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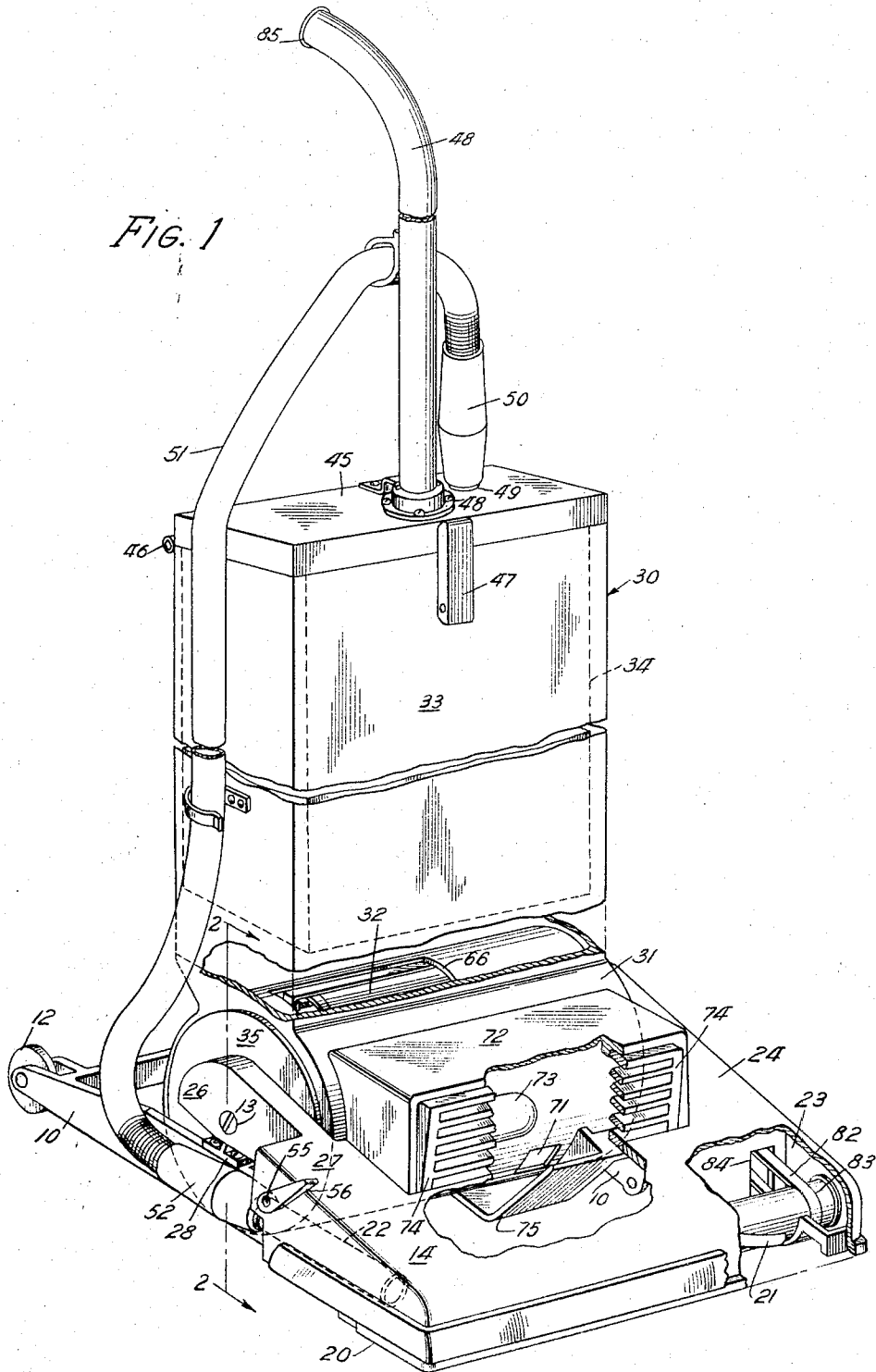
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COMBINATION SUCTION CLEANERS

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2 Sheets-Sheet 1



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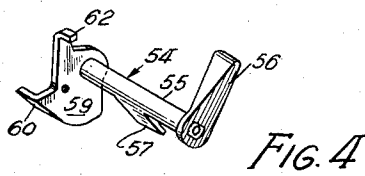
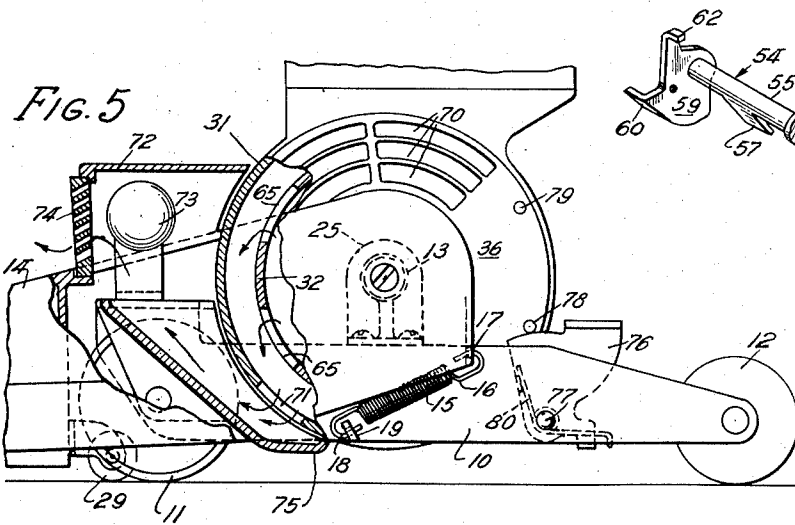
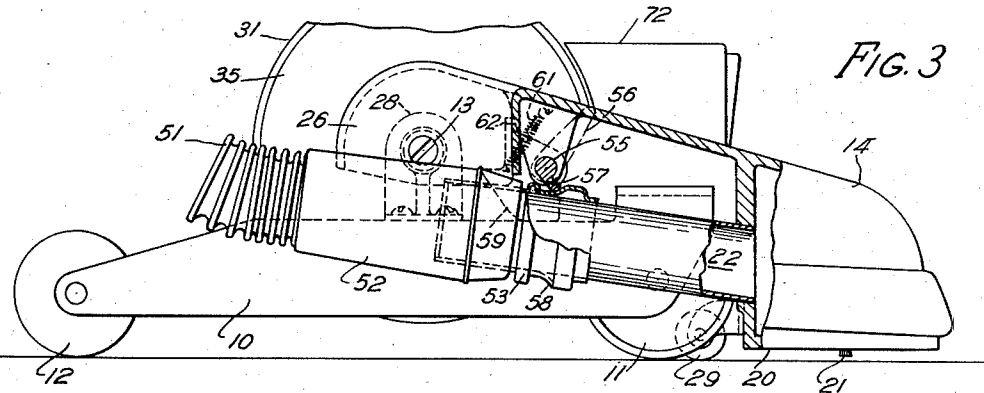
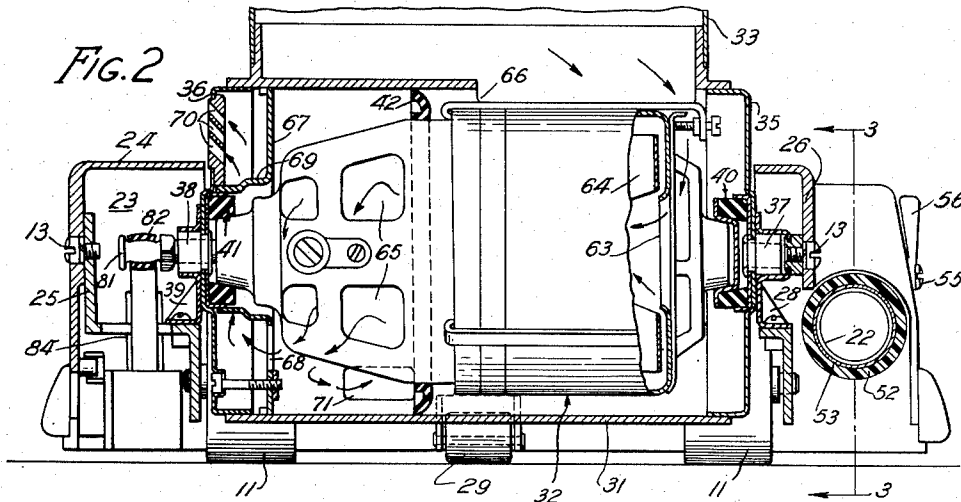
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COMBINATION SUCTION CLEANERS

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4 Claims. (Cl. 15—324)

The present invention relates to suction cleaners and more particularly to a conversion arrangement therefor by which the cleaner may be used as an upright cleaner for on-the-floor cleaning or as a so called canister type or general purpose cleaner by which all types of cleaning may be done by means of a nozzle attached to the cleaner by a flexible and extensible hose. All of the parts necessary for the use of the cleaner for both types of operation are associated with the cleaner except the nozzles which are to be attached to the end of the hose when the cleaner is in use for general cleaning purposes.

The cleaner according to the present invention includes a chassis upon which a suction nozzle is pivoted for free floating operation when the cleaner is used as an upright cleaner for on-the-floor cleaning operation. The motor-fan-filter unit forms a part of the handle and is also pivoted to the chassis on the same axis as the nozzle and also on the axis of the motor-fan assembly.

The suction nozzle includes a downwardly facing suction mouth, a suction passage extending rearwardly thereof at one end and the belt passage at the other end which is out of communication with the suction nozzle proper except for a passage for one end of a rotary agitator which is rotatably mounted within the suction mouth for contact with the surface being cleaned when the cleaner is being used as an upright cleaner.

The motor-fan assembly is provided with a belt pulley extending horizontally into the belt passage in order to drive the agitator by means of an endless belt surrounding the motor pulley and a pulley on the end of the agitator which extends into the belt passage. Since the nozzle and the motor-fan assembly are pivoted to the chassis on the same axis and on the axis of the motor-fan system the belt will remain taut in all pivoted positions of the nozzle and of the motor-fan-filter unit when the cleaner is set for on-the-floor cleaning.

The motor-fan-filter unit is enclosed in a casing and forms a portion of the propelling handle. The suction inlet is formed in the top of the casing and a dirt collecting filter is supported within the casing ahead of the motor-fan assembly so that the fan handles clean air.

A flexible and extensible hose is attached, at its upper end, to the inlet to the filter casing and its lower end is detachably connected to the outlet of the suction passage of the suction nozzle.

During on-the-floor cleaning air will enter the nozzle mouth and pick up dirt loosened by the agitator, pass through the suction passage and hose and into the filter where the dirt will be separated therefrom. The cleaned air will then pass through the motor-fan assembly, to cool the motor and part of it will be exhausted from the motor casing at one end thereof while the remainder will be exhausted into a hood mounted on the suction nozzle and surrounding a headlight so as to cool the latter.

When it is desired to use the cleaner for general cleaning purposes the flexible hose is detached from the suction nozzle outlet and the necessary cleaning tools including a wand attached to the hose at its free end. Under such

2

circumstances it is desirable that the agitator be deactivated so that no harm will be done to the surface on which the cleaner rests by the rotation of the agitator with the cleaner standing still. For that purpose the agitator is deactivated by raising the nozzle when the hose is detached.

Other objects and advantages of the present invention will become apparent as the description proceeds when taken in connection with the accompanying drawings in which,

Figure 1 is a perspective view of the cleaner of the present invention with certain parts broken away to show details of the construction,

Figure 2 is a cross-sectional view of the cleaner of Fig. 1 taken on line 2—2 of Fig. 1 and looking in the direction of the arrows,

Figure 3 is a segmental sectional view taken on line 3—3 of Fig. 2 partly broken away to show the manner in which the lower end of the extensible hose is attached,

Figure 4 is a perspective view of a latch lever for latching the lower end of the hose to the outlet of the suction nozzle, and,

Figure 5 is a segmental view partly in section showing how the air is circulated over the headlight.

Referring to the drawing the reference numeral 10 represents a chassis mounted for ambulatory movement upon pairs of front and rear wheels 11 and 12 respectively. Pivotaly attached to the chassis 10 at 13 is a floating nozzle 14 the weight of which is partially counterbalanced by a spring 15, Fig. 5, having a hooked end 16 entering an eye 17 in the lower rear corner of the nozzle 14 beneath and to the rear of its pivot point 13. At its other end spring 15 has a hooked end 18 hooked to a lug 19 below and forwardly of the pivot point 13.

The nozzle 14 includes a downwardly facing suction mouth 20 in which an agitator 21, of known construction, is rotatably mounted, a suction tube 22 extending backwardly from one end of suction mouth and a belt passage 23 extending upwardly and rearwardly from its opposite end.

An apron 24 extends upwardly and backwardly from one end of suction mouth 20 and forms the walls of the belt passage 23, being pivoted to one side of the chassis 10 by means of a bracket 25 and one of the pivots 13. An apron 26, offset at 27, extends upwardly and rearwardly from the other end of suction mouth 20 and is pivoted to the other side of chassis 10 by means of a bracket 28 and the other pivot pin 13. The weight of the nozzle 14 not carried by the spring 15 is carried by a small roller 29 attached centrally to the rear of the nozzle mouth 20.

A motor-fan-filter unit generally indicated by the reference numeral 30 is also pivoted to the chassis 10 on the axis of the pivot pins 13. The motor-fan-filter unit includes a semicylindrical casing 31 for housing a motor-fan assembly 32 and a casing 33 for housing a dirt storing filter bag 34 suitably supported to the interior of casing 33 adjacent its upper end.

The casing 31 is closed at its ends by plates 35 and 36 pivoted as shown to chassis 10 on eyelets 37 and 38 and brackets 28 and 39 attached to the opposite sides of chassis 10.

The motor-fan assembly 32 is supported within the casing 31 by rubber mounts 40 and 41 at its ends and centrally by a rubber bulk head 42 which compels the air to flow through the casing 31 in a manner which will presently appear.

The upper end of the casing 33 is closed by closure plate 45 hinged to the casing 33 at 46 and held closed at its opposite side by any suitable latch 47. A propelling hand grip 48 is suitably secured centrally of the closure 45 as shown at 48.

The closure 45 is provided with a suction inlet 49 to

which the upper end 50 of a flexible and extensible hose 51 is attached, the lower end 52 of hose 51 being provided with a fitting 53 for telescopic and detachable engagement with the suction tube 22 of nozzle 14.

The fitting 53 is held in telescopic engagement with the suction tube 22 by means of a combined latch and nozzle lifter generally indicated by the reference numeral 54, shown in detail in Fig. 4. The latch 54 is pivoted to the side wall of offset 27 of apron 26 by a shaft 55 and is adapted to be manually actuated by handle 56. A latching tail 57 extends forwardly and downwardly for engagement with a shoulder 58 on fitting 53 to hold the latter telescoped over tube 22.

A nozzle adjusting cam 59 is rigid with the inner end of shaft 55 and has a cam surface 60 which comes into engagement with one leg of chassis 10 to raise the nozzle 14 when the latch 54 is actuated to release the lower end 52 of the hose from the tube 22.

The latch 54 is spring biased clockwise to latching position by spring 61 as shown in Fig. 3 being stopped by stop lug 62 extending inwardly from the cam 59 and adapted to engage the rear of offset 27.

The casing of the motor-fan assembly 32 is provided at one end with a fan eye 63 leading to the suction side of the fan 64 and at its opposite end is provided with outlet ports 65. At its lower end the casing 33 is provided with the port 66 leading to the interior of casing 31, the latter being provided with a bulk head 67 having ports 68. The bulk head 67 is provided with an annular extension 69 surrounding the support 41 and the end wall 36 of casing 31 is provided with grilled outlet ports 70.

The casing 31 is also provided with a port 71 (Fig. 5) which communicates with the interior of a housing 72 which encloses a headlight 73 and is provided with a forwardly facing louvered closure plate 74 through which light rays are emitted and through which cooling air flows as will later appear. Air egressing from port 71 is directed upwardly into the housing 72 by a deflector plate 75 suitably secured to the chassis 10 so as to be in communication with port 71 in all positions of the handle of the cleaner as will later appear.

The handle is adapted to be held in either its storage upright position or its inclined position by a foot actuated latch 76 pivoted to one leg of the chassis 10 at 77 and cooperating with pins 78 and 79 extending from the end wall 36 of casing 31. The latch 76 is spring biased to latching position by a spring 80 as shown.

The motor shaft is extended into the belt passage 23 to form a belt pulley 81 which drives a belt 82 extending over a pulley 83 on one end of the agitator 21. It is to be noted that an opening 84, Fig. 1, is provided in the rear wall of the suction mouth 20 so as to substantially seal the belt passage 23 from the suction mouth 20.

Operation

In the position shown in Figs. 1 and 5 the handle is held in its vertical storage position by engagement of the latch 76 with the pin 78, and the lower end 52 of the hose 51 is attached to the suction tube 22 by the engagement of the tail 57 of latch 54 with the shoulder 58 of the fitting 53. In that position the cleaner is all set for on-the-floor cleaning.

The hand grip 48 may then be grasped, the foot pedal 76 depressed and the handle pulled rearwardly to its upper operating range and the cleaner propelled about for ordinary on-the-floor cleaning. If it is desired to clean under beds or other low furniture the foot pedal 76 is again depressed free of pin 79 and the handle moved further downwardly to its low operating range. In both cases the nozzle mouth rides freely over the carpet by the engagement of the roller 29 with the floor.

When the motor is energized a suction will be produced at the suction mouth 20 to lift the carpet upwardly

against the nozzle mouth 20 and the agitator 21 will be rotated to beat the dirt from the carpet. The combined action of the air passing through the carpet and the agitation of the agitator 21 will remove the dirt from the carpet and it will be carried away in the suction air stream.

The dirt laden air will pass through the nozzle mouth 20, the suction tube 22, hose 51 and into the interior of the filter 34 where the dirt will be separated therefrom and the clean air will pass into the interior of casing 33. The cleaned air will then pass through the port 66 into the interior casing 31. The rubber bulkhead 42 will confine the air stream to the right hand end of the casing 31 as viewed in Fig. 2 and the air will pass through the fan eye 63 into the suction side of the fan 64 and be discharged under pressure into the interior of the motor fan casing 32 to cool the interior of the motor. The air under pressure will then pass thru the ports 65 into the left hand end of casing 31 as viewed in Fig. 2. The air stream will then divide, one portion will flow through port 71, the interior of deflector 75 into the housing 72 where it will flow over the headlight 73 to cool it and be discharged through lowered opening 74 and the other stream will flow through the ports 68 in bulk head 67 and be discharged upwardly away from the floor through louvered port 70.

When it is desired to use the cleaner for cleaning furniture or for other general cleaning purposes the handle is placed in storage position as shown in Figs. 1 and 5. The lower end 52 of the hose 51 is detached from the suction tube 22 and cleaning tools including a wand attached to the thus freed end of the hose. The hose 51 is extensible to two or three times its relaxed length so that points distant from the cleaner may be cleaned.

The motor-fan assembly 32 may be of the high speed multi-stage type producing a high suction and there being no air leaks as in the usual conversion arrangements, the cleaner will be just as effective for general cleaning purposes as the standard canister or tank type cleaner.

The air flow through the cleaner will be the same as when the cleaner is used for on-the-floor cleaning except that there will be no air flow through the nozzle mouth 20 and the suction tube 22.

The lower end 52 of hose 51 is detached by turning the latch lever 56 counterclockwise as viewed in Fig. 1 to raise the tail 57 from behind the shoulder 58 of the fitting 53 whereby the fitting may be slid rearwardly out of telescopic engagement with the tube 22. When the latch lever 56 is thus rotated the cam surface 60 will engage one of the legs of the chassis 10 to raise the nozzle mouth 20 above the surface upon which the cleaner rests whereby the rotating agitator 21 will not injure the carpet. The cam surface 60 is flat so that the lifter 56 will remain in that position against the bias of spring 61.

To reconvert the cleaner to on-the-floor cleaning it is only necessary to slide the fitting 53 over the end of suction tube 22 and move the lever 56 clockwise to the position shown in Fig. 1 to reengage the tail 57 behind the shoulder 58 and thus latch the end 52 of the hose 51 in place.

When the handle lever 56 is moved clockwise, the nozzle 14 will move downwardly under its own weight against the bias of spring 15 until the roller 29 contacts the surface upon which the cleaner rests and the cleaner is ready for on-the-floor cleaning as previously described.

The rear wheels 12 and the rear end 85 of the hand grip 48 are so arranged that with the casing 33 and handle 48 locked in a vertical storage position the cleaner may be tilted backwardly and supported at those three points in a substantially horizontal position when the hose 51 is detached and the cleaner is being used for general cleaning purposes. Thus the cleaner will

present an appearance not unlike an ordinary tank type cleaner as well as being functionally the same.

From the foregoing it can be seen that the present invention provides a truly two in one cleaner which may be used as an on-the-floor cleaner and which may be easily converted to use as a standard canister or tank type cleaner in which all parts necessary for both types of operation, except the necessary wand and cleaning tools are incorporated into the structure of the cleaner proper.

It can also be seen that with either type of operation the fan handles clean air and the filter is easily replaced when it becomes clogged with dirt.

While I have shown and described but a single embodiment of my invention it is to be understood that that embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the specific structure shown and described but wish to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. A combination canister type and upright on-the-floor type suction cleaner comprising; a chassis mounted for ambulatory movement, a nozzle casing pivoted to said chassis at one end thereof with its opposite end free to rest on a surface to be cleaned; a counterbalance spring connected between said chassis and nozzle casing and of sufficient strength to support a portion only of the weight thereof; said nozzle casing forming a downwardly facing suction mouth extending across its forward end for contact with the surface to be cleaned, a suction passage extending rearwardly along one side of the casing and including an outlet fitting, and a belt passage extending upwardly and rearwardly along the other side of said casing and out of direct communication with said suction mouth; an agitator rotatably mounted within said suction mouth and having an agitator pulley positioned in the forward lower end of said belt passage; a filter casing pivoted to said chassis on the same axis as said nozzle casing and forming a portion of the propelling handle for the cleaner and extending in a generally vertical direction when in storage position; a releasable latch for holding said filter casing in its storage position; a motor-fan assembly in the lower end of said filter casing with its axis in alignment with the pivotal axis of said casing; a motor pulley formed on one end of the motor shaft and positioned in the upper rear end of said belt passage; a driving belt drivingly connected to said motor and agitator pulleys and positioned within said

belt passage; said fan being connected to the opposite end of the motor shaft and having a suction eye communicating with the interior of said casing; a dirt storing filter in the upper part of said filter casing and having an open upper end secured to said filter casing adjacent its upper end; a hand grip secured to the upper end wall of said filter casing; the upper end wall of said filter casing being formed with a suction inlet opening; an extensible hose having one end secured to the suction inlet opening; and a detachable connection between the other end of said hose and the outlet fitting of said suction passage whereby the cleaner may be propelled about for on-the-floor cleaning when said detachable connection is attached and said detachable connection released and suitable suction cleaning tools attached to the free end of said hose for general purpose cleaning.

2. A suction cleaner according to claim 1 in which said chassis is mounted on front and rear wheels with the rear wheels extending rearwardly of said nozzle casing and said hand grip is bent rearwardly, the arrangement being such that the cleaner may be supported in a generally horizontal position on said rear wheels and the rearwardly bent end of said hand grip.

3. A suction cleaner according to claim 1 in which said nozzle casing is formed with an upwardly extending lamp housing formed with forwardly facing light emitting openings, a lamp mounted in said housing, and said filter casing is formed with an exhaust opening adjacent said lamp housing whereby a portion of the air exhausted by the fan is utilized for cooling said lamp.

4. A suction cleaner according to claim 1 including a roller secured to the rear edge of said suction mouth for contact with the surface being cleaned to prevent the lips of said suction mouth from digging into the surface being cleaned.

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