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(54) IMPROVEMENTS IN OR RELATING TO ELECTRIC APPLIANCES

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AMELIORATIONS APORTEES A OU CONCERNANT DES APPAREILS ELECTRIQUES

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Description

[0001] The present invention relates to electric appliances, namely vacuum cleaners.

[0002] Vacuum cleaners work by suction. An electric motor in the cleaner drives a fan that pumps air from a chamber within the cleaner to create a vacuum. This vacuum is employed to draw air laden with dust and dirt from a surface into a dust bag or into a collection compartment within the cleaner which retains the dirt and dust. The air is expelled through an outlet in the body of the cleaner.

[0003] Typically there are two types of vacuum cleaner, the cylinder vacuum cleaner and the upright vacuum cleaner. In the cylinder vacuum cleaner a flexible hose connected to a cleaning attachment is provided and the cleaning attachment is passed over a surface to be cleaned to draw air laden with dirt and dust into the collection compartment or dust bag via the hose. In the upright vacuum cleaner air is drawn into the collection compartment or dust bag through an inlet in a base or foot unit which comprises wheels to allow the cleaner to be pushed and pulled over the surface to be cleaned. To further improve the cleaning action of the cleaner a rotating brush is provided across the inlet in the base unit that beats dirt and dust out of the surface to be cleaned. Some upright cleaners are also provided with a flexible hose and cleaning attachment like the cylinder type for the purpose of cleaning surfaces such as floors and upholstery, and means for switching suction between this and the base unit of the cleaner.

[0004] Conventional vacuum cleaners of both types are effective in drawing in dirt and dust from the surfaces on which the cleaning attachment or base unit is used. However, they do not draw in airborne particles of dirt and dust. Indeed, the very act of vacuuming can cause large quantities of dirt and dust to become airborne, thereby avoiding the cleaning action of the vacuum cleaner. In this regard, air expelled from the vacuum cleaner blows dirt and dust into the air, movement of the cleaning attachment or base causes dirt and dust to become airborne and even the movement of the operative can raise dirt and dust into the air. The presence of these airborne particles of dirt and dust can be a problem for those people who have dust allergies.

[0005] A solution to this problem is proposed by US-A-5 293 665 which forms the basis for the preamble of the independent claim. The intake opening for the airborne particles serves to supply the air for driving the turbine which in turn drives the brush roller.

[0006] It is an object of the present invention to provide a vacuum cleaner which adjustably draws airborne particles of dirt and dust into the cleaner.

[0007] According to the present invention there is provided a vacuum cleaner according to the subject-matter of independent claim 1.

[0008] Airborne particles of dirt and dust from around the cleaner may be sucked into the cleaner by the secondary inlet(s). The advantage of this is that dirt and dust are removed from the room environment and not just from said surface.

[0009] There may be only one secondary inlet, in which case it is preferably in the form of a slot. Preferably, however, there is an array of secondary inlets.

[0010] The relative cross sections of the first and second inlet can be used to balance the performance of each inlet. Preferably the cross section of the second inlet is less than 200% of the cross section of the first inlet, ideally less than 100%. Preferably the cross section of the second inlet is greater than 5% of the first inlet, preferably greater than 10%.

[0011] According to the invention adjustable inlet cross-section reduction means (dampening means) are provided to both first and second inlets so as to independently adjust the performance of each inlet. Operator adjustments to performance can then be made to adjust the vacuum cleaner to differing cleaning environments, for example, carpet type, room size, levels of dust etc. The dampening means are controlled by an actuator, which is activated directly or indirectly by the operator to pre-set positions. Electronic control means may be used within the vacuum to control the actuator(s). Sensors may be present in the vacuum cleaner to feed information into the electronic control means which may automatically adjust the dampening means via the actuator(s) during operation in response to the sensor information. Sensors may detect air flow, pressure or levels of dirt.

[0012] The dampening means may be any suitable feature known to open or close air inlets, examples may include a slidably mounted inertial shutter, air valve, constricting/dilating passageway or a switch to the suction means or a combination of any thereof.

[0013] The electronic control means will be any conventional solid state system or circuit board able to process information input from any optionally present sensor or from the operator and effect a change directly to the dampening means or indirectly to the dampening means via the actuator(s).

[0014] The dampening means are provided to the first and second inlet and are independently able to fully open and fully close, or any position in between, each inlet. Such an orientation of the device allows the vacuum cleaner to be switched between solely taking in air from the primary inlet or the secondary inlet or in any proportion in between.

[0015] The secondary inlet(s) may be connected into the passageway connecting the surface cleaning head to the dust and dirt collection compartment in which case both the surface cleaning head and the secondary inlet(s) may share a common suction means. Alternatively, a separate passageway, or passageways, may be provided to connect the said secondary inlet(s) to the dust and dirt collection compartment. In this latter case, it may be convenient to provide separate suction means for each passageway.
Suction means will invariably involve an electric motor and/or a fan, these are conventional in the field, to draw the air through the cleaner. The suction means may draw the air through both inlets by way of a single motor drawing air through both inlets or two motors one for each inlet. A single motor could simultaneously draw air from through both inlets by way of driving a fan in each inlet.

In a preferred orientation of the single motor in which the second inlet is connected to the passageway of the first inlet the cross-sectional area of the secondary inlet relative to the cross-section of the primary inlet will primarily determine the relative air flows between the two inlets.

Dust filtering means, such as an electrostatic filter, may be provided between the secondary inlet(s) and said compartment. This may be appropriate when the air drawn into the secondary inlet(s) ("secondary air") is conveyed over the suction means or part of it (that is, over a fan and/or motor). This may be done to effect cooling. Preferably, however, secondary air is not thus conveyed. Preferably, also, no such dust filtering means between the secondary inlet(s) and said compartment is provided.

With upright vacuum cleaners, typically having a wheeled base unit which contains the primary inlet, and articulated to an upright main body which contains the dirt and dust container, there is preferably a plurality of secondary inlets provided in an upper surface of the base unit or in the main body thereof, or in both. With cylinder vacuum cleaners, typically having a single, generally drum shaped, wheeled body, carrying a cleaning head comprising the primary inlet, on a flexible tube, there is preferably a plurality of secondary inlets provided in the body thereof, preferably in the upper region thereof. Alternatively or additionally one or more tubes may extend over the outer casing of the vacuum cleaner, whether of upright or cylinder type, and having a plurality of secondary inlets therein at intervals along its length through which airborne particles of dirt and dust can be drawn. In one such embodiment of the present invention such a tube extends in a helix around the main body or on the upper surface vacuum cleaner.

Preferably the secondary inlets of an array are reasonably well spaced from each other. Preferably, the secondary inlets of an array are not unidirectional. By unidirectional here, we mean all facing in the same direction.

Preferably, at least one secondary inlet of an array faces generally forwards.

Preferably, at least one secondary inlet of an array faces generally rearwards.

Preferably, at least one secondary inlet of an array faces generally sideways.

Preferably, at least one secondary inlet of an array faces generally sideways in one direction and at least one secondary inlet of an array faces generally sideways in the opposite direction.

If wished, at least one secondary inlet of an array faces generally upwards.

Suitably there are at least 3 secondary inlets in an array, preferably at least 5, more preferably at least 8, and most preferably at least 10.

Alternatively or additionally, a secondary inlet may be in the form of a single slot is not unidirectional. By unidirectional here, we refer to a straight slot provided in a planar face.

Preferably, a secondary inlet in the form of a single slot has a portion which faces generally forwards.

Preferably, a secondary inlet in the form of a single slot has a portion which faces generally rearwards.

Preferably, a secondary inlet in the form of a single slot has a portion which faces generally sideways.

Preferably, a secondary inlet in the form of a single slot has a portion which faces generally sideways in one direction and a portion which faces generally sideways in the opposite direction.

A secondary inlet in the form of a slot may extend substantially all the way around the cleaner, such that it can draw in airborne dirt and dust from the front, rear and both sideways directions. Thus, it could be an endless slot or a generally helical slot.

If wished, a secondary inlet in the form of a single slot has a portion which faces generally upwards.

The words "forwards", "rearwards", "sideways" and "upwards" are used herein with reference to the vacuum cleaner in its normal configuration and orientation in use, with the cleaning head at the front.

In accordance with a second aspect of the present invention there is provided a method of cleaning using a vacuum cleaner of the invention as defined herein, whereby dust and dirt are drawn in from a surface through the primary inlet and from the air by the secondary inlet.

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

Figure 1 shows a partial sectional view of an upright vacuum cleaner according to a first embodiment of the present invention; and

Figure 2 shows an upright vacuum cleaner according to a second embodiment of the present invention.

Referring to Figure 1 of the drawings the upright vacuum cleaner comprises a main body 1 (only partially shown), the interior of which defines a compartment for the collection of dirt and dust or for housing a dust bag. The body 1 is mounted on an elongate shaft 2, the upper end of which defines a handle (not shown) and the lower end of which is pivotally connected to a base unit 3. The base unit 3 is supported at the front and rear, on wheels or rollers 4 to facilitate movement of the
The base unit 3 comprises an electric motor 5 which drives a fan 6 positioned within a chamber 7. To the rear of the chamber 7 there is provided a conveying passageway 8 which is connected via a short length of flexible hose 9 to the compartment in the main body 1. To the front of the chamber 7 there is provided in the floor of the base unit 3 an elongate slot 10. This elongate slot 10 extends from one side to the other of the base unit 3. A roller brush 11 is positioned in the slot 10, supported at each end in the side wall of the base unit 3. The roller brush is rotatably driven by the electric motor 5 acting through an extension to the drive shaft 12 which supports the fan 6 and a drive belt 13.

As described hereinabove the upright vacuum cleaner is conventional. Dirt and dust are beaten out of the surface on which the cleaner is supported by the action of the rotating roller brush 11. The dirt and dust is then drawn into the chamber 7 as a result of the vacuum created by the fan 6. The increased air pressure behind the fan pushes air laden with dirt and dust along the conveying passageway 8, through the flexible hose 9, and into the compartment in the main body.

The base unit 3 is also provided with an array of secondary air inlets in the upper face thereof. Inlets 20 are spaced from each other in a circular array, of which two can be seen in Fig 1 (one facing generally forwards and the other facing generally rearwards, and with others, not shown, facing in other directions around the circle).

A further secondary inlet is at the centre of the circle facing generally upwards. It will be appreciated that air from around the cleaner is drawn in through the secondary inlets 20, 21, carrying with it airborne particles of dirt and dust, and that air joins with the main column of air drawn in through the passageway 8 and the hose 9 into the compartment in the main body.

As shown in Figure 1 the secondary air inlets 20, 21 in the upper face of the base unit leads directly into the air intake side of the chamber 7 in which the fan 6 is situated. However, it is envisaged that the secondary air inlets may also be connected into the air outlet side of the fan at any point prior to the collection compartment or dust bag. In this regard, where the velocity of the column of air passing between the fan and the collection compartment or dust bag is sufficiently high it will entrain air from a spur pathway. This spur pathway is connected to the secondary air inlets to allow airborne particles of dirt and dust to be drawn in.

Referring now to Figure 2 there is shown another upright vacuum cleaner embodying the present invention. For the purposes of explanation this can be considered to be identical in all conventional respects to the one described hereinbefore with reference to Figure 1. However, instead of having secondary air inlets in the upper part of the base unit 3, the cleaner is provided with a tube 30 which is wrapped around the main body 1 thereof. The tube 30 may be a separate component from the main body 1, but preferably it is formed integrally with the main body 1. The upper end of the tube 30 is closed, whilst the lower end thereof is connected into the base unit 3 to join with the main airway therethrough. Small holes 32, several dozen in total, are provided at intervals along the length of the tube.

In use, air around the main body 1 of the cleaner is drawn into the tube 30 through the holes 32 therein, carrying with it airborne particles of dirt and dust. From the tube 30 the air passes into the base unit 3 where it joins with the main column of air passing therethrough into the collection compartment within the main body 1.

The present invention has been described with reference to upright vacuum cleaners. However, it is equally applicable to cylinder vacuum cleaners, having a wheeled unit containing the container for dirt and dust, and with the cleaning head, having the primary inlet, carried on a flexible tube. Thus, in another embodiment, not shown in the drawings, a cylinder vacuum cleaner has instead of a multiplicity of secondary inlets, a horizontal slot extending all the way around its housing, adjacent to its upper end, to serve as the secondary inlet. The air drawn in through the slot is directed by an internal conduit to the collection compartment.

Claims

1. A vacuum cleaner comprising: a body which houses a container (1) in which is collected dirt and dust; a surface cleaning head (3) defining a primary dirt and dust collection inlet (10) able to contact, in use, a surface over which the surface cleaning head is moved; a passageway (7) connecting the primary inlet to the container; a secondary dirt and dust collection inlet (20) spaced, in use, from said surface; and suction means (6) for drawing dirt and dust through the primary and secondary inlets into the cleaner; the primary inlet being adapted to draw surface-borne dirt and dust efficiently into the cleaner and the secondary inlet being adapted to draw airborne dirt and dust efficiently into the cleaner and wherein dampening means are provided to both the first and second inlets, the dampening means being controlled each by an actuator activated directly or indirectly by the operator of the vacuum cleaner characterised in that the dampening means are provided to the first and second inlet and are independently able to fully open and fully close, or any position in between, each inlet.

2. A vacuum cleaner according to claim 1, wherein the secondary inlet is connected into the passageway connecting the surface cleaning head to the container.

3. A vacuum cleaner according to claim 1, wherein the secondary inlet (30) is connected to the container.
by way of a further separate passageway.

4. A vacuum cleaner according to claim 1, 2 or 3, wherein there is a secondary inlet in the form of a non-unidirectional slot.

5. A vacuum cleaner according to any of claims 1 to 3, wherein there is an array of secondary inlets.

6. A vacuum cleaner as claimed in claim 5, wherein the secondary inlets do not face in the same direction.

7. A vacuum cleaner as claimed in claim 6, wherein at least one secondary inlet faces generally forwards, at least one secondary inlet faces generally rearwards, at least one secondary inlet faces generally sideways in one direction, and at least one secondary inlet faces generally sideways in the other direction.

8. A vacuum cleaner according to any preceding claim, being an upright vacuum cleaner, comprising a base unit having the surface cleaning head and a main body which houses the container, wherein secondary inlet(s) is/are provided in an upper surface of the base unit and/or in the main body.

9. A vacuum cleaner according to any one of claims 1 to 7, being a cylinder vacuum cleaner, wherein secondary inlet(s) is/are provided in the upper region of the main body thereof.

10. A method of cleaning, using a vacuum cleaner according to any preceding claim, whereby dust and dirt are drawn in from a surface through the primary inlet and from the air by the secondary inlet.

**Patentansprüche**


2. Ein Staubsauger gemäß Anspruch 1, worin der sekundäre Einlass in den Durchlass verbunden ist, welcher den Oberflächenreinigungskopf mit dem Behälter verbindet.

3. Ein Staubsauger gemäß Anspruch 1, worin der sekundäre Einlass (30) mit dem Behälter über einen weiteren getrennten Durchgang verbunden ist.

4. Ein Staubsauger gemäß Anspruch 1, 2 oder 3, bei dem es einen sekundären Einlass in der Form eines nicht unidirektionalen Schlitzes gibt.

5. Ein Staubsauger gemäß irgendeinem der Ansprüche 1 bis 3, bei dem es ein Feld von sekundären Einlässen gibt.


7. Ein Staubsauger wie beansprucht in Anspruch 6, worin wenigstens ein sekundärer Einlass allgemein nach vorne zeigt, wenigstens ein sekundärer Einlass allgemein nach hinten zeigt, wenigstens ein sekundärer Einlass allgemein nach der Seite zeigt oder in einer Richtung, und wenigstens ein sekundärer Einlass allgemein nach der Seite zeigt oder in die andere Richtung.


10. Ein Verfahren zum Reinigen unter Verwendung eines Staubsaugers gemäß irgendeinem vorange-
henden Anspruch, bei dem Staub und Schmutz eingesaugt werden von einer Oberfläche durch den primären Einlass und aus der Luft durch den sekundären Einlass.

Revendications

1. Aspirateur comprenant : un corps qui contient un bac (1) dans lequel est collectée la saleté et la poussière ; une tête de nettoyage de surface (3) définissant un orifice d'admission primaire de collecte de saleté et de poussière (10) capable d'entrer en contact, en utilisation, avec une surface sur laquelle la tête de nettoyage de surface se déplace ; un passage (7) reliant l'orifice d'admission primaire au bac ; un orifice d'admission secondaire de collecte de saleté et de poussière (20) espacé, en utilisation, de ladite surface ; et un moyen d'aspiration (6) destiné à aspirer la saleté et la poussière à travers les orifices d'admission primaire et secondaire dans le nettoyeur ; l'orifice d'admission primaire étant adapté pour aspirer de manière efficace la saleté et la poussière en surface dans le nettoyeur et l'orifice d'admission secondaire étant adapté pour aspirer de manière efficace la saleté et la poussière en suspension dans le nettoyeur et dans lequel des moyens atténuateurs sont disposés sur les orifices d'admission primaire et secondaire, les moyens atténuateurs étant commandés chacun par un actionneur activé directement ou indirectement par l'utilisateur de l'aspirateur, caractérisé en ce que les moyens atténuateurs sont disposés sur les premier et second orifices d'admission et sont capables, de manière indépendante, d'ouvrir totalement et de fermer totalement, ou de placer à n'importe quelle position intermédiaire, chaque orifice d'admission.

2. Aspirateur selon la revendication 1, dans lequel l'orifice d'admission secondaire est relié au passage reliant la tête de nettoyage de surface au bac.

3. Aspirateur selon la revendication 1, dans lequel l'orifice d'admission secondaire (30) est relié au bac par un autre passage séparé.

4. Aspirateur selon la revendication 1, 2 ou 3, dans lequel un orifice d'admission secondaire se présente sous la forme d'une fente non unidirectionnelle.

5. Aspirateur selon l'une quelconque des revendications 1 à 3, dans lequel se trouve un ensemble d'orifices d'admission secondaires.

6. Aspirateur selon la revendication 5, dans lequel les orifices d'admission secondaires ne sont pas orientés dans la même direction.

7. Aspirateur selon la revendication 6, dans lequel au moins un orifice d'admission secondaire est orienté globalement vers l'avant, au moins un orifice d'admission secondaire est orienté globalement vers l'arrière, au moins un orifice d'admission secondaire est orienté globalement sur le côté dans une direction, et au moins un orifice d'admission secondaire est orienté globalement sur le côté dans l'autre direction.

8. Aspirateur selon l'une quelconque des revendications précédentes, l'aspirateur étant un aspirateur vertical, comprenant une unité de base comprenant la tête de nettoyage de surface et un corps principal qui contient le bac, dans lequel un(des) orifice(s) d'admission secondaire(s) est(ont) disposé(s) dans une surface supérieure de l'unité de base et/ou dans le corps principal.

9. Aspirateur selon l'une quelconque des revendications 1 à 7, l'aspirateur étant un aspirateur cylindrique, dans lequel une(des) orifice(s) d'admission secondaire(s) est(ont) disposé(s) dans la région supérieure du corps principal de celui-ci.

10. Procédé de nettoyage, utilisant un aspirateur selon l'une quelconque des revendications précédentes, moyennant quoi la poussière et la saleté sont aspirées depuis une surface à travers l'orifice d'admission primaire et dans l'air par l'orifice d'admission secondaire.