ports.

7. A vacuum cleaner according to Claim 1, in which the auxiliary suction enhancer is connected to said exhaust ports through a flexible hose so as to be movable independently of the suction head.

8. A vacuum cleaner according to Claim 7, wherein a dust receiving member to collect the dust blown by the air from the air ejection means of said auxiliary suction enhancer is provided adjacent the suction port in the suction head.

9. In a vacuum cleaner having an enclosure containing a suction fan motor, having a suction port to which a suction head is connected, a dust bag to collect the dust sucked in through the suction head, and an exhaust port to discharge the air separated from the collected dust, the improvement which comprises:

an auxiliary suction enhancer attached to the suction head, the auxiliary suction enhancer comprising a movable dust-raking brush that is either rotated or vibrated by exhaust air from the exhaust port.

10. A vacuum cleaner substantially as hereinbefore described with reference to Figs. 1-3, Figs. 1, 4 and 5, Fig. 6 or Figs. 1, 6 and 7 of the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under section 17 (The Search Report)

Application number: 9122175.4

Relevant Technical fields

(i) UK Cl (Edition) A4F

(ii) Int Cl (Edition) A47L

Search Examiner: G HEMSLEY

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search: 11 DECEMBER 1991

Documents considered relevant following a search in respect of claims 1-8 & 10

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X, Y	GB 2088479 (PLUMLEY) page 1 lines 62-75	1
X	US 4884315 (EHNERT) column 2 line 61 to column 3 line 55	1, 2, 4, 7, 8
Y	US 4751759 (Zoell) column 3 lines 25-59	1,2,5
Y	US 4651381 (MEIDEL) column 2 line 54 to column 3 line 26	1
X	US 4393536 (TAPP) column 2 line 63 to column 3 line 33	1, 2
X	US 4333205 (WOODWARD) column 3 line 10 to column 4 line 36	1, 2

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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(19) **Japan Patent Office (JP)**

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(51) **Int. CL**[4]	**ID Symbol**	**Office Reference Number**	(43) **Disclosure Date:**
A 47 L 9/00	105	B -6864-3B	November 2, 1985
5/28		7715-3B	

Request for Examination: Not yet submitted
Number of claims:1
Total number of pages in original:3

(54) **Title of the Invention: ELECTRIC VACUUM CLEANER**

(21) **Application No.**S59-74098
(22) **Filing Date:**April 13, 1984

(72) **Inventor:**Kazuyoshi MATSUKUMA — Matsushita Denki Sankyo, Co., Ltd. Kadoma, Kadoma 1006

(71) **Applicant:**Matsushita Denki Sankyo, Co., Ltd. — Kadoma, Kadoma 1006

(74) **Agent:**Toshio NAKAO,Patent Attorney,
andone more

PATENT SPECIFICATION

1. Title of the Invention: Electric Vacuum Cleaner

2. Claims
(1) An electric vacuum cleaner having on one side of an extension pipe a locking mechanism that holds a crevice suction device.

(2) An electric vacuum cleaner according to Claim 1, wherein the locking mechanism has a locking member that is formed in an extension pipe and a locking device that is attachable to said locking member through a resilient member, the locking device being attached to the locking member with possibility of movement relative to the locking member.

3. Detailed Description of the Invention

Field of the Invention
The present invention relates to an electric vacuum cleaner that is provided with an extension pipe and a crevice suction device.

Construction of a Prior-Art Device and Associated Problems

Conventionally, a crevice suction device of an electric vacuum cleaner is stored separately or in a holding case and is attached only when it is necessary to use the vacuum cleaner, which is inconvenient. When the crevice suction device is stored separately, it can easily be lost, and when it is of a holdable storage type, it requires the use of a storage case which is expensive.

Object of the Invention

In order to solve the problems of the prior art, it is an object of the present invention to provide an electric vacuum cleaner that allows the holding of the suction crevice device in a simple manner and without undue costs.

Structure

The above object is achieved by providing an electric vacuum cleaner having a locking device for holding the crevice suction on one side of the extension pipe.

Detailed Description of the Invention

The invention will now be explained by way of a practical example with reference to the accompanying drawings.

In Fig. 1, reference numeral 1 designates the body of the vacuum cleaner, and 2 designates the extension pipe attachable to the front end of the vacuum cleaner body. Reference numeral 3 designates the suction tool with a wide opening that is attached to the front end of the extension pipe 2, reference numeral 4 designates the locking mechanism which is formed on a part of the suction extension pipe, and 5 is the crevice suction device which can be secured by means of the locking mechanism 4.

Below, the construction of the locking mechanism 4 is described with reference to Fig. 2 and other drawings. In Figs. 5 to 9, reference numeral 4a shows a boss vertically arranged on one side of the extension pipe 2, and reference numeral 4b shows a ring-shaped rib that surrounds the boss 4a. The boss 4a and the ring-shaped rib 4b are interconnected by ribs 4c. Altogether, the boss 4a and the ribs 4b and 4c form a locking member, and 4d shows the locking device. The locking device 4d has a groove member 4e that engages the ribs 4b and 4c of the locking member, and also has an engagement member 4f with a dimension slightly smaller than the opening atthe end of the crevice suction device*[This sentence is incomplete in the Japanese original. and the term 若干さ makes no sense — translator's note]*.The locking device 4d provides fixation when a grooved member 4e engages the ribs 4b, 4c of the locking member and when the grooved member 4e is urged by a screw 7 under the effect of a coil spring 6 to the side of the suction extension pipe. Thus, the locking member consisting of the boss4a and ribs 4b and 4c, the locking device consisting of the grooved member 4e and the engaging piece 4f, and the coil spring 6 with the screw 7 form the locking mechanism.

The open end 5a at the front edge of the suction crevice device 5 shown in Fig. 4 is inserted into the engaging piece 4f of the aforementioned locking mechanism and thus is fixed for storage. At this stage, fixation of the suction crevice device 5 in a storage position is completed. However, a significant force should be applied to the engaging piece in order to disengage the suction

crevice device 5 from this position. In that case, the rib 4c is pressed against the grooved member 4e of the locking device 4d, whereby the locking device moves by overcoming the force of the coil spring 6 and is protected from damage by turning and swinging around the boss 4a.

In the example described above, the locking engagement was carried out by providing the projecting ribs 4b and 4c in the locking member and the grooved member 4e in the locking device. However, the same results may be obtained by forming a groove in the locking member and the projecting ribs in the locking device.

Effects of the Invention

Because the electric vacuum cleaner of the invention has on one side of the extension pipe a locking mechanism that holds the crevice suction device, this device cannot be lost, replacement is very convenient, and therefore the invention is of great practical value.

4. Brief Description of the Drawings

Fig. 1 is a general perspective view of an electric vacuum cleaner according to one embodiment of the invention. Fig. 2 is side view of the mechanism for locking the crevice suction device. Fig. 3 is a view of the lower side of the same mechanism. Fig. 4 is a perspective view of the crevice suction device, and Fig. 5 is a cross-sectional view. Fig. 6 is a plan view of the locking member in the suction extension pipe. Fig. 7 is a plan view of the locking device. Fig. 8 is a perspective view of the locking member. Fig. 9 is a perspective view of the locking device.

1 - vacuum cleaner body; 2 - suction extension pipe; 3 - suction device with open end; 4 - locking mechanism; 4a - boss; 4b, 4c - ribs; 4d - locking device; 4e - grooved member; 4f - engaging piece; 5 - suction crevice device; 5a - open end at front edge of suction crevice device; 6 - coil spring (resilient member); 7 - piece

Agent: Toshio NAKAO, Patent Attorney, and one more

第 1 図

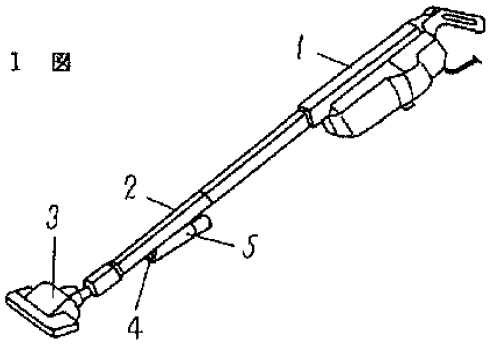


Fig. 1

第 2 図

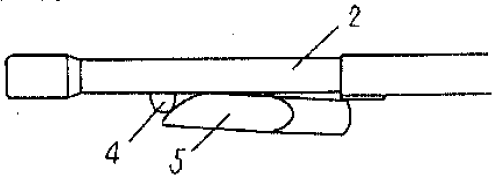


Fig. 2

第 3 図

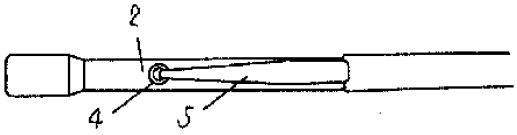


Fig. 3

第 4 図

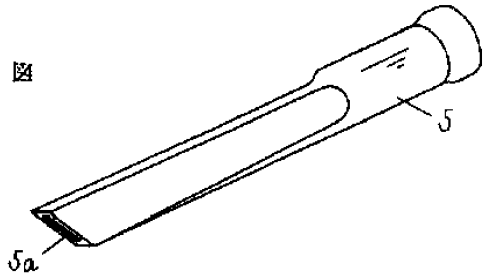


Fig. 4

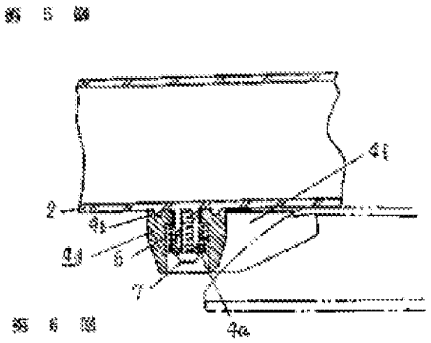


Fig. 5

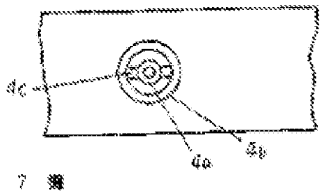


Fig. 6

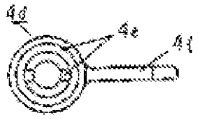


Fig. 8

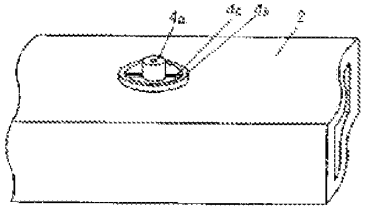


Fig. 8



Fig. 9

⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭60－220027

⑤Int.Cl.⁴	識別記号	庁内整理番号	㊸公開　昭和60年(1985)11月2日
A 47 L 9/00 5/28	105	B－6864－3B 7715－3B	

審査請求　未請求　発明の数 1　（全3頁）

㊹発明の名称　電気掃除機

㉑特　願　昭59－74098
㉒出　願　昭59(1984)4月13日

㉒発明者　松限　一義　門真市大字門真1006番地　松下電器産業株式会社内
㉑出願人　松下電器産業株式会社　門真市大字門真1006番地
㉔代理人　弁理士　中尾　敏男　外1名

明　細　書

1、発明の名称

電気掃除機

2、特許請求の範囲

(1) 吸込延長管の一側部に、隙間用吸込具を保持する係止装置を有する電気掃除機。

(2) 係止装置は、吸込延長管に形成した係止部と、前記係止部に弾性部材を介して取り付けられた係止具とを有し、前記係止具は前記係止部に対し可動な状態で取り付けられてなることを特徴とする特許請求の範囲第1項記載の電気掃除機。

3、発明の詳細な説明

産業上の利用分野

本発明は、延長管と隙間用吸込具を備えた電気掃除機に関する。

従来例の構成とその問題点

一般に、電気掃除機の隙間用吸込具は、単品で保管されるかあるいは収納ケースに収納されており、掃除の途中で付けかえて使用する場合、不便であった。また、単品で保管の場合、紛失することがあった。さらに、収納タイプにするためには、別ピースの収納ケースが、必要でありコスト的負担が大きかった。

発明の目的

本発明は、前記従来の問題に留意し、大幅なコストアップを招くこともなく、しかも簡単な構造で隙間用吸込具の収納が行えるようにした電気掃除機を提供することを目的とする。

発明の構成

前記目的を、達成するため、本発明の電気掃除機は、延長管の一側部に隙間用吸込具を保持するための係止装置を設けた構成としたものである。

実施例の説明

以下本発明の一実施例を図面を用いて説明する。第1図において1は掃除機本体であり、2は掃除機本体の前部に取り付けられた吸込延長管である。3は、前記吸込延長管2の先端に取り付けられた広口用吸込具であり、4は吸込延長管2の一部に形成された係止装置であり、5は前記係止装置4により係止固定された隙間用吸込具である。

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以下第２図以降の図面を用い前記係止装置４の構造につき説明を加える。

第５図～第９図において、４ａは、吸込延長管２の一側に立設されたボスであり、このボス４ａを囲んで環状のリブ４ｂが形成されている。また環状のリブ４ｂとボス４ａとは、リブ４ｃによって一部が架橋されており、前記ボス４ａ、リブ４ｂ，４ｃとで係止部を構成している。４ｄは係止具を示し、この係止具４ｄは、前記係止部のリブ４ｂ，４ｃと嵌まり合う溝部４ｅと寸法が、スキマ用吸込具の先端開口部より若干さの係止片4fとを有している。前記係止具４ｄは、溝部４ｅを、前記係止部のリブ４ｂ，４ｃに嵌め合わせた状態で、しかも、コイルバネ６により吸込延長管側に付勢された状態でビス７により固定されている。以上説明したボス４ａ、リブ４ｂ，４ｃよりなる係止部と溝４ｅ、係止片４ｆが形成された係止具と、コイルバネ６およびビス７により係止装置は構成される。この係止装置の係止片４ｆに、第４図で示した隙間用吸込具５の先端開口部５ａを挿着し、スキマ用吸込具の保持固定を行う。以上で、隙間用吸込具５の保持固定は一応完了するのであるが、隙間用吸込具５の脱着の際、係止片４ｆに大きな負荷が掛かることがある。そのときは、係止部のリブ４ｃが、係止具４ｄの溝４ｅを乗り越え、その結果係止具４ｄはコイルバネ６の付勢力に抗して移動し、ボス４ａを中心として回動および揺動することにより係止具４ｄの破損を防ぐ。

本実施例においては、係止部に凸リブ４ｂ，４ｃを、係止具に凹溝部４ｅを設け、係止部と係止具との係合を行っていたが、係止部に凹溝部，係止具に凸リブとしても良いことは自明である。

発明の効果

以上説明したように、本発明の電気掃除機は、吸込延長管の一部に、隙間用吸込具を保持する係止装置を設けたため、隙間用吸込具を紛失する心配もなく、また、吸込具取りかえの際便利であり、その実用的価値大なるものである。

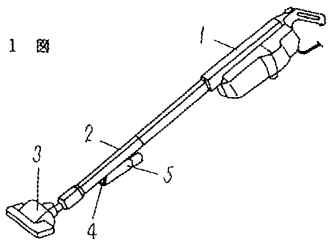
４、図面の簡単な説明

第１図は、本発明一実施例の電気掃除機の全体外観斜視図、第２図は、吸込延長管に設けた隙間用吸込具の係止装置の側面図、第３図は、同底面図、第４図は、隙間用吸込具の斜視図、第５図は、同断面図、第６図は、吸込延長管に設けた係止部を示す平面図、第７図は、係止具の平面図、第８図は、係止部の斜視図、第９図は、係止具の斜視図である。

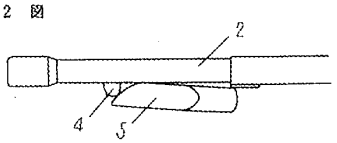
１……掃除機本体、２……吸込延長管、３……広口用吸込具、４……係止装置、４ａ……ボス、４ｂ，４ｃ……リブ、４ｄ……係止具、４ｅ……溝部、４ｆ……係止片、５……隙間用吸込具、５ａ……先端開口部、６……コイルバネ（弾性部材）、７……ビス。

代理人の氏名　弁理士　中　尾　敏　男　ほか１名

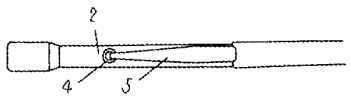
第１図



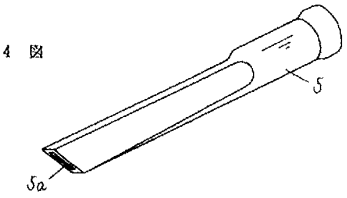
第２図



第３図

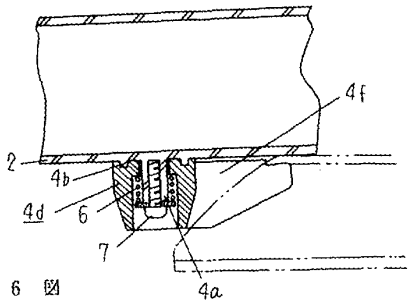


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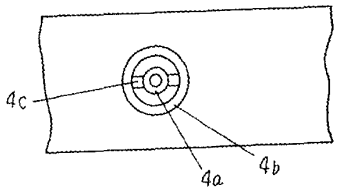


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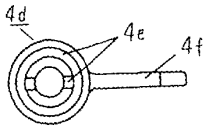
第 5 図



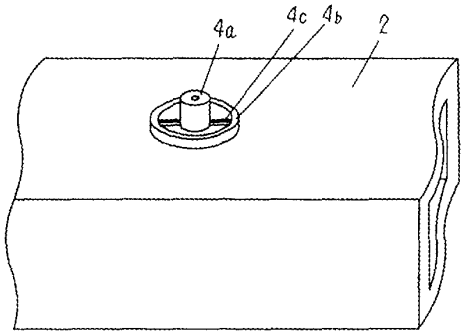
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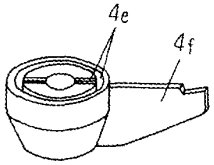
第 7 図



第 8 図



第 9 図



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(19) **Japan Patent Office (JP)**

(12)**Official Gazette for Unexamined Patent Application Publications (A)**

(11) **Japanese Unexamined Patent Application Publication (Kokai) No. S63-246116**

(51) **Int. CL**[4]	**ID Symbol**	**Office Reference Number**	(43) **Disclosure Date:**
A 47 L 5/28		8206-3B	October 13, 1988
9/28		Z-6864-3B	

Request for Examination: Not yet submitted
Number of claims:1
Total number of pages in original:4

(54) **Title of the Invention: VERTICAL-TYPE ELECTRIC VACUUM CLEANER**

(21) **Application No.**S61-81428
(22) **Filing Date:**April 2, 1987

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(74) **Agent:**Toshio NAKAO, Patent Attorney, and one more

PATENT SPECIFICATION

1. Title of the Invention: Vertical-Type Electric Vacuum Cleaner

2. Claims

A vertical-type electric vacuum cleaner comprising a housing that contains an electric blower; an extension pipe connected to the front end of the housing; a floor suction device that has a rotational brush and an electric motor for driving the brush, wherein a cord for supplying electric power to the electric motor is connected to a receptacle which is located on the extension pipe at the front end of the housing or on the lower side of the connection member for the suction device.

3. Detailed Description of the Invention

Field of the Invention

The present invention relates to a vertical-type electric vacuum cleaner that is provided with a rotational brush inside a floor suction device.

Description of the Prior Art

As shown in the drawings of Unexamined Utility Model Application Publication (Kokai) S57-20958, construction of a conventional, vertical electric vacuum cleaner of the aforementioned type comprises a housing for collection of dust and contains a rotational brush and a floor suction device located nearby and also an electric motor for driving the brush. Electric wiring for supplying power to the electric motor consists of a plug provided on the front end of the cord, which is extendable from the interior of the floor suction device, and a receptacle for the plug, which is located on the lower surface of the housing.

Furthermore, a handle for operating the vertical electric vacuum cleaner of the aforementioned type is formed at the end of a pipe that is inserted into the rear surface of the housing and extends upward.

Problems to be Solved by the Present Invention

It can be assumed that during use of the vacuum cleaner having the aforementioned construction it would be impossible to perform cleaning operations by moving the housing in such narrow spaces as areas under a table.

Also, since connection of the plug to the receptacle is located on the lower surface of the housing, and since during operation the housing is located in the vicinity of the working area, when vacuum cleaning is performed under a bed, the height of the handle above the floor is short, and the plug comes into contact with the floor, whereby multiple repetition of such an operation may cause damage.

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It is an object of the present invention to solve the problems of the prior art and to provide a vertical-type electric vacuum cleaner, which is highly convenient to use.

Means for the Solution of the Problems

Technical means for solution of the problems comprise a housing that has a front part and contains an electric blower; an extension pipe connected to the front end of the housing; a floor suction device that has a rotational brush and an electric motor for driving the brush; and a cord which is extendable from the floor suction device and supplies electric power to the electric motor, the cord having a plug at its end which is connected to a receptacle located on the extension pipe at the front end of the housing or on the lower side of the connection member for the suction device.

Action

Since the floor suction device can be used in a floor area at a distance from the housing, the housing cannot come into contact with the work area. Furthermore, by arranging the cord connection part below the extension pipe, during use this part is protected from damage by contact with the floor surface, domestic appliances, or the like.

Description of Practical Embodiment

The invention will be further described by way of its practical embodiment with reference to the accompanying drawings. In Figs. 1 and 2, reference numeral 1 designates a housing that contains an electric blower 2 and a cord-winding device 3. A dust-collecting chamber is formed on the suction side of the electric blower 2, and a cover 4 of this chamber can be opened and closed with the use of a latch 5. Reference numeral 6 designates an extension pipe which is slidingly held within a connection pipe located in the upper part of the housing case 1 and which can be fixed in any extended position relative to the housing case 1 by means of a locking device 8. Reference numeral 9 designates a handle grip which projects from the housing 1 and is formed on the side of the housing 1 opposite to the locking device 8. Reference numeral 10 designates a floor suction device connected to the extension pipe 6. The floor suction device 10 contains an electric motor 11 and a rotational brush 12 driven into rotation by the electrical motor 11. Reference numeral 13 designates a receptacle that is electrically connected to a cord 14 wound

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onto the cord winding device 3 and which is located on the front surface of the housing 1, i.e., on the floor suction device side and under the locking device 8. Reference numeral 16 designates a part of the cord extended from the floor suction device. The cord is self-wound on the winding device due to its contraction when released. When a plug 17 on the end of the cord is inserted into the receptacle 13, an electric circuit is formed through which the electric power can be supplied to the electric motor 11 of the floor suction device 10.

Operation of the above-described construction will now be explained. As shown in Fig. 2, for normal operation, an extension pipe 6 is pulled from the housing 1 to the maximum length, then locked in this position by the locking device 8, and the vacuum cleaning operation is carried out by moving the vacuum cleaner back and forth. Since in this case the cord 16 is wound into a coil and can be extended along the extension pipe 6 at a winding pitch, the cord does not interfere with the operation. Also, because in this state the housing 1 is approximately 50 cm from the treated surface, the floor suction device 10 can be easily used under tables or in other narrow spaces, and the housing does not come into contact with the surrounding area.

When the device is used in a car or in a similar narrow space, the extension pipe 6 may be kept inside the housing 1, as shown in Fig. 1. In this case, the connection between the plug 17 and the receptacle 13 is located above the line $\swarrow$ that connects the bottom surface of the housing 1 with the floor suction device 10. Therefore, the receptacle and plug cannot come into contact with a dusty surface or with a hard object, and this protects the receptacle and plug from damage. The plug and socket are protected from damage in an extended position of the extension pipe 6 as well.

The above explanation relates to the extension pipe 6 installed in a freely slidable position. However, as shown in Fig. 3, the principle of the invention relates also to vacuum cleaners using attachable extension pipes. There are no special restrictions with regard to the shape of the housing or methods for attaching the extension pipes. What is essential is that the cord that supplies energy to the electric motor is connected to the receptacle that is located either on the extension pipe near the front surface of the housing case or on the lower side of the floor-suction device connection part.

Effects of the Invention

As seen from the above, the invention provides a vertical-type electric vacuum that comprises a housing that contains an electric blower and an extension pipe connected to the front end of the housing and a floor suction device that has a rotational brush and an electric motor for driving the brush, wherein a cord for supplying electric power to the electric motor is connected to a receptacle which is formed on the extension pipe at the front end of the housing or on the lower side of the connection member for the suction device. Such a vacuum cleaner produces the following effects:

I. When the device is used in a normal state, the housing does not create obstacles for operation movements of the floor suction device and makes it possible to collect dust in narrow spaces, which improves workability.

II. When the device is used in a normal state or in a state with the floor suction device not only near the housing, the plug of the cord that supplies power to the electric motor and the receptacle located on the housing are protected from damage, whereby it possible to improve endurance and safety of the device.

4. Brief Description of the Drawings

Fig. 1 is a side view of an electric vacuum cleaner according to an embodiment of the invention. Fig. 2 is a view illustrating the vacuum cleaner during operation. Fig. 3 is a perspective view of an electric vacuum cleaner of the second embodiment in a disassembled state.

1 - housing; 2 - electric blower; 6 - extension pipe; 10 - floor suction device; 11 - electric motor; 12 - rotational brush; 13 - receptacle; 16 - cord

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1 - housing
2 - electric blower
6 - extension pipe
10 - floor suction device
11 - electric motor
12 - rotational brush
13 - receptacle
16 - cord
17 - plug

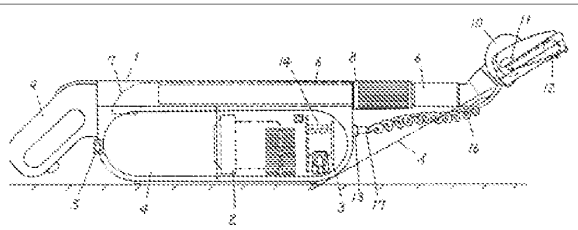


Fig. 1

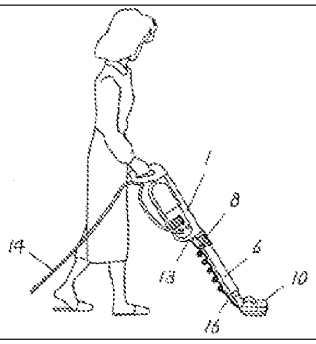


Fig. 2

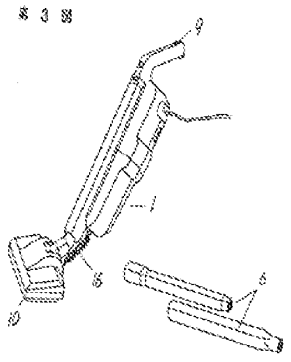


Fig. 3

⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭63－246116

⑤1Int.Cl.⁴	識別記号	庁内整理番号	④3公開　昭和63年(1988)10月13日
A 47 L 5/28		8206－3B	
9/28		Z－6864－3B	

審査請求　未請求　発明の数 1　（全4頁）

⑤4発明の名称　たて型電気掃除機

⑳特　願　昭62－81428

㉒出　願　昭62(1987)4月2日

⑦2発明者　北村　秀典　大阪府門真市大字門真1006番地　松下電器産業株式会社内

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明　細　書

1、発明の名称

たて型電気掃除機

2、特許請求の範囲

電動送風機を内蔵した本体と、この本体の前面上部に接続された延長管と、この延長管の先端に接続され、回転ブラシおよびこれを駆動する電動機を有する床用吸込具とを備え、前記電動機に電力を供給するコードは、本体前面の延長管或いは床用吸込具接続部の下側に形設したコンセントに接続したたて型電気掃除機。

3、発明の詳細な説明

産業上の利用分野

本発明は電動式の回転ブラシを床用吸込具に内設したたて型電気掃除機に関するものである。

従来の技術

従来、この種のたて型電気掃除機の構成は、実開昭57－20958号公報記載の図面で示されるように、塵埃を蓄積する本体は、回転ブラシと、これを駆動する電動機を有する床用吸込具と近接して設けられ、前記電動機に電力を供給するための配線は、床用吸込具内から引き出してきたコードの先端に設けたプラグを本体の底面に形設したコンセントに接続して行っていた。

また、このたて型電気掃除機を操作するための把手は、本体の後面に挿着されて上方に伸びたパイプ先端に形成されていた。

発明が解決しようとする問題点

前記構成により、机の下などの狭い所で使用するときには、本体が移動操作することに周囲に当たって思うように掃除できないという問題があった。

また、プラグのコンセントへの接続が、本体の底面で行われていたため、ベッドの下などを掃除しようとして把手の床面からの高さを低くして掃除すると、プラグが床面に当たり、繰り返しで損傷してしまうという欠点をも有していた。

本発明はこのような従来の問題点を解消したもので、使い勝手を大いに高めたたて型電気掃除機を提供するものである。

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問題点を解決するための手段

上記の問題を解消するための本発明の技術的手段は、電動送風機を内蔵する本体の前面上部と、回転ブラシとこれを駆動する電動機を有する床用吸込具を延長管で接続し、電動機に電力を供給するため床用吸込具から引き出したコードは、その先端に設けたプラグを、本体前面の前記延長管接続部の下側に形設したコンセントに接続して行うものである。

作用

この作用は、本体を床面から遠く離すことによって床用吸込具を思いどうりに移動させても、本体が周囲に当たることがなくなるものであり、さらに、コードの接続部が延長管の下側にすることによって、使用中に同部が床面や家具等に当たって損傷することを防止するものである。

実施例

以下添付図面に基づいてその実施例を説明する。第１図～第２図において、１は電動送風機２、コード巻取装置３を内蔵した本体で、電動送風機２の吸気側には集塵室が形成され、蓋４がこれを尾錠５の作用で開閉自在におおっている。６は本体ケース１の上部に内蔵された接続管７の内面に摺動自在に保持される延長管で、係止装置８により、本体ケース１に対し任意の伸出位置で固定される。９は本体１の係止装置８配設側とは逆側端面から突出して形成された把手、１０は延長管６に接続された床用吸込具である。床用吸込具１０は、電動機１１とこの回転によって駆動される回転ブラシ１２を内蔵している。１３は本体１の前面、すなわち床用吸込具１０側の係止装置８の下側に設けたコンセントで、コード巻取装置３に巻き取られたコード１４と電気的に接続されている。１６は床用吸込具１０より引き出されたコードで、伸縮が簡単にできるようコイル状に巻かれている。この先端のプラグ１７をコンセント１３に接続すると、床用吸込具１０の電動機１１に電力を供給できるように電気回路が形成される。

次に上記構成による作用について説明する。第２図に示すように、一般的な使用状態は、延長管６を本体１から一杯まで引き出し、係止装置８で固定した状態で把手９を握り持って掃除機を前後に移動させて行うものとなる。このとき、コード１６はコイル状に巻かれているため、延長管６に沿ったままこの巻きピッチが伸びて操作上支障にはならない。また、この状態では本体１が掃除面から約５０cm程度離れるため、机の下など狭い所に床用吸込具１０を差し入れても本体１が周囲に当たって思いどうりに操作できないということが起こらない。

また、車の中など狭い所で使用するときは延長管６を本体１内に収納した第１図の状態で行うが、このときは、床用吸込具１０と本体１の底面とを結ぶ直線イと、係止装置８の間にコンセント１３・プラグ１７が位置することとなり、使用中に固い所にコンセント１３・プラグ１７を当てることが起こらず、また、掃除面に接触させることもないため、同部を損傷させることがない。なお、このプラグ１７とコンセント１３の損傷防止は、前述の延長管６を引き伸ばした状態でも同様である。

また、上記の説明では延長管６が伸縮自在である場合について説明したが、第３図に示すように延長管を接続して使用する掃除機でも作用は同様であり、本体ケースの形状や延長管の接続方法について特定するものではなく、要は、電動機に電力を供給するコードは本体ケース前面の延長管或いは床用吸込具接続部の下側に設けたコンセントに接続されるものであれば良い。

発明の効果

以上説明したように本発明は、電動送風機を内蔵する本体と、電動機とこれにより回転駆動する回転ブラシを有する床用吸込具とこれらを延長管で接続するたて型電気掃除機において、前記電動機に電力を供給するためのコードは、本体の延長管、或いは床用吸込具接続部の下側に設けたコンセントに接続することにより、次の効果を発揮するものである。

Ⅰ．通常の使用状態では、床用吸込具の移動操作に対して本体が支障にならず、狭い所でも十分な掃除が可能となり、使い勝手が向上する。

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Ⅱ. 通常の状態、或いは、本体と床用吸込具を近づけての使用状態でも、電動機に電力を供給するコードのプラグや本体に形設したコンセントが破損することがなくなり、耐久性・安全性が向上する。

4、図面の簡単な説明

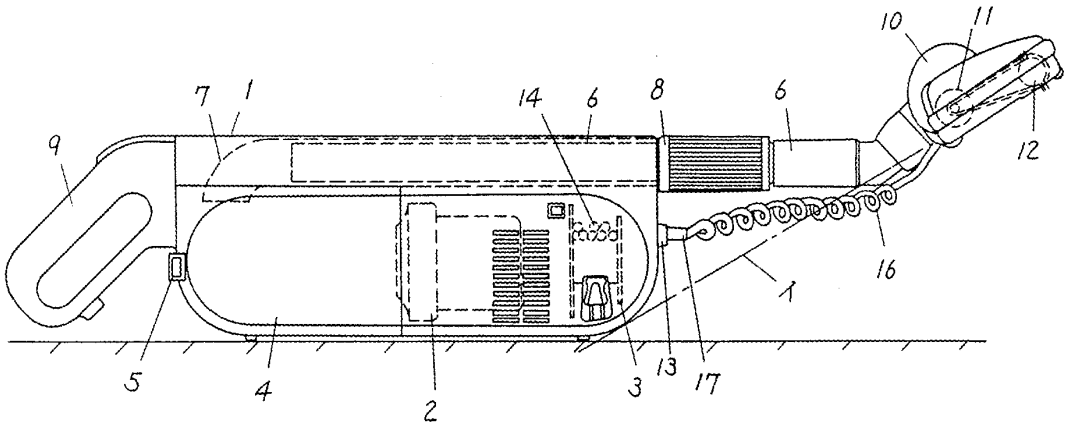
第１図は本発明の実施例による電気掃除機の正面図、第２図は同使用時の状態説明図、第３図は第２の実施例における電気掃除機の分解斜視図である。

１……本体、２……電動送風機、６……延長管、１０……床用吸込具、１１……電動機、１２……回転ブラシ、１３……コンセント、１６……コード。

代理人の氏名　弁理士　中　尾　敏　男　ほか１名

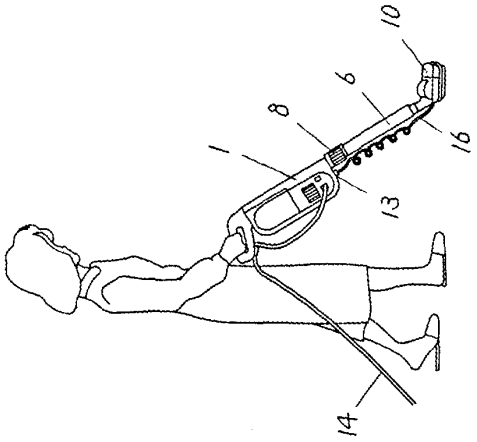
第　1　図

1…本体　12…回転ブラシ
2…電動送風機　13…コンセント
6…延長管　16…コード
10…床用吸込具　17…プラグ
11…電動機

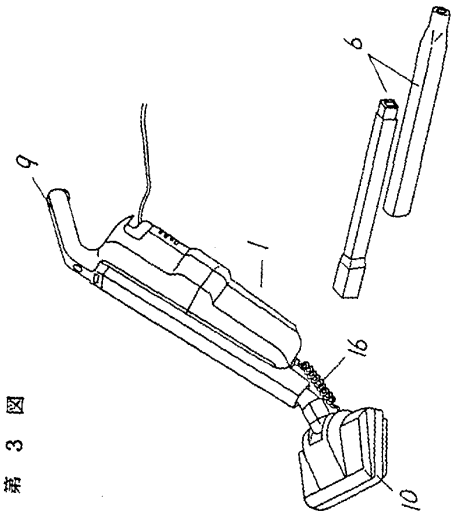


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第２図



第３図



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Electronic Acknowledgement Receipt

EFS ID:	21941057
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Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Linda Johnson Hodge/Robert Enojado
Filer Authorized By:	Linda Johnson Hodge
Attorney Docket Number:	P46540
Receipt Date:	01-APR-2015
Filing Date:	18-SEP-2014
Time Stamp:	15:48:55
Application Type:	Utility under 35 USC 111(a)

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File Listing:

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<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Number	14/489,646
Filing Date	2014-09-18
First Named Inventor	Wayne Ernest CONRAD
Title	SURFACE CLEANING APPARATUS
Art Unit	3723
Examiner Name	Shantese McDonald
Attorney Docket Number	P46540

SIGNATURE of Applicant or Patent Practitioner

Signature	Linda J Hodge	Date (Optional)	5/4/2015
Name	Linda J. Hodge	Registration Number	47,348
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 07055

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

	Firm or Individual Name				
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box)

G.B.D. Corp.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	April 17, 2015
Name	Anthony Inder Rieden		
Title	Director, G.B.D. Corp.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	22243481
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Linda Johnson Hodge/Robert Enojado
Filer Authorized By:	Linda Johnson Hodge
Attorney Docket Number:	P46540
Receipt Date:	05-MAY-2015
Filing Date:	18-SEP-2014
Time Stamp:	10:53:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		P46540_POA.pdf	194241 1816967590650fead6c12aeb308ccfdedafc35bd	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Power of Attorney	2	3
Warnings:			
Information:			
	Total Files Size (in bytes):	194241	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

P46540

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s) :	Wayne Ernest CONRAD	Group Art Unit :	Not yet assigned
Appl. No. :	14/489,646	Examiner :	Not yet assigned
Filed :	September 18, 2014	Confirmation. No.:	6255
For :	SURFACE CLEANING APPARATUS		

COVER LETTER

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop _____
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

Enclosed is an executed Power of Attorney by the Applicant G.B.D. CORP. If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Wayne Ernest CONRAD

/Linda J. Hodge/
Reg. No. 47,348
Linda J. Hodge

_____
Branko Pejic
Reg. No. 60255

May 4, 2015
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Wayne Ernest CONRAD	Art Unit	: 3727
Appl. No.	: 14/489,646	Examiner	: B. Muller
Filed	: September 18, 2014	Conf. No.	: 6255
For	: SURFACE CLEANING APPARATUS		

PRELIMINARY AMENDMENT

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir :

Prior to the examination of the above-identified patent application on the merits, the Examiner is respectfully requested to amend the claims as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 – 27. (Cancelled)

28. (New) A hand vacuum cleaner comprising:

a) a fluid flow path extending from a dirty air inlet to a clean air outlet;

b) a first cyclonic cleaning stage in the fluid flow path and comprising a first cyclone and a dirt collection region that has an openable bottom;

c) a second cyclonic cleaning stage in the fluid flow path downstream from the first cyclonic cleaning stage and comprising an air outlet;

d) a pre-motor filter in the fluid flow path downstream from the second cyclonic cleaning stage and comprising an upstream side and a downstream side wherein the upstream side faces the second cyclonic cleaning stage air outlet; and,

e) a main body comprising a fluid flow motor disposed in the fluid flow path downstream from the pre-motor filter.

29. (New) The hand vacuum cleaner of claim 28, wherein the second cyclonic cleaning stage and the pre-motor filter have a comparable cross sectional area in a direction transverse to the air flow therethrough.

30. (New) The hand vacuum cleaner of claim 28, wherein the first and second cyclonic cleaning stages each have a longitudinal axis and the axes are parallel.

31. (New) The hand vacuum cleaner of claim 28, wherein the second cyclonic cleaning stage comprises a plurality of second cyclones in parallel.

32. (New) The hand vacuum cleaner of claim 31, wherein each of the second cyclones are smaller than the first cyclone.

33. (New) The hand vacuum cleaner of claim 28, wherein the hand vacuum cleaner has a front end and a rear end and the second cyclonic cleaning stage is rearward of the first cyclonic cleaning stage.

34. (New) The hand vacuum cleaner of claim 33, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage.

35. (New) A hand vacuum cleaner comprising:

a) a fluid flow path extending from a dirty air inlet to a clean air outlet;

b) a first cyclonic cleaning stage in the fluid flow path and comprising a first cyclone and a dirt collection region;

c) a second cyclonic cleaning stage in the fluid flow path downstream from the first cyclonic cleaning stage and comprising an air outlet;

d) a pre-motor filter in the fluid flow path downstream from the second cyclonic cleaning stage and comprising an upstream side and a downstream side wherein the upstream side faces the second cyclonic cleaning stage air outlet; and,

e) a main body comprising a fluid flow motor disposed in the fluid flow path downstream from the pre-motor filter

wherein the second cyclonic cleaning stage and the pre-motor filter have a comparable cross sectional area in a direction transverse to the air flow therethrough.

36. (New) The hand vacuum cleaner of claim 35, wherein the first and second cyclonic cleaning stages each have a longitudinal axis and the axes are parallel.

37. (New) The hand vacuum cleaner of claim 35, wherein the second cyclonic cleaning stage comprises a plurality of second cyclones in parallel.

38. (New) The hand vacuum cleaner of claim 37, wherein each of the second cyclones are smaller than the first cyclone.

39. (New) The hand vacuum cleaner of claim 35, wherein the hand vacuum cleaner has a front end and a rear end and the second cyclonic cleaning stage is rearward of the first cyclonic cleaning stage.

40. (New) The hand vacuum cleaner of claim 39, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage.

41. A hand vacuum cleaner comprising:

a) a fluid flow path extending from a dirty air inlet to a clean air outlet;

b) a first cyclonic cleaning stage in the fluid flow path and comprising a first cyclone and a dirt collection region that has an openable bottom;

c) a second cyclonic cleaning stage in the fluid flow path downstream from the first cyclonic cleaning stage and comprising an openable top; and

d) a main body comprising a handle and a fluid flow motor disposed in the fluid flow path downstream from the second cyclonic cleaning stage.

42. (New) The hand vacuum cleaner of claim 41, wherein the second cyclonic cleaning stage comprises a plurality of second cyclones in parallel.

43. (New) The hand vacuum cleaner of claim 42, wherein each of the second cyclones are smaller than the first cyclone.

44. (New) The hand vacuum cleaner of claim 41, wherein the dirt collection region is external the first cyclone.

45. (New) The hand vacuum cleaner of claim 44, wherein the first cyclone comprises an air inlet, an air outlet and a dirt outlet and the air inlet and the air outlet are at an upper end of the first cyclone and the dirt outlet is at lower end of the first cyclone.

46. (New) The hand vacuum cleaner of claim 41, wherein when the hand vacuum is positioned on a horizontal surface the dirt collection region extends beneath the second cyclonic cleaning stage.

47. (New) The hand vacuum cleaner of claim 41, wherein when the hand vacuum is positioned on a horizontal surface the openable bottom extends beneath the second cyclonic cleaning stage.

48. (New) The hand vacuum cleaner of claim 45, wherein the hand vacuum cleaner has a front end and a rear end and the second cyclonic cleaning stage is rearward of the first cyclonic cleaning stage.

49. (New) The hand vacuum cleaner of claim 48, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage.

50. (New) The hand vacuum cleaner of claim 41, further comprising a pre-motor filter chamber that is disposed in the fluid flow path rearward of the second cyclonic cleaning stage.

51. (New) The hand vacuum cleaner of claim 50, wherein the second cyclonic cleaning stage is rearward of the first cyclonic cleaning stage.

52. (New) The hand vacuum cleaner of claim 41, wherein when the hand vacuum cleaner is positioned on a horizontal surface, the second cyclonic cleaning stage is positioned above a lower end of the first cyclone.

53. (New) The hand vacuum cleaner of claim 41, wherein the first cyclone chamber extends longitudinally along a first longitudinal axis and the second cyclonic cleaning stage extends longitudinally along a second longitudinal axis that is parallel to the first longitudinal axis.

54. (New) The hand vacuum cleaner of claim 41, wherein the fluid flow motor has an inlet end that faces towards a front of the hand vacuum cleaner.

REMARKS

Claims 1-27 have been canceled, and newly presented claims 28-54 have been added. Applicant notes that none of these amendments are believed to include any impermissible new matter. Since the amendments have not been made as a result of any rejection in the present application, no estoppel should be deemed to be associated with this amendment.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,
Wayne Ernest CONRAD

/Linda J. Hodge/
Reg. No. 47,348
Linda J. Hodge

_____
Branko Pejic
Reg. No. 60255

May 8, 2015
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

Electronic Acknowledgement Receipt

EFS ID:	22297155
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Linda Johnson Hodge/Robert Enojado
Filer Authorized By:	Linda Johnson Hodge
Attorney Docket Number:	P46540
Receipt Date:	08-MAY-2015
Filing Date:	18-SEP-2014
Time Stamp:	16:38:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	P46540_PA.pdf	31589 37eaa5850e750c6925c1d613eb8e7798fce1bdd6	no	6

Warnings:	
Information:	

Total Files Size (in bytes):	31589

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New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
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New International Application Filed with the USPTO as a Receiving Office
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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/489,646	Filing Date 09/18/2014	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	05/08/2015	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 27	Minus	** 27	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/MARSHA RICHARDS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/489,646	09/18/2014	Wayne Ernest CONRAD	P46540

CONFIRMATION NO. 6255

7055
GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

POA ACCEPTANCE LETTER

OC000000075076463

Date Mailed: 05/12/2015

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/05/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/yteferra/

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/489,646
Filing Date	September 18, 2014
First Named Inventor	Wayne Ernest Conrad
Title	SURFACE CLEANING APPARATUS
Art Unit	3723
Examiner Name	MULLER, BRYAN R
Attorney Docket Number	10452-P38805US04

SIGNATURE of Applicant or Patent Practitioner

Signature		Date (Optional)	
Name	Philip C. Mendes da Costa	Registration Number	33,106
Title (if Applicant is a juristic entity)	Vice President - Intellectual Property		
Applicant Name (if Applicant is a juristic entity)	Omachron Intellectual Property Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
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U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 01059

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Omachron Intellectual Property Inc.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	July 28, 2015
Name	Philip Mendes da Costa		
Title	Vice President		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office;U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Omachron Intellectual Property Inc.

Application No./Patent No.: 14/489,646 Filed/Issue Date: September 18, 2014

Titled: SURFACE CLEANING APPARATUS

Omachron Intellectual Property Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: WAYNE ERNEST CONRAD To: G.B.D. CORP.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 033768, Frame 0179, or for which a copy thereof is attached.

2. From: G.B.D. CORP. To: CONRAD IN TRUST, WAYNE

   The document was recorded in the United States Patent and Trademark Office at
   Reel 036175, Frame 0514, or for which a copy thereof is attached.

This collection of information is required by37 CFR3.73(b). The information is required toobtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentialityis governed by35 U.S.C. 122and 37 CFR1.11 and1.14. Thiscollection is estimated to take 12 minutes to complete, including gathering, preparing, and submittingthe completed application form to the USPTO.Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent tothe Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.**SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: CONRAD IN TRUST, WAYNE To: OMACHRON INTELLECTUAL PROPERTY INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 036175, Frame 0600, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Philip. C. Mendes da Costa/	September 2, 2015
Signature	Date
Philip C. Mendes da Costa	33106
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that yoube given certain informationin connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, pleasebe advised that: (1) the general authority forthe collection of thisinformation is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and(3) the principal purpose forwhich the information isused by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent applicationor patent. If you do not furnish the requested information,the U.S. Patent and Trademark Office may not be able to process and/or examineyour submission,which may result in termination of proceedings or abandonment of the applicationor expiration of the patent.

The informationprovided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the informationin order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an InternationalApplication filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, arecord may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from thissystem of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	23386239
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Philip C. Mendes da Costa/Lissette Escobar
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	P46540
Receipt Date:	02-SEP-2015
Filing Date:	18-SEP-2014
Time Stamp:	16:29:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	P38805US04_UpdatedADS.pdf	1666163 a583ab46556d21856856883ed0a005ce872d3f40	no	7

Warnings:	
Information:	

This is not an USPTO supplied ADS fillable form					
2	Power of Attorney	P38805US04_executedPOA.PDF	125418 ecdbd7a55abeb0f9df9fe31a88ff41d51f12cbde	no	2
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	P38805US04_Statement.pdf	121758 6013e24deb4f42b2984f013265ad110f485fca9e	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	1913339		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~P46540~~ 10452-P38805US04
	Application Number	14/489,646
Title of Invention	SURFACE CLEANING APPARATUS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing S document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Wayne	Ernest	CONRAD	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hampton	Country of Residence i	CA

Mailing Address of Inventor:

Address 1	9 King Lane		
Address 2			
City	Hampton	State/Province	ON
Postal Code	L0B 1J0	Country i	CA

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	~~07055~~ 01059		
Email Address	~~gbpatent@gbpatent.com~~ pmdcosta@bereskinparr.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURFACE CLEANING APPARATUS		
Attorney Docket Number	~~P46540~~ 10452-P38805US04	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	13	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~P46640~~ 10452-P38805US04
	Application Number	14/489646
Title of Invention	SURFACE CLEANING APPARATUS	

Filing By Reference :

Only compete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	~~07055~~ 01059		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation ~~in part~~ of	11/953292	2007-12-10
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/893990	2007-03-09

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~P46640~~ 10452-P38805US04
	Application Number	14/489646
Title of Invention	SURFACE CLEANING APPARATUS	

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/894005	2007-03-09
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/869586	2006-12-12
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [j] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~P46640~~ 10452-P38805US04
	Application Number	14/489646
Title of Invention	SURFACE CLEANING APPARATUS	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(•) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. [X]

Organization Name: ~~G.B.D. CORP.~~ Omachron Intellectual Property Inc.

Mailing Address Information:

Address 1	~~Templeton Building, Lyford Cay~~ 9 King Lane		
Address 2	~~P.O. Box N-9204~~		
City	~~Nassau~~ Hampton	**State/Province**	ON
Country [i]	~~BS~~ CA	Postal Code	L0B 1J0
Phone Number		Fax Number	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~P46640~~ 10452-P38805US04
	Application Number	14/489646
Title of Invention	SURFACE CLEANING APPARATUS	

Email Address	

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	~~/Leslie J. Paperner/~~ /Philip C. Mendes da Costa/	Date (YYYY-MM-DD)	~~2014-09-16~~ 2015-09-02
First Name	~~Leslie J.~~ Philip C.	Last Name	~~Paperner~~ Mendes da Costa
Registration Number	~~33329~~ 33106		

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~P46640~~ 10452-P38805US04
	Application Number	14/489646
Title of Invention	SURFACE CLEANING APPARATUS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/489,646	09/18/2014	Wayne Ernest CONRAD	P46540

CONFIRMATION NO. 6255

POWER OF ATTORNEY NOTICE

7055
GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

OC000000077387171

Date Mailed: 09/11/2015

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/02/2015.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mteklemichael/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04

CONFIRMATION NO. 6255

1059
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

POA ACCEPTANCE LETTER

OC000000077387218

Date Mailed: 09/11/2015

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/02/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mteklemichael/

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/489,646	09/18/2014	3727	2160	10452-P38805US04	27	1

CONFIRMATION NO. 6255

REPLACEMENT FILING RECEIPT

1059
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA



Date Mailed: 09/11/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Wayne Ernest CONRAD, Hampton, CANADA;

Applicant(s)

Omachron Intellectual Property Inc., Hampton, ON, CANADA;

Power of Attorney: The patent practitioners associated with Customer Number 01059

Domestic Priority data as claimed by applicant

This application is a CIP of 11/953,292 12/10/2007 PAT 8869344
which claims benefit of 60/893,990 03/09/2007
and claims benefit of 60/894,005 03/09/2007
and claims benefit of 60/869,586 12/12/2006

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 09/23/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/489,646**
Projected Publication Date: Not Applicable
Non-Publication Request: No

Early Publication Request: No
Title

SURFACE CLEANING APPARATUS

Preliminary Class

015

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	:	14/489,646	Confirmation No.: 6255
Applicant	:	Wayne Ernest Conrad	
Filed	:	September 18, 2014	
Title	:	SURFACE CLEANING APPARATUS	
TC./A.U.	:	N/A	
Examiner	:	N/A.	
Docket No.	:	10452-P38805US04	
Customer No.	:	01059	

Mail Stop Amendment
Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

December 21, 2015

SUPPLEMENTAL PRELIMINARY AMENDMENT

Sir:

Prior to examination of the above-captioned application, and further to our preliminary amendment of May 8, 2015, please amend the application as follows.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Bereskin & Parr LLP
Scotia Plaza, 40 King Street West, 40th Floor, Toronto, Ontario, Canada M5H 3Y2
Tel: 416.364.7311 Fax: 416.361.1398 www.bereskinparr.com
TORONTO MISSISSAUGA WATERLOO MONTRÉAL

Amendments to the Claims:

Please amend the claims as follows.

Listing of Claims:

1. – 54. (Cancelled)

55. (New) A hand vacuum cleaner comprising:

a) a fluid flow path extending from a dirty air inlet to a clean air outlet;

b) a first cyclonic cleaning stage in the fluid flow path and comprising a first cyclone and an openable bottom;

c) a second cyclonic cleaning stage in the fluid flow path downstream from the first cyclonic cleaning stage and comprising a central longitudinal axis;

d) a pre-motor filter in the fluid flow path downstream from the second cyclonic cleaning stage and comprising an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter; and,

e) a main body comprising a fluid flow motor disposed in the fluid flow path downstream from the pre-motor filter.

56. (New) The hand vacuum cleaner of claim 55, wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion.

57. (New) The hand vacuum cleaner of claim 55, wherein the pre-motor filter is removable while the first and second cyclone stages are attached to the main body.

58. (New) The hand vacuum cleaner of claim 55, wherein the pre-motor filter is removable through an upper end of the hand vacuum cleaner.

59. (New) The hand vacuum cleaner of claim 58, wherein the second cyclonic cleaning stage comprises a plurality of cyclones in parallel and each of the second cyclones are smaller than the first cyclone.

60. (New) The hand vacuum cleaner of claim 55, wherein the second cyclonic cleaning stage comprises a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion.

61. (New) The hand vacuum cleaner of claim 60, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

62. (New) The hand vacuum cleaner of claim 55, wherein the dirty air inlet has an axis and a projection of the dirty air inlet axis intersects the second cyclonic cleaning stage.

63. (New) The hand vacuum cleaner of claim 55, wherein the fluid flow motor has an axis and a projection of the fluid flow motor axis intersects the central longitudinal axis.

64. (New) The hand vacuum cleaner of claim 55, wherein the fluid flow motor and a handle of the hand vacuum cleaner are positioned rearward of the second cyclonic cleaning stage.

65. (New) The hand vacuum cleaner of claim 55, wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.

66. (New) The hand vacuum cleaner of claim 55, wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter.

67. (New) A hand vacuum cleaner comprising:

a) a fluid flow path extending from a dirty air inlet to a clean air outlet;

b) a first cyclonic cleaning stage in the fluid flow path and comprising a first cyclone and an openable bottom;

c) a second cyclonic cleaning stage in the fluid flow path downstream from the first cyclonic cleaning stage and comprising a plurality of cyclones that operate in parallel and that are arranged around a central portion and a longitudinal axis that extends through the central portion;

d) a pre-motor filter in the fluid flow path downstream from the second cyclonic cleaning stage and comprising an upstream side and a downstream side; and,

e) a main body comprising a fluid flow motor disposed in the fluid flow path downstream from the pre-motor filter wherein and, after exiting the second stage cyclones, air enters the central portion.

68. (New) The hand vacuum cleaner of claim 67, wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion.

69. (New) The hand vacuum cleaner of claim 67, wherein the pre-motor filter is removable while the first and second cyclone stages are attached to the main body.

70. (New) The hand vacuum cleaner of claim 67, wherein the pre-motor filter is removable through an upper end of the hand vacuum cleaner.

71. (New) The hand vacuum cleaner of claim 67, wherein each of the second cyclones are smaller than the first cyclone.

72. (New) The hand vacuum cleaner of claim 67, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

73. (New) The hand vacuum cleaner of claim 67, wherein the dirty air inlet has an axis and a projection of the dirty air inlet axis intersects the second cyclonic cleaning stage.

74. (New) The hand vacuum cleaner of claim 67, wherein the fluid flow motor has an axis and a projection of the fluid flow motor axis intersects the central axis.

75. (New) The hand vacuum cleaner of claim 67, wherein the fluid flow motor and a handle of the hand vacuum cleaner are positioned rearward of the second cyclonic cleaning stage.

76. (New) The hand vacuum cleaner of claim 67, wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.

77. (New) The hand vacuum cleaner of claim 67, wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter.

REMARKS/ARGUMENTS

Claims 1-54 have been canceled, and newly presented claims 55-77 have been added.

No new matter has been added to the application by way of the above-noted amendment. Accordingly, entry of this amendment is respectfully requested.

By this amendment, the Applicant has amended the claims so as to put them into a form that the Applicant desires to present for examination.

Conclusion

In light of the applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

No Disclaimers or Disavowals

Notwithstanding any argument or claim amendment herein presented in response to any rejection or objection in the Office Action, any argument submitted herein is not to be assumed to be exhaustive. Unless clearly indicated, the Applicant does not consent to, or acquiesce in, any rejection or objection made in the Office Action. The Applicant expressly reserves the right to submit such further or other arguments or amendments as may advance the case, at such time and in such manner as the Applicant may choose in accordance with law, whether in prosecution herein, in a continuation, divisional, re-examination or re-issue proceeding, or such other proceeding as may be. Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, applicant is not conceding

in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that applicant has made any disclaimers or disavowals of any subject matter supported by the present specification.

Please charge any additional fees including any fees for additional claims or extension of time or credit or overpayment to deposit account number 02-2095.

Should the Examiner deem it beneficial to discuss the application in greater detail, the Examiner is kindly requested to contact Philip C. Mendes da Costa by telephone at 416-957-1695 at the Examiner's convenience.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

P. Mendes da Costa

By _____
Philip C. Mendes da Costa
Reg. No. 33,106
Tel: 416-957-1695

Electronic Acknowledgement Receipt

EFS ID:	24431815
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P38805US04
Receipt Date:	21-DEC-2015
Filing Date:	18-SEP-2014
Time Stamp:	17:21:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	P38805US04_Preliminary_Amendment_2015_12_21_Final.pdf	181943 3fa90843628bd1f7dde932a7e5dda938eeed3603	no	7

Warnings:	
Information:	

Total Files Size (in bytes):	181943

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/489,646	Filing Date 09/18/2014	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	12/21/2015	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 27	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/THERESA OKON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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UNITED STATES DEPARTMENT OF COMMERCE
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Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

1059 7590 01/29/2016

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

EXAMINER
MULLER, BRYAN R

ART UNIT	PAPER NUMBER
3727	

MAIL DATE	DELIVERY MODE
01/29/2016	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/489,646	CONRAD, WAYNE ERNEST	
	Examiner	Art Unit	
	BRYAN R. MULLER	3727	

All participants (applicant, applicant's representative, PTO personnel):

(1) *BRYAN R. MULLER*. (3)_____.

(2) *PHILIP MENDES DA COSTA*. (4)_____.

Date of Interview: *22 January 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *n/a*.

Identification of prior art discussed: *n/a*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The applicant requested an interview on the merits of the application and the examiner indicated that no examination has been conducted at this time. The examiner also indicated that an Election of Species would be required prior to examination and the applicant agreed to consider the Election Requirement and reply with an election .

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/BRYAN R MULLER/ Primary Examiner, Art Unit 3727	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

———

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

1059 7590 02/04/2016

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

EXAMINER	
MULLER, BRYAN R	

ART UNIT	PAPER NUMBER
3727	

MAIL DATE	DELIVERY MODE
02/04/2016	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/489,646	CONRAD, WAYNE ERNEST	
	Examiner	Art Unit	
	BRYAN R. MULLER	3727	

All participants (applicant, applicant's representative, PTO personnel):

(1) *BRYAN R. MULLER*. (3) *WAYNE CONRAD*.

(2) *PHILIP MENDES DA COSTA*. (4)_____.

Date of Interview: *01 February 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☒112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *55,58,60,62,63,73 and 74*.

Identification of prior art discussed: _____.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The examiner indicated some initial issues with the claims that may raise rejections under 35 U.S.C. 112 and/or objections to the claim. The applicant suggested structure that is believed to be novel in the art and potential inclusion of such structure in the claims. The examiner agreed to consider the suggestions during further examination and prior art search and to further discuss the merits of the claims with the applicant prior to issuing an Office Action .

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/BRYAN R MULLER/ Primary Examiner, Art Unit 3727	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

———

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

1059 7590 02/05/2016

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CANADA

EXAMINER
MULLER, BRYAN R

ART UNIT	PAPER NUMBER
3727	

MAIL DATE	DELIVERY MODE
02/05/2016	PAPER

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The time period for reply, if any, is set in the attached communication.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	14/489,646	CONRAD, WAYNE ERNEST	
	Examiner	Art Unit	
	BRYAN R. MULLER	3727	

All participants (applicant, applicant's representative, PTO personnel):

(1) *BRYAN R. MULLER*. (3)_____.

(2) *PHILIP MENDES DA COSTA*. (4)_____.

Date of Interview: *03 February 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *55,60,64,73 and 74*.

Identification of prior art discussed: *Weistra (5,135,552), Ivarsson (7,481,860 [2006/0179801]), Miyake et al. (3,653,189), Sham (5,341,541), Kochte (4,573,237), Miller (4,380,845)*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The examiner contacted the applicant after completion of prior art search, as requested in the previous Applicant-initiated Interview, indicating that prior art had been found to reject all pending claims. The examiner also proposed claim limitations that would be considered to be allowable, including combination of claims 55, 60, 64 and limitations directed to the first and second cyclonic cleaning stages being offset and substantially parallel and the dirt collection chamber extending below the entirety of the first and second cyclonic cleaning stages. The applicant proposed several alternative claim amendments relative to the handle location and configuration relative to the dirty air inlet and motor housing but the examiner indicated that the limitations did not define any structure that would be considered to be novel over the prior art or allowable. The applicant agreed to discuss the examiner's proposed amendments with the inventor and assignee and reply to the examiner by the end of the week .

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/BRYAN R MULLER/ Primary Examiner, Art Unit 3727	

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	:	14/489,646	Confirmation No.: 6255
Applicant	:	Wayne Ernest Conrad	
Filed	:	September 18, 2014	
Title	:	SURFACE CLEANING APPARATUS	
TC./A.U.	:	N/A	
Examiner	:	N/A.	
Docket No.	:	10452-P38805US04	
Customer No.	:	01059	

Mail Stop Amendment
Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

February 5, 2016

SUPPLEMENTAL PRELIMINARY AMENDMENT

Sir:

Prior to examination of the above-captioned application, and further to our preliminary amendment of December 21, 2015, please amend the application as follows.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims:

Please amend the claims as follows.

Listing of Claims:

1. – 54. (Cancelled)

55. (Currently Amended) A hand vacuum cleaner comprising an air treatment portion and a main body, the air treatment portion comprising a first cyclonic cleaning stage, a second cyclonic cleaning stage and a pre-motor filter, the hand vacuum cleaner comprising:

a) a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis;

b) [[a]] the first cyclonic cleaning stage is positioned in the fluid flow path and comprises ~~comprising~~ a first cyclone having a dirt collection region wherein the dirt collection region has [[and]] an openable bottom;

c) [[a]] the second cyclonic cleaning stage is positioned in the fluid flow path downstream from the first cyclonic cleaning stage and comprises ~~comprising~~ a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion;

d) [[a]] the pre-motor filter is positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises ~~comprising~~ an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter; and,

e) [[a]] the main body comprises ~~comprising~~ a fluid flow motor housing for a fluid flow motor that is disposed in the fluid flow path downstream from the pre-

motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion,

wherein

(i) the fluid flow motor and a handle of the hand vacuum cleaner are positioned rearward of the second cyclonic cleaning stage;

(ii) the dirt collection region is positioned beneath the cyclones of the first cyclonic cleaning stage and the second cyclonic cleaning stage and the dirt collection region has a bottom that is beneath the pre-motor filter; and,

(iii) the handle comprises an upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the upwardly extending portion extends away from the fluid flow motor housing and the passage axis intersects the upwardly extending portion of the handle.

56. (Previously Presented) The hand vacuum cleaner of claim 55, wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion.

57. (Cancelled).

58. (Cancelled)

59. (Currently Amended) The hand vacuum cleaner of claim 58, wherein ~~the second cyclonic cleaning stage comprises a plurality of cyclones in parallel and~~ each of the second cyclones are smaller than the first cyclone.

60. (Cancelled).

61. (New) The hand vacuum cleaner of claim 60, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

62. (Currently Amended) The hand vacuum cleaner of claim 55, wherein the dirty air inlet has [[an]] a central longitudinal axis and a projection of the dirty air inlet central longitudinal axis intersects the second cyclonic cleaning stage.

63. (Cancelled).

64. (Cancelled).

65. (Previously Presented) The hand vacuum cleaner of claim 55, wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.

66. (Previously Presented) The hand vacuum cleaner of claim 55, wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter.

67-77 (Cancelled).

78. (New) The hand vacuum cleaner of claim 55 wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.

79. (New) The hand vacuum cleaner of claim 55 wherein the dirt collection region has a pivotally openable bottom.

80. (New) The hand vacuum cleaner of claim 79 wherein the bottom is openable when the dirt collection region is attached to the main body.

81. (New) The hand vacuum cleaner of claim 55 wherein the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis.

82. (New) The hand vacuum cleaner of claim 81 wherein the rotational axis of the fluid flow motor is parallel to the passage axis.

83. (New) The hand vacuum cleaner of claim 55 further comprising a hand grip region which is positioned between the upwardly extending portion of the handle and a portion of the sidewall of the air treatment portion.

REMARKS/ARGUMENTS

The Applicant submits herewith a further preliminary amendment.

No new matter has been added to the application by way of the above-noted amendment. Accordingly, entry of this amendment is respectfully requested.

By this amendment, the Applicant has amended the claims so as to put them into a form that the Applicant desires to present for examination.

Conclusion

In light of the applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

No Disclaimers or Disavowals

The Applicant expressly reserves the right to submit such further or other arguments or amendments as may advance the case, at such time and in such manner as the Applicant may choose in accordance with law, whether in prosecution herein, in a continuation, divisional, re-examination or re-issue proceeding, or such other proceeding as may be.

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate

expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that applicant has made any disclaimers or disavowals of any subject matter supported by the present specification.

Please charge any additional fees including any fees for additional claims or extension of time or credit or overpayment to deposit account number 02-2095.

Should the Examiner deem it beneficial to discuss the application in greater detail, the Examiner is kindly requested to contact Philip C. Mendes da Costa by telephone at 416-957-1695 at the Examiner's convenience.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

P. Mendes da Costa

By _____
Philip C. Mendes da Costa
Reg. No. 33,106
Tel: 416-957-1695

Electronic Acknowledgement Receipt

EFS ID:	24839817
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P38805US04
Receipt Date:	05-FEB-2016
Filing Date:	18-SEP-2014
Time Stamp:	16:09:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	P38805US04_Preliminary_Amendment_II_2015_02-05_Final.pdf	183285 1ba98b8bec451b19b8a07c8a8e1bef4b3c0af368	no	7

Warnings:	
Information:	

Total Files Size (in bytes):	183285

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/489,646	Filing Date 09/18/2014	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	02/05/2016	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 13	Minus	** 27	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/CASSANDRA B. DOWNS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

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P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

1059 7590 02/10/2016

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

EXAMINER	
MULLER, BRYAN R	

ART UNIT	PAPER NUMBER
3727	

MAIL DATE	DELIVERY MODE
02/10/2016	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	14/489,646	CONRAD, WAYNE ERNEST	
	Examiner	Art Unit	
	BRYAN R. MULLER	3727	

All participants (applicant, applicant's representative, PTO personnel):

(1) *BRYAN R. MULLER*. (3)_____.

(2) *PHILIP MENDES DA COSTA*. (4)_____.

Date of Interview: *05 February 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☒ Yes ☐ No.
If Yes, brief description: *Applicant proposed claim amendments*.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *55*.

Identification of prior art discussed: _____.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The examiner reviewed the applicant's proposed amendments and indicated additional claim limitations in an attempt to place the claims in condition for allowance. The applicant agreed to the examiner's proposed claims and will submit the amendments as a preliminary amendment ASAP .

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/BRYAN R MULLER/ Primary Examiner, Art Unit 3727	

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NOTICE OF ALLOWANCE AND FEE(S) DUE

1059 7590 02/18/2016

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

EXAMINER
MULLER, BRYAN R

ART UNIT	PAPER NUMBER
3727	

DATE MAILED: 02/18/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

TITLE OF INVENTION: SURFACE CLEANING APPARATUS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/18/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

1059 7590 02/18/2016
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

TITLE OF INVENTION: SURFACE CLEANING APPARATUS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/18/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
MULLER, BRYAN R	3727	015-353000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
❑ Issue Fee
❑ Publication Fee (No small entity discount permitted)
❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
❑ A check is enclosed.
❑ Payment by credit card. Form PTO-2038 is attached.
❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
❑ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Page 766

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

1059 7590 02/18/2016

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40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

EXAMINER	
MULLER, BRYAN R	
ART UNIT	**PAPER NUMBER**
3727	

DATE MAILED: 02/18/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/489,646	Applicant(s) CONRAD, WAYNE ERNEST	
	Examiner BRYAN R. MULLER	Art Unit 3727	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *claims filed 2/5/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *55,56,59,61,62,65,66 and 78-83*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/BRYAN R MULLER/
Primary Examiner, Art Unit 3727

EXAMINER'S AMENDMENT

The present application is being examined under the pre-AIA first to invent provisions.

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species:

A. Figures 1a, 2a and 6.

B. Figures 1b, 2b and 7.

C. Figures 1c and 2c.

D. Figures 1d and 2d.

The species are independent or distinct because each species introduces materially distinct and different structure from one another including size, shape and application. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are considered to be generic to all species.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply: the distinct embodiments would require extensive consideration to understand the differences of

each embodiment as well as extensive search in multiple classification areas and within individual class/subclasses.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the

evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

2. During a telephone conversation with Philip Mendes Da Costa on 2/1/2016 a provisional election was made without traverse to prosecute the invention of Species A, claims 55, 56, 58-68 and 70-77. Affirmation of this election must be made by applicant in replying to this Office action. Claims 57 and 69 (cancelled below) have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Examiner's Amendment

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

4. Authorization for this examiner's amendment was given in a telephone interview with Philip Mendes Da Costa on 2/5/2016.

5. The application has been amended as follows:

a. In claim 55:

i. The word “beneath” in line 30 (line 1 of clause ii) has been changed to “underneath”.

ii. The phrase “dirt collection region has a bottom that is beneath” in lines 31-32 (line 2-3 of clause ii) has been replaced with the word “underneath”.

iii. The phrase “of the dirty fluid inlet” has been added after the word "axis" in line 35 (line 3 of clause iii).

b. Claims 59 and 61 have been amended to depend from claim 55.

2. The following is an examiner’s statement of reasons for allowance: the prior art of record (considered as a whole) neither anticipates nor renders obvious a hand held vacuum cleaner having a fluid flow path including a dirty air inlet, an air treatment portion with first and second cyclonic cleaning stages, a pre-motor filter and a fluid flow motor with the combination of (i) the second cyclonic cleaning stage including a plurality of cyclones in parallel and arranged around a central portion, through which airflow enters the upper portion of the central portion after exiting the plurality of cyclones and exits the central portion below the upper portion, (ii) the pre-motor filter is positioned downstream of the central portion with a central longitudinal axis of the central portion passing through the pre-motor filter, (iii) the fluid flow motor having a rotational axis that intersects the central longitudinal axis of the central portion, (iv) the motor housing is secured to only a portion of a sidewall of the air treatment portion, (v) the fluid flow motor and a handle are positioned rearward of the second cyclonic cleaning stage, (vi)

the dirt collection region of the first cyclonic cleaning stage is positioned beneath the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter and (vii) the handle comprises an upwardly extending portion extending away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle in combination with the rest of the limitations set forth in the independent claim. Weistra (5,135,552) is considered to be the closest prior art of record with Hwang et al. (7,582,128) and Yung (6,484,350) also having similar structure to the claimed invention. However, none of the prior art is considered to make obvious the specific configuration of the claimed invention, specifically the particular orientation of the cyclones relative to one another, the motor, handle and pre-motor filter or the orientation of the motor and handle relative to one another and relative to the central portion of the second cyclonic cleaning stage and the inlet axis, respectively. Although each of the above listed structures *may* be taught in the prior art individually, the extent to which modification of an apparatus of Weistra or other known prior art would be required to reach the claimed invention as a whole is not considered to be obvious.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYAN R. MULLER whose telephone number is (571)272-4489. The examiner can normally be reached on Monday thru Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Monica S. Carter can be reached on (571) 272-4475. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRYAN R MULLER/
Primary Examiner, Art Unit 3727
2/8/2016

Notice of References Cited	Application/Control No. 14/489,646	Applicant(s)/Patent Under Reexamination CONRAD, WAYNE ERNEST	
	Examiner BRYAN R. MULLER	Art Unit 3727	Page 1 of 1

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	J	US-				
	K	US-				
	L	US-				
	M	US-				

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	Art Unit
	BRYAN R MULLER	3727

CPC- SEARCHED		
Symbol	Date	Examiner
A47L 5/24, 9/16, 9/1616, 9/165, 9/1625, 9/1641, 9/322, 9/1608	2/2/2016	BRM

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
15	353, 344, 327.7	2/8/2016	BRM

SEARCH NOTES		
Search Notes	Date	Examiner
CPC, Class/subclass, text and citations search in US-PGPUBs, USPAT< USOCR, EPO, JPO and DERWENT databases	2/2/2016	BRM

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
A47L	5/24, 9/16, 9/1616, 9/1625 in US-PGPUBs databases	2/8/2016	BRM
15	353, 344, 327.7 in US-PGPUBs database	2/8/2016	BRM
	Text claims search in US-PGPUBs and USPAT datebases	2/8/2016	BRM

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	**Art Unit**
	BRYAN R MULLER	3727

CPC						
Symbol					**Type**	**Version**
A47L		9	/	1616	F	2013-01-01
A47L		9	/	1641	I	2013-01-01
A47L		9	/	1608	I	2013-01-01
A47L		9	/	1666	I	2013-01-01
A47L		9	/	165	I	2013-01-01
A47L		5	/	24	I	2013-01-01
A47L		9	/	322	I	2013-01-01
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CPC Combination Sets							
Symbol				**Type**	**Set**	**Ranking**	**Version**
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NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 13	
/BRYAN R MULLER/ Primary Examiner.Art Unit 3727 (Primary Examiner)	2/8/2016 (Date)	O.G. Print Claim(s) 55	O.G. Print Figure 2a

U.S. Patent and Trademark Office

Part of Paper No. 20160208

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	**Art Unit**
	BRYAN R MULLER	3727

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION												
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED							
15	355	A	4	7	L	9 / 10 (2006.0)								
CROSS REFERENCE(S)		A	4	7	L	9 / 20 (2006.0)								
		A	4	7	L	5 / 00 (2006.0)								
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)													
15	344	327.7												

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	13	
/BRYAN R MULLER/ Primary Examiner.Art Unit 3727	2/8/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	55	2a

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	**Art Unit**
	BRYAN R MULLER	3727

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	55														
2	56														
3	59														
4	61														
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7	66														
8	78														
9	79														
10	80														
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12	82														
13	83														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 13	
/BRYAN R MULLER/ Primary Examiner.Art Unit 3727 (Primary Examiner)	2/8/2016 (Date)	O.G. Print Claim(s) 55	O.G. Print Figure 2a

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BIB DATA SHEET

CONFIRMATION NO. 6255

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/489,646	09/18/2014	015	3727	10452-P38805US04

APPLICANTS
Omachron Intellectual Property Inc., Hampton, ON, CANADA;

INVENTORS
Wayne Ernest CONRAD, Hampton, CANADA;

**** CONTINUING DATA ***************************
This application is a CIP of 11/953,292 12/10/2007 PAT 8869344
which claims benefit of 60/893,990 03/09/2007
and claims benefit of 60/894,005 03/09/2007
and claims benefit of 60/869,586 12/12/2006

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
09/23/2014

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /Bryan R. Muller/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		CANADA	13	27	1

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CANADA

TITLE
SURFACE CLEANING APPARATUS

FILING FEE RECEIVED		
2160	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Attorney Docket No. P46540 Application No.14/489,646

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Wayne Ernest CONRAD	Conf. No.: 6255
Appl. No.	:	14/489,646	Examiner:
Filed	:	September 18, 2014	Group Art Unit:
For	:	SURFACE CLEANING APPARATUS	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
U.S. Patent and Trademark Office
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Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In accordance with the duty of disclosure under 37 CFR § 1.56 and §§ 1.97 – 1.98, Applicant(s) wish to bring the following information to the attention of the Examiner.

Applicant(s) wish to make of record the documents listed on the attached form 1449. Copies of the listed documents are attached, where required, as are noted English translations, or partial translations of pertinent portions, and/or English language abstracts, of any non-English language references. The relevance of any document cited in any International/Foreign Search Report or Written Opinion is indicated in the Search Report or Written Opinion.

Applicant(s) note that the present application is a continuation of U.S. Appl. No. 11/953,292; thus copies of the documents cited in U.S. Appl. No. 11/953,292 are not required to be filed in the present application. Applicant(s) further note that U.S. Appl. Nos. 14/489,622, 14/489,636, 14/489,670, 14/489,657, 14/488,449, 14/488,430, and 14/488,464 are also continuations of U.S. Appl. No. 11/953,292.

CERTIFICATION

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. This certification does not apply to any document previously cited in the present application.

☐ Moreover, this communication was not received by any individual designated in §1.56 (c) more than thirty days prior to the filing of the Information Disclosure Statement.

FEES

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R.M/

☐ A payment in the amount required under 37 CFR §1.17(p) is provided herewith.

DEPOSIT ACCOUNT

In the event that any additional fees are due with respect to this paper, the Commissioner is hereby authorized to charge such fees to Deposit Account No. 19-0089 of the undersigned.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Wayne Ernest CONRAD

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R.M/

/BRYAN R MULLER/ (02/02/2016)

FORM 1449 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. P46537	Application No. 14/489,646
	Applicant G.B.D. CORP.	
	Filing Date September 18, 2014	Group

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	5								
EXAMINER/BRYAN R MULLER/ (02/02/2016)				DATE CONSIDERED 02/02/2016					
*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.									

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	9	("20090313958" | "5379483" | "7931716" | "8117712" | "8156609" | "8236077" | "8302250" | "8347455" | "8387204").PN.	US-PGPUB; USPAT	OR	OFF	2016/02/01 14:47
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S4	57	("1871624" | "20020096341" | "20020189048" | "20030030984" | "20040078921" | "20040144070" | "20040261382" | "20050229355" | "20050274094" | "20060162117" | "20070119016" | "20070163073" | "20100229321" | "3914820" | "4245370" | "5074006" | "5089738" | "5102435" | "5692262" | "6073302" | "6170118" | "6569217" | "7303613" | "7309365" | "7334290" | "7640624").PN. OR ("7931716" | "8156609" | "8302250").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/02/01 14:52
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S6	1	"20060207055".pn.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/02/02 15:14
S7	0	"EP0489468"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2016/02/02 15:15
S8	18	"EP 0489468"	US-	OR	OFF	2016/02/02

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S10	750	A47L5/24.cpc.	US-PGPUB; USPAT	OR	OFF	2016/02/02 15:23
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S13	17	("3320727" | "3582616" | "4373228" | "4826515" | "5230722" | "5309601" | "5858038" | "6210469" | "6221134" | "6553612" | "6560818" | "6581239" | "6782585" | "7222393" | "7386916" | "7485164").PN. OR ("8590102").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/02/02 15:25
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S22	24	("2002/0189048").URPN.	USPAT	OR	OFF	2016/02/02 16:40
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S25	672	A47L9/1641.cpc. and cyclon$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2016/02/02 17:34
S26	12	("2007/0214754").URPN.	USPAT	OR	OFF	2016/02/02 17:45
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S28	7	("2006/0254226").URPN.	USPAT	OR	OFF	2016/02/02 17:52
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S51	986	A47L9/1666.cpc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2016/02/08 10:42
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S53	347	S52 not (S46 S47 S49)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2016/02/08 10:42

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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S55	53	A47L9/16.cpc.	US-PGPUB	OR	OFF	2016/02/08 10:43
S56	16	A47L9/1616.cpc.	US-PGPUB	OR	OFF	2016/02/08 10:44
S57	274	A47L9/1625.cpc.	US-PGPUB	OR	OFF	2016/02/08 10:45
S58	228	S57 not (S54 S55 S56)	US-PGPUB	OR	OFF	2016/02/08 10:45
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S60	594	15/353,344,327.7.ccls.	US-PGPUB	OR	OFF	2016/02/08 10:53
S61	382	S60 not (S54 S55 S56 S57 S58 S59)	US-PGPUB	OR	OFF	2016/02/08 10:53

2/ 8/ 2016 12:20:24 PM
C:\ Users\ bmuller\ Documents\ EAST\ Workspaces\ 14489646.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors :	Wayne Ernest CONRAD	Conf. No.:	6255
Appl. No. :	14/489,646	Examiner:	Not Yet Assigned
Filed :	September 18, 2014	Group Art Unit:	1776
For :	SURFACE CLEANING APPARATUS		

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In accordance with the duty of disclosure under 37 CFR § 1.56 and §§ 1.97 – 1.98, Applicant(s) wish to bring the following information to the attention of the Examiner.

Applicant(s) wish to make of record the documents listed on the attached form 1449. Copies of the listed documents are attached, where required, as are noted English translations, or partial translations of pertinent portions, and/or English language abstracts, of any non-English language references. The relevance of any document cited in any International/Foreign Search Report or Written Opinion is indicated in the Search Report or Written Opinion.

CERTIFICATION

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. This certification does not apply to any document previously cited in the present application.

☐ Moreover, this communication was not received by any individual designated in §1.56 (c) more than thirty days prior to the filing of the Information Disclosure Statement.

FEES

☐ A payment in the amount required under 37 CFR §1.17(p) is provided herewith.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R.M/

DEPOSIT ACCOUNT

In the event that any additional fees are due with respect to this paper, the Commissioner is hereby authorized to charge such fees to Deposit Account No. 19-0089 of the undersigned.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Wayne Ernest CONRAD

/Linda J. Hodge/
Linda J. Hodge
Reg. No. 47,348

Branko Pejic
Reg. No. 60255

April 1, 2015
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R.M/

FORM 1449 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. P46540	Application No. 14/489,646
	Applicant G.B.D. CORP.	
	Filing Date September 18, 2014	Group 1776

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	A	5379483	01/10/1995	PINO			
	B	8347455	01/08/2013	DYSON et al.			
	C	8302250	11/06/2012	DYSON et al.			
	D	8387204	03/05/2013	DYSON			
	E	8236077	08/07/2012	GOMICIAGA -PEREDA et al.			
	F	8156609	04/17/2012	MILNE et al.			
	G	7931716	04/26/2011	OAKHAM			
	H	8117712	02/21/2012	Dyson			
	I	2009/0313958	12/24/2009	GOMICIAGA -PEREDA et al.			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANS-LATION YES	FAMILY MEMBER YES	ENGLISH ABSTRACT YES
	a	202005020767	08/10/2006	GERMANY			X		
	b	2251178	07/01/1992	UNITED KINGDOM					
	c	60-220027	11/02/1985	JAPAN			X		
	d	63-246116	10/13/1988	JAPAN			X		
	e								
	f								
	g								

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	1	What's the Best vacuum.com Forum discussion "Dyson DC16 Root 6 Hand Held Vacuum Cleaner; http://www.abbysguide.com/vacuum/legacy/cgi-bin/yabb/2618~YaBB.html; dated October 21, 2006.
	2	

EXAMINER /BRYAN R MULLER/ (02/02/2016)	DATE CONSIDERED 02/02/2016

*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R.M/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

1059 7590 02/22/2016

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CANADA

EXAMINER	
MULLER, BRYAN R	

ART UNIT	PAPER NUMBER
3727	

MAIL DATE	DELIVERY MODE
02/22/2016	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Corrected Notice of Allowability	**Application No.** 14/489,646	**Applicant(s)** CONRAD, WAYNE ERNEST	
	Examiner BRYAN R. MULLER	**Art Unit** 3727	**AIA (First Inventor to File) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *claims filed 2/5/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *55,56,59,61,62,65,66 and 78-83*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/BRYAN R MULLER/
Primary Examiner, Art Unit 3727

EXAMINER'S AMENDMENT

The present application is being examined under the pre-AIA first to invent provisions.

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species:

A. Figures 1a, 2a and 6.

B. Figures 1b, 2b and 7.

C. Figures 1c and 2c.

D. Figures 1d and 2d.

The species are independent or distinct because each species introduces materially distinct and different structure from one another including size, shape and application. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are considered to be generic to all species.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply: the distinct embodiments would require extensive consideration to understand the differences of

each embodiment as well as extensive search in multiple classification areas and within individual class/subclasses.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the

evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

2. During a telephone conversation with Philip Mendes Da Costa on 2/1/2016 a provisional election was made without traverse to prosecute the invention of Species A, claims 55, 56, 58-68 and 70-77. Affirmation of this election must be made by applicant in replying to this Office action. Claims 57 and 69 (cancelled below) have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Examiner's Amendment

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

4. Authorization for this examiner's amendment was given in a telephone interview with Philip Mendes Da Costa on 2/5/2016.

5. The application has been amended as follows:

a. In claim 55:

i. Clause ii (lines 30-32) has been amended as follows:

(ii) the dirt collection region is positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages and the ~~second cyclonic cleaning stage and the dirt collection region has a bottom that is beneath the~~ pre-motor filter; and,

ii. The phrase “of the dirty fluid inlet” has been added after the word "axis" in line 35 (line 3 of clause iii).

b. Claims 59 and 61 have been amended to depend from claim 55.

2. The following is an examiner’s statement of reasons for allowance: the prior art of record (considered as a whole) neither anticipates nor renders obvious a hand held vacuum cleaner having a fluid flow path including a dirty air inlet, an air treatment portion with first and second cyclonic cleaning stages, a pre-motor filter and a fluid flow motor with the combination of (i) the second cyclonic cleaning stage including a plurality of cyclones in parallel and arranged around a central portion, through which airflow enters the upper portion of the central portion after exiting the plurality of cyclones and exits the central portion below the upper portion, (ii) the pre-motor filter is positioned downstream of the central portion with a central longitudinal axis of the central portion passing through the pre-motor filter, (iii) the fluid flow motor having a rotational axis that intersects the central longitudinal axis of the central portion, (iv) the motor housing is secured to only a portion of a sidewall of the air treatment portion, (v) the fluid flow motor and a handle are positioned rearward of the second cyclonic cleaning stage, (vi) the dirt collection region of the first cyclonic cleaning stage is positioned beneath the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter and

(vii) the handle comprises an upwardly extending portion extending away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle in combination with the rest of the limitations set forth in the independent claim. Weistra (5,135,552) is considered to be the closest prior art of record with Hwang et al. (7,582,128) and Yung (6,484,350) also having similar structure to the claimed invention. However, none of the prior art is considered to make obvious the specific configuration of the claimed invention, specifically the particular orientation of the cyclones relative to one another, the motor, handle and pre-motor filter or the orientation of the motor and handle relative to one another and relative to the central portion of the second cyclonic cleaning stage and the inlet axis, respectively. Although each of the above listed structures *may* be taught in the prior art individually, the extent to which modification of an apparatus of Weistra or other known prior art would be required to reach the claimed invention as a whole is not considered to be obvious.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYAN R. MULLER whose telephone number is (571)272-4489. The examiner can normally be reached on Monday thru Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Monica S. Carter can be reached on (571) 272-4475. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRYAN R MULLER/
Primary Examiner, Art Unit 3727
2/19/2016

Notice of References Cited	Application/Control No. 14/489,646	Applicant(s)/Patent Under Reexamination CONRAD, WAYNE ERNEST	
	Examiner BRYAN R. MULLER	Art Unit 3727	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5,135,552 A	08-1992	Weistra; Marten P.	A47L9/1418	55/337
*	B	US-7,582,128 B2	09-2009	Hwang; Man Tae	A47L9/0081	55/337
*	C	US-6,484,350 B2	11-2002	Yung; Billy	A47L5/28	15/327.1
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	Art Unit
	BRYAN R MULLER	3727

CPC- SEARCHED		
Symbol	Date	Examiner
A47L 5/24, 9/16, 9/1616, 9/165, 9/1625, 9/1641, 9/322, 9/1608	2/2/2016	BRM

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
15	353, 344, 327.7	2/8/2016	BRM

SEARCH NOTES		
Search Notes	Date	Examiner
CPC, Class/subclass, text and citations search in US-PGPUBs, USPAT< USOCR, EPO, JPO and DERWENT databases	2/2/2016	BRM

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
A47L	5/24, 9/16, 9/1616, 9/1625 in US-PGPUBs databases	2/8/2016	BRM
15	353, 344, 327.7 in US-PGPUBs database	2/8/2016	BRM
	Text claims search in US-PGPUBs and USPAT datebases	2/8/2016	BRM

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	**Art Unit**
	BRYAN R MULLER	3727

CPC								
Symbol							**Type**	**Version**
A47L	/	9	/	1616			F	2013-01-01
A47L	/	9	/	1641			I	2013-01-01
A47L	/	9	/	1608			I	2013-01-01
A47L	/	9	/	1666			I	2013-01-01
A47L	/	9	/	165			I	2013-01-01
A47L	/	5	/	24			I	2013-01-01
A47L	/	9	/	322			I	2013-01-01
A47L	/	9	/	1625			I	2013-01-01

CPC Combination Sets									
Symbol							**Type**	**Set**	**Ranking**	**Version**

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	13	
/BRYAN R MULLER/ Primary Examiner.Art Unit 3727	2/8/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	55	2a

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	**Art Unit**
	BRYAN R MULLER	3727

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
15	355	A	4	7	L	9 / 10						
CROSS REFERENCE(S)		A	4	7	L	9 / 20						
		A	4	7	L	5 / 00						

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
15	344	327.7			

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	13	
/BRYAN R MULLER/ Primary Examiner.Art Unit 3727	2/8/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	55	2a

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14489646	CONRAD, WAYNE ERNEST
	Examiner	**Art Unit**
	BRYAN R MULLER	3727

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	55														
2	56														
3	59														
4	61														
5	62														
6	65														
7	66														
8	78														
9	79														
10	80														
11	81														
12	82														
13	83														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 13	
/BRYAN R MULLER/ Primary Examiner.Art Unit 3727 (Primary Examiner)	2/8/2016 (Date)	O.G. Print Claim(s) 55	O.G. Print Figure 2a

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

1059 7590 02/18/2016
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/489,646	09/18/2014	Wayne Ernest CONRAD	10452-P38805US04	6255

TITLE OF INVENTION: SURFACE CLEANING APPARATUS Philip C. Mendes da Costa

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/18/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
MULLER, BRYAN R	3727	015-353000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Philip C. Mendes da Costa
2 BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Omachron Intellectual Property Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Hampton, Ontario

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 022095 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Philip C. Mendes da Costa/ Date February 22, 2016
Typed or printed name Philip C. Mendes da Costa Registration No. 33106

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	: 14/489,646	Confirmation No.:	6255
Applicant	: Wayne Ernest Conrad		
Filed	: September 18, 2014		
Title	: SURFACE CLEANING APPARATUS		
TC./A.U.	: 3727		
Examiner	: Bryan Muller		
Docket No.	: 10452-P38805US04		
Customer No.	: 01059		

Mail Stop Amendment
Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

February 22, 2016

RESPONSE

Sir:

In the Corrected Notice of Allowability mailed February 22, 2016, the Examiner requested restriction of prosecution to one of the following species:

Species A: Represented by Figures 1a, 2a and 6;

Species B: Represented by Figures 1b, 2b and 7;

Species C: Represented by Figures 1c and 2c; and

Species D: Represented by Figures 1d and 2d.

Bereskin & Parr LLP
Scotia Plaza, 40 King Street West, 40th Floor, Toronto, Ontario, Canada M5H 3Y2
Tel: 416.364.7311 Fax: 416.361.1398 www.bereskinparr.com
TORONTO MISSISSAUGA WATERLOO MONTRÉAL

In a telephone discussion with the Examiner on February 1, 2016, the Applicant elected Species A, without traverse. In the corrected Notice of Allowability, the Examiner advised that an affirmation of the election is required. Accordingly, the Applicant elects Species A without traverse. The Applicant reserves the right to pursue the non-elected claims in one or more related applications.

The Applicant has concurrently paid the issue fees. The Applicant submits that the application is now in condition for issuance.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

P. Mendes da Costa

By _____
Philip C. Mendes da Costa
Reg. No. 33,106
Tel: 416-957-1695

Electronic Patent Application Fee Transmittal

Application Number:	14489646
Filing Date:	18-Sep-2014
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Attorney Docket Number:	10452-P38805US04

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**960**

Electronic Acknowledgement Receipt	
EFS ID:	24982599
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P38805US04
Receipt Date:	22-FEB-2016
Filing Date:	18-SEP-2014
Time Stamp:	16:05:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$960
RAM confirmation Number	2744
Deposit Account	022095
Authorized User	AITKEN, NICHOLAS A.
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 CFR 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 CFR 1.19 (Document supply fees)

Charge any Additional Fees required under 37 CFR 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	10452_P38805US04_IssueFeePayment.PDF	179415 81b62ccd463abc7f4d6cfcc6eda2c5ff27d0acbe	no	1
Warnings:					
Information:					
2	Issue Fee Payment (PTO-85B)	P38805US04_IssueFee_Transmittal.pdf	110252 f913ff43c316d46d69c0152197d18239bc6e4e8d	no	1
Warnings:					
Information:					
3	Response to Election / Restriction Filed	P38805US04_Response_2016-02-22.pdf	166006 96bb8e9dcc7bd758d022286665345d28633ee3e5	no	2
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30636 d3d78a94a23291ee9a1c8bba9cdf773d0e7084a5	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	486309		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	:	14/489,646	Confirmation No.: 6255
Applicant	:	Wayne Ernest Conrad	
Filed	:	September 18, 2014	
Title	:	SURFACE CLEANING APPARATUS	
TC./A.U.	:	3727	
Examiner	:	Bryan Muller	
Docket No.	:	10452-P38805US04	
Customer No.	:	01059	

February 22, 2016

Mail Stop Issue Fee
Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

ISSUE FEE

This correspondence is responsive to the Notice of Allowance and Issue Fee Due dated **February 18, 2016** and the corrected Notice of Allowability dated **February 22, 2016** issued in the above-identified patent application. As required, we enclose herewith the Issue Fee transmittal form and a Response containing an affirmation of the election that was previously made in a call with the Examiner.

Please charge the government fee of **$960.00** to our deposit account no. 02-2095. Please also charge any deficiency or credit any overpayment to this account.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

P. mendes da Costa

By _____
Philip C. Mendes da Costa
Reg. No. 33,106
Attorney of Record

Bereskin & Parr LLP
Scotia Plaza, 40 King Street West, 40th Floor, Toronto, Ontario, Canada M5H 3Y2
Tel: 416.364.7311 Fax: 416.361.1398 www.bereskinparr.com
TORONTO MISSISSAUGA WATERLOO MONTRÉAL

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/489,646	09/18/2014	3727	2160	10452-P38805US04	27	1

CONFIRMATION NO. 6255

CORRECTED FILING RECEIPT

1059
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA



Date Mailed: 02/26/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Wayne Ernest CONRAD, Hampton, CANADA;

Applicant(s)

Omachron Intellectual Property Inc., Hampton, ON, CANADA;

Power of Attorney: The patent practitioners associated with Customer Number 01059

Domestic Priority data as claimed by applicant

This application is a CON of 11/953,292 12/10/2007 PAT 8869344
which claims benefit of 60/893,990 03/09/2007
and claims benefit of 60/894,005 03/09/2007
and claims benefit of 60/869,586 12/12/2006

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 09/23/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/489,646**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
Title

SURFACE CLEANING APPARATUS

Preliminary Class

015

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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NOT GRANTED

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ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 48 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

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