United States Patent [19]

Principe et al.

[11] **3,879,797**

[45] **Apr. 29, 1975**

[54] **SUCTION CLEANER**

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[22] Filed: **May 7, 1973**

[21] Appl. No.: **357,639**

[30] **Foreign Application Priority Data**

Apr. 17, 1973 Switzerland 5541/73

[52] **U.S. Cl.** **15/334**; 15/410

[51] **Int. Cl.** **A47l 5/32**

[58] **Field of Search** 15/331, 332, 334, 335, 15/337, 336, 410

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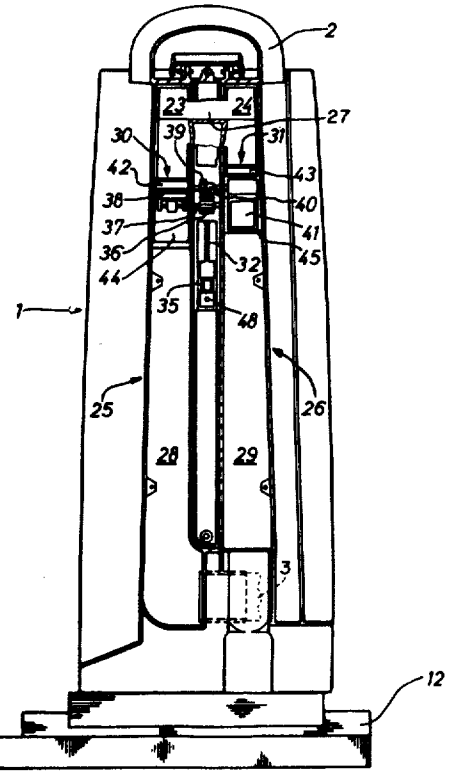
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[57] **ABSTRACT**

This disclosure teaches a new construction of a cleaning device, particularly a suction cleaner having a dust suction part which has a motor, a fan, a dust filter, a first suction pipe and having a nozzle part including at least one motor-driven brush, wherein there is provided a second suction pipe in the same way as the first suction pipe leads via a valve device to the dust suction part, in such a way that by actuating the valve device one or other of the suction pipes can be optionally connected to the dust suction part. This construction permits to use the device for cleaning floor areas by using brushes with the possibility of separately connecting a suction pipe for cleaning other areas.

17 Claims, 5 Drawing Figures



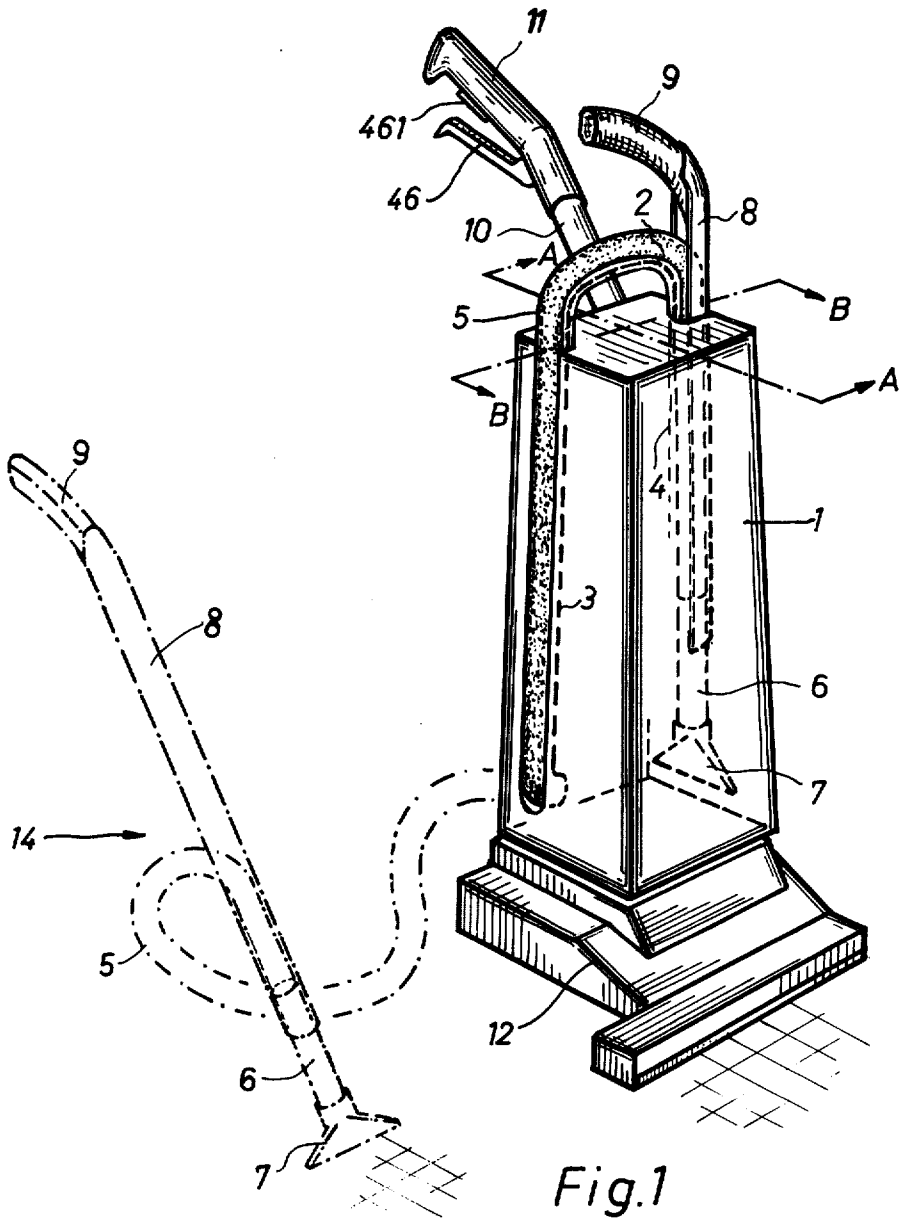


Fig.1

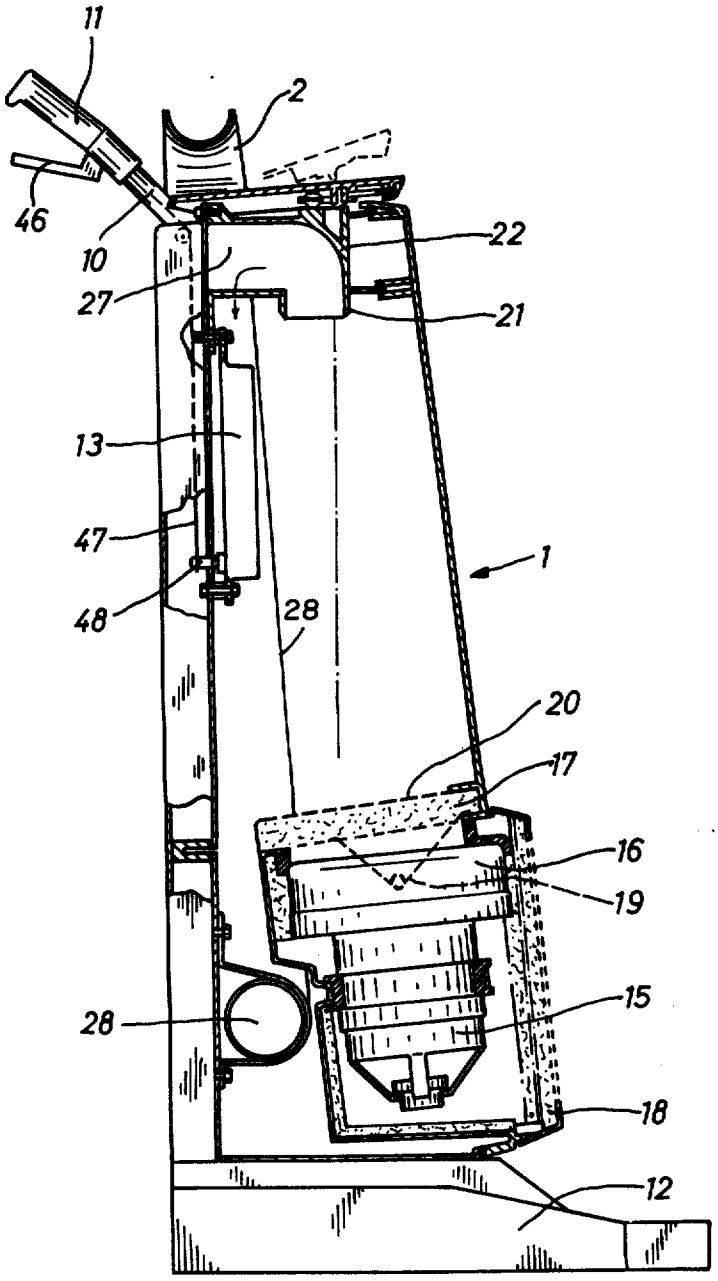


Fig.2 Schnitt A-A

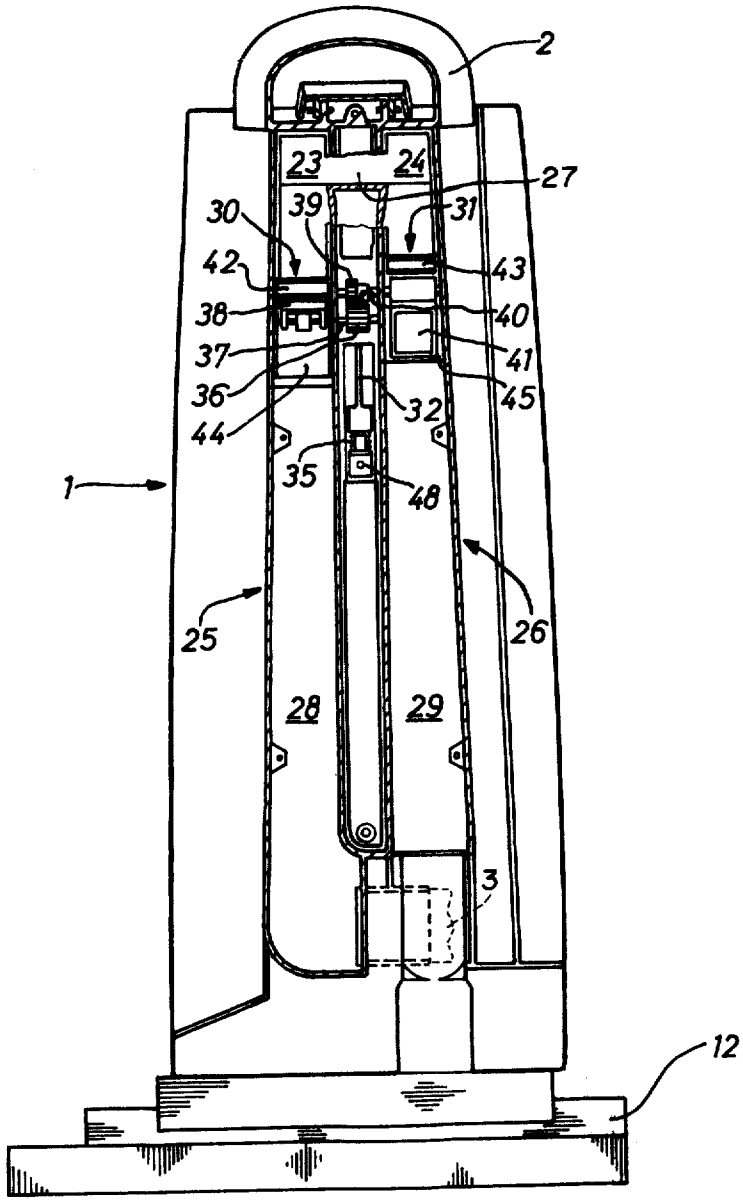


Fig. 3 Schnitt B - B

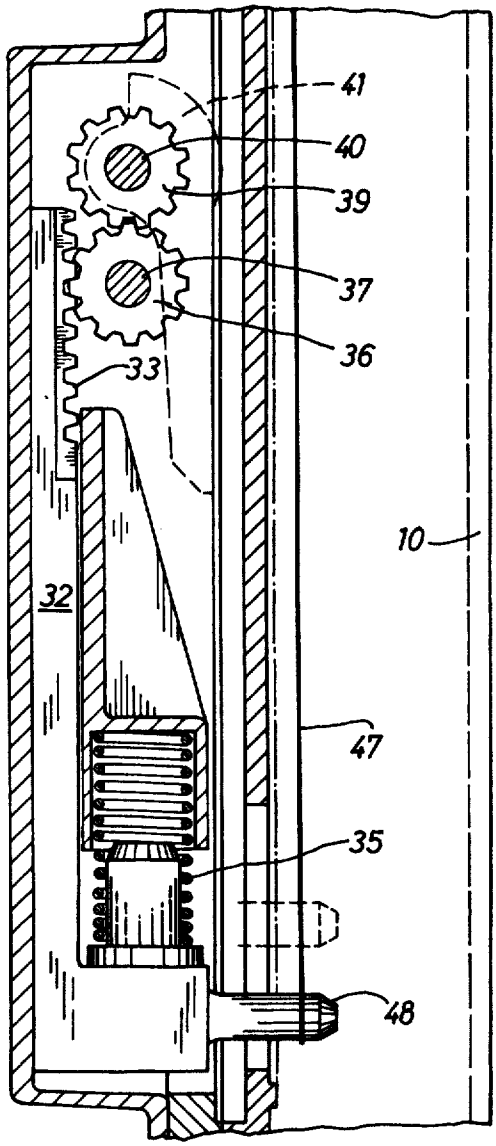


Fig.4

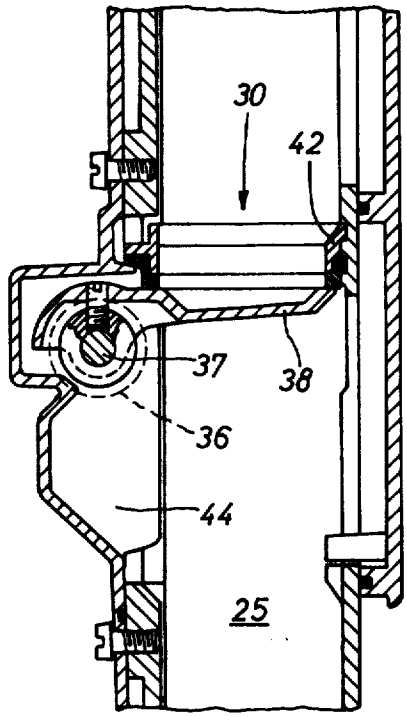


Fig.5

SUCTION CLEANER

BACKGROUND OF THE INVENTION

This invention relates to suction cleaners having a dust suction part which has a motor driven fan, a dust filter and a suction hose to which a dust pick-up nozzle can be connected, and with a brush part which contains at least one motor-driven brush.

For cleaning large floor areas, especially carpeted surfaces, so-called "brush-vacuum cleaners" are frequently used and have a brush width which is sufficient to provide the necessary high cleaning performance that is necessary to clean a large area in a short time. Such cleaners work efficiently so long as they are used on open carpeted areas. However, as soon as the carpeted areas are even only partially covered by furniture, such as tables, chairs and the like, the brush suction nozzle of these cleaners is too wide to be able to work under and between such furniture. This presents a serious problem where rapid cleaning is required such as between changes of occupancy of hotel rooms and wherever reasons of cost or regard to the circumstances in adjoining areas prevent or hinder the removal of the obstacles to cleaning. Since in most cases a restriction of cleaning to the open carpeted areas is not permissible, various courses of action have hitherto been resorted to, for example as follows:

a. In hotels a smaller suction cleaner of the household appliance type is taken along from room to room and each time in addition to the work with the brush-vacuum cleaner the surfaces between adjacent articles of furniture and those underneath long-legged furniture are cleaned using the smaller cleaner.

b. There are known brush-vacuum cleaners in which the suction hose connection between the dust suction unit, and the brush carriage can be separated and in its place a flexible suction hose with a manual guidance tube and suction nozzle can be coupled to the dust suction unit.

It can easily be seen, and is borne out in practice, that in cases a and b the transition from one cleaning method to the other is too time consuming and complicated to deal with cleaning any niches or furniture-covered areas in passing during the course of the large-scale cleaning. Also, the flow of work is impeded by carrying along the manual suction device over the whole cleaning paths, whether in the form of a separate cleaner or of a manual suction hose attachments which can be coupled to the dust suction unit of the brush-vacuum cleaner.

c. A third possibility is to carry out the entire cleaning program or parts thereof in two separate operations. For example the rooms in question can first be cleaned using the brush-vacuum cleaner and thereafter localized cleaning using a hand suction nozzle to circumvent obstacles.

This latter possibility is out of the question in many instances, because the rooms in question simply are not free for intermediate cleaning for sufficient time to allow one to wait through the period of time occurring between two thorough cleaning operations. The consequences of these difficulties are either a merely superficial cleaning or adequate cleaning engendering excessive expenditure of time or personnel.

SUMMARY OF THE INVENTION

According to the invention there is provided a suction cleaner having a dust suction part which has a motor, a fan, a dust filter, a first suction pipe and having a nozzle part including at least one motor-driven brush, wherein there is provided a second suction pipe which in the same way as the first suction pipe leads via a valve device to the dust suction part in such a way that by actuating the valve device one or other of the suction pipes can be optionally connected to the dust suction part.

BRIEF SUMMARY OF THE DRAWINGS

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which;

FIG. 1 is a perspective view of a cleaner in accordance with the invention;

FIG. 2 is a longitudinal section on the line A—A in FIG. 1;

FIG. 3 is a longitudinal section, with parts broken away, on the line B—B in FIG. 1;

FIG. 4 is a longitudinal section through a valve device for the cleaner drawn to a larger scale and

FIG. 5 is longitudinal section of one of the valves of the cleaner.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The cleaner has a housing **1**, in which the dust section part of the cleaner is located. The housing **1** is mounted on a guide arm **10** of a brush carriage **12**, said arm being pivotable in a vertical plane and to the brush carriage **12** by way of a suction pipe (not shown). The brush carriage **12** has a brush suction nozzle in which there is arranged at least one brush (not shown) drivable by a separate motor.

In the housing **1** there are formed two suction pipes **25, 26** (FIG. 3) leading to the dust filter **17** (FIG. 2) of the dust suction part. Suction pipe **25** is also connected to a manually operable suction device **14**, while the suction pipe **26** is connected to the brush nozzle **12**.

The manual suction device **14** has a ready-to-use manual suction hose **5** which is connected to the housing **1** and which is provided with a guide handle **8** and a suction nozzle **7**.

To the flexible manual suction hose **5** there is connected by one end a rigid tubular member **6**, which is connected by its other end to the suction nozzle **7**. The tubular member **6** is connected to the nozzle guide handle **8** which is in the form of an open section-member. The guide handle **8** partially covers part of the length of the tubular member **6** and of the suction hose **5**.

When the manual suction device **14** is not in use it is housed on the body of the cleaner, on the housing thereof. With this, however, there is linked the problem of arranging a sufficiently long manual suction hose **5** on the relatively small cleaner housing in such a way that the normal working with the brush part of the cleaner is not impeded. On the other hand, however, the manual suction device **14** should be so readily available for use that it can be removed, taken from the cleaner housing single handed, used and also replaced on the housing while the other hand guides the cleaner by means of the guide arm **10** provided with a handgrip **11**. These requirements are taken into account in that

the hose 5 when not in use rests on the cleaner housing in such a way that, considered in the direction of travel of the cleaner, the lateral profile contours of the complete cleaner are not altered by placing the hose and attachments on to the housing. Therefore no parts of the manual suction device may project beyond the lateral boundary surfaces of the housing of the cleaner and for this reason they have to be recessed substantially flush into the lateral surfaces of the housing. Passage between obstacles is thus not made more difficult, and also the suction pipe is unable to catch on such obstacles.

For this purpose the housing 1 is provided not only with a carrying handle 2 the upper surface of which is shaped to accommodate the hose 5 but also with channel-like recesses 3 and 4 formed in the opposite sides of the housing 1. At the lower end of the first recess there is situated the beginning of the first suction pipe 25 (FIGS. 1 and 3), to which there is connected the hose 5 which may be only partly flexible. Hose 5 then runs up first recess 3, around the carrying handle 2, which serves as a support member; and into the second recess 4.

The second channel-like recess 4, is formed to such a depth that the nozzle guide handle 8 does not project beyond the outer profile of the housing. Also, the nozzle guide handle 8 is of such a length that its free end lies approximately at comfortable hand height, and is at this end provided with a handgrip 9.

The guide arm 10 is provided with a handgrip 11 and an operating lever 46. Lever 46 operates valve device 13 for alternate operation of the suction pipes 25, 26 and for switching on or off the brush drive motor (not shown).

In the event of operation of the valve device to bring the suction pipes 25, 26 to the "manual suction" position the brush drive motor is switched off. If when in the manual suction position it is desired to run the brush drive motor the switch 461 on the handgrip 11 must be operated.

In the housing 1 of the cleaner there are further arranged a motor 15 for the dust suction unit, a blower 16, a dust filter 17 and an air-permeable sound-damping insert 18.

The motor 15 together with the blower 16 is held tight against an aperture 20 leading into the interior of the housing by means of resilient elements 19 arranged on either side of the motor housing. Above this aperture 20 there may be arranged a bag intended to collect dust (not shown), whose mouth can be attached to the end part 21 of a collection tube 22. The collection tube is connected to upper portions of the two suction pipes 25, 26, by way of chamber 27.

The suction pipes 25, 26 also have lower portions 28, 29 which can be closed off from the upper portions 23, 24 by means of valves 30, 31. The valves 30, 31 are operated by means of the aforementioned valve device 13.

Between the valves 30, 31 there is arranged a slide 32 which carries a rack 33 and is displaceably mounted. The slide is subjected to the influence of a compression spring 35 which holds it in an end position of its range of displacement.

The rack 33 is in engagement with teeth of a first pinion 36 which is fast on a first shaft 37. shaft 37 is also fast with the valve flap 38 of the first valve 30 thereof, so that movement of the rack determines the position of valve flap 38. In engagement with the pinion 36 is a second pinion 39 fast on a second shaft 40 on which the valve flap 41 of the second valve 31 is also fast.

The valves 30, 31 close against valve seats 42, 43 which are arranged transverse to the axial direction of the suction pipes 25, 26.

In the pivoting region of the valve flaps 38, 41 there are provided in the walls of the suction pipes 25, 26 recesses 44 and 45 respectively for the valve flaps 38, 41, into which the valve flaps retract in their open position to allow unhindered fluid flow along the pipes 25 and 26.

For the purpose of maximum possible simplicity of design of the two valve flaps 38, 41 and of their coupling with one another the valves 30, 31 are arranged in the parallel straight parts of the suction pipes 25, 26. These parts of the suction pipes in which the valve flaps are installed lie at least approximately parallel to a straight part of the guide arm 10 of the brush carriage 12, which arm is in the form of a tube and carries the housing 1.

For actuation of the valve device from the handgrip 11 of the guide arm 10, there is provided a tension member, for example a cable pull 47, which leads from the operating lever 46 and which lies in the interior of the guide arm tube 10. The cable pull engages with a bolt-like projection 48 of the intermediate member 34, protruding into the interior of the arm.

The slide 32 can be moved by means of this cable pull against the tension of the compression spring 35 as far as the other end position. When the operating lever 46 on the guide arm 10 is released, the compression spring 35 returns the slide 32 and thus the two valve flaps 38, 41 to their basic position.

Above the valves 30, 31 of the two suction pipes 25, 26 there are provided covers which can be opened without special tools (see FIG. 5), can be closed with the aid of catches and allow access to the valve flaps and valve seats for the purposes of inspection and, if necessary, removal of particles of dirt or grit adhering thereto.

If the slide 32 with the rack 33 is now displaced, the two pinions 36, 39 turn in opposite directions of rotation and one of the valve members is moved to engage its corresponding seat and the other valve members hand is opened and lies flush with the wall of the suction pipe, in the recess with which it is associated. The two valve flaps 38, 41 are mounted on their shafts 37, 40 in the correct phase, so that one flap is fully open when the other is in its fully closed position.

The valve seats 42, 43 are arranged in such a way that the negative pressure produced by the suction blower additionally presses the closed valve flap against its valve seat, in such a way the airtightness of the valve mechanism is guaranteed.

While working with the manual suction pipe the cleaner will be stationary in many cases. Consequently provision is made so that with actuation of the valve device to operation of the manual suction pipe, the brush drive motor is either necessarily switched off or this actuation proceeds in such a way that only in the case of intentional manipulation does this motor continue running. In this way local, visible permanent alterations to the carpet pile by the rotary brush are avoided when the cleaner is stationary.

The flexible part of the manual suction hose 5 in the case of the cleaner described can therefore be made

relatively long because the passage thereof from, for example, the right-hand side to the left-hand side of the cleaner housing is not recessed into the housing but ascend the contrary insofar as it does not hinder the working of the machine — is detached from the housing and is guided over the support **2**. This support member **2** for the flexible manual suction hose is simultaneously used as the carrying handle for the housing. **23**

The generally conventional construction of the nozzle guide handle, for known suction cleaners having flexible manual suction hoses, as a rigid tube which joins on the flexible suction pipe as an extension and is of such dimensions that it is possible to comfortably work on floor coverings while standing or walking, is dispensed with and replaced by the rigid tubular component **6** of the manual suction pipe, to which component there is coupled the suction nozzle **7**. The tubular component **6** is considerably shorter than it has to be when it has to serve as a guide handle for a person working upright.

For guiding the nozzle **7** the handle **8** with the grip **9** is used, which near its lower end is attached to the rigid tubular component **6**. In this way the manual suction hose **5** may be shorter for a specific working position than when it has to ascend from the advantageously low outlet from the machine housing firstly up to about hand height and then extend back again to the floor. The guide handle extends rearward from the manual suction pipe end, i.e. upwards to a comfortable hand level and does not thereby prolong the suction pipe to be accommodated on the housing, but runs for some way further parallel adjacent thereto. By designing the guide handle as an open hollow section handle, when this latter is placed in the rest position it is able to lie protectively over a portion of the flexible manual suction hose.

The flexible portion of the manual suction hose **5** is made elastically extendible longitudinally so that in the rest position it has approximately its shortest length and becomes relatively greatly extended when only a small tension is applied. The measure is not novel per se but in this context it assumes special significance.

Instead of the cable pull **47** it is also possible to utilize a linkage.

What is claimed is:

1. A suction cleaner having a dust suction part means,

first and second suction pipes connected to said dust suction part means, the first suction pipe having a brush nozzle part means,

a valve device connected to the first and second suction pipes,

the valve device having two valve flaps of which the first valve flap is situated in one of the two suction pipes and the second valve flap is situated in the other of the two suction pipes, and

means mechanically coupling with the two valve flaps so that one valve flap closes its associated suction pipe when the other valve flap in its suction pipe is arranged in an open position at least approximately parallel to the suction fluid flow along its suction pipe

the opposing force to be applied for changing the position of the valve flaps can be transmitted from the guide arm by the cable pull means to the means mechanically coupling with the two valve flaps for moving the valve flaps.

2. A cleaner as claimed in claim **1**, wherein there is connected to the inlet of the second suction pipe at least a partly flexible manual suction hose having a coupling facility for suction nozzles.

3. A cleaner as claimed in claim **2**, wherein the manual suction hose includes a nozzle guide handle and a rigid tubular component; the tubular component terminates at the hose end remote from the cleaner; the nozzle guide handle is attached at its front end to the tubular component; and a hand grip is carried at the rear end of the nozzle guide handle remote from the manual suction hose.

4. A cleaner as claimed in claim **3**, wherein the nozzle guide handle has between its attachment to the tubular component and the hand grip an open hollow section into which the hose can be nested so that the nozzle guide handle encloses the hose along at least part of its length and encloses part of its circumference.

5. A cleaner as claimed in claim **3**, wherein a housing contains the dust suction part means; and the housing has on its surface channel-like recesses in which at least part of the lengths of the manual hose and of the nozzle guide handle can be carried.

6. A cleaner as claimed in claim **5**, wherein the channel-like recesses are provided on two opposite sides of the housing.

7. A cleaner as claimed in claim **5**, wherein a support member is connected to a channel-like recess on one side of the housing and is connected to a channel-like recess on the other side; and the support member carries the manual suction hose in its passage from one side of the housing to the other.

8. A cleaner as claimed in claim **7**, wherein the support member takes the form of an arch which also acts as a carrying handle.

9. A cleaner as claimed in claim **1** wherein the means mechanically coupling with the two valve flaps includes at least one rack and pinion means cooperating with said rack.

10. A cleaner as claimed in claim **1** wherein the suction cleaner has a guide arm; the suction pipes have straight portions running parallel to one another, both valve flaps being incorporated in the straight portion of their respective suction pipe; and the straight portions of the suction pipes are arranged at least approximately parallel to a part of the guide arm.

11. A cleaner as claimed in claim **10** wherein said guide arm has a hand grip; and means are mounted on the hand grip for actuating said valve device.

12. A cleaner as claimed in claim **10** wherein means are included on the guide arm for actuating the brush nozzle part means.

13. A cleaner as claimed in claim **1**, wherein each suction pipe has a wall and a recess in the wall; and each of the two valve flaps, in the open position, lies in the recess in the wall of its associated suction pipe so that the surface of the valve flap facing the suction fluid flow lies substantially flush with the inside of the wall of its associated suction pipe.

14. A cleaner as claimed in claim **1** wherein the pair of valve flaps is biased into one of the two operative positions by a spring means and the switch over into the other operative position may be achieved by a force opposing this spring means.

15. A cleaner as claimed in claim **14** wherein the suction cleaner has a guide arm, a cable pull means extending between and interconnected to the guide arm

and the means mechanically coupling with the two valve flaps; and

the opposing force to be applied for changing the position of the valve flaps can be transmitted from the guide arm by the cable pull means to the means mechanically coupling with the two valve flaps for moving the valve flaps.

16. A cleaner as claimed in claim **1** wherein the suction cleaner has a housing having at least one cover to be opened by hand; and the cover allows access to the valve flaps of the suction pipes.

17. A cleaner as claimed in claim **1**, wherein the suction cleaner has a suction fan; the suction pipes include valve seats; and the valve flaps and the valve seats are so arranged in the suction pipes that each valve flap is pressed in its closure position, due to the negative pressure created by the suction fan, against its valve seat during operation of the suction cleaner.

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