Aug. 11, 1959 C. C. HURD 2,898,622

COMBINATION SUCTION CLEANERS

Filed Nov. 30, 1955 5 Sheets-Sheet 1

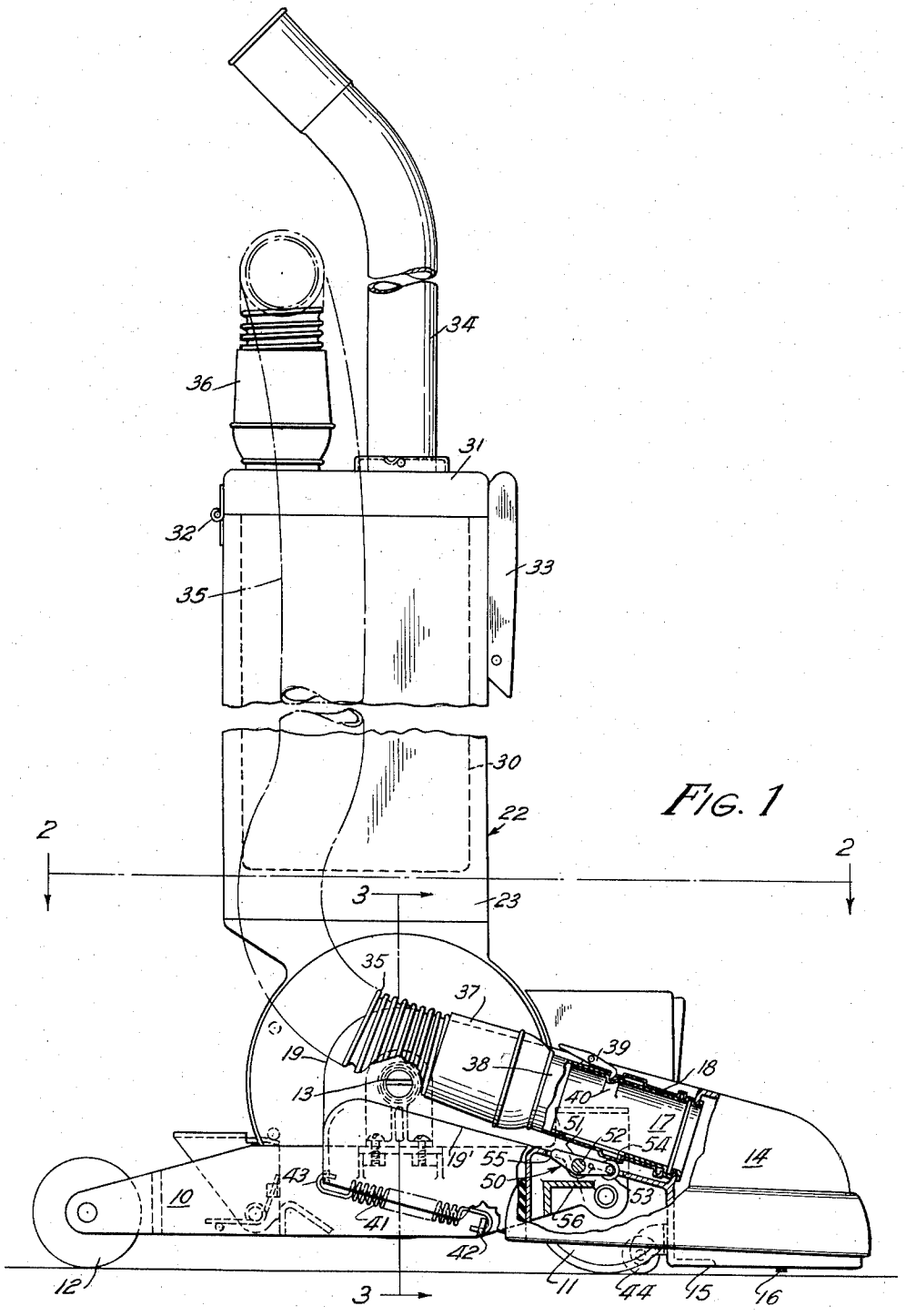


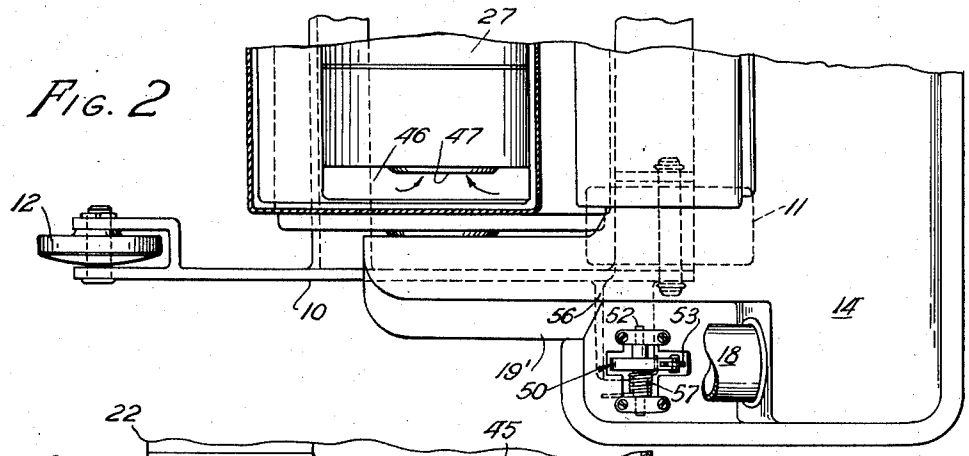
FIG. 1

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FIG. 2



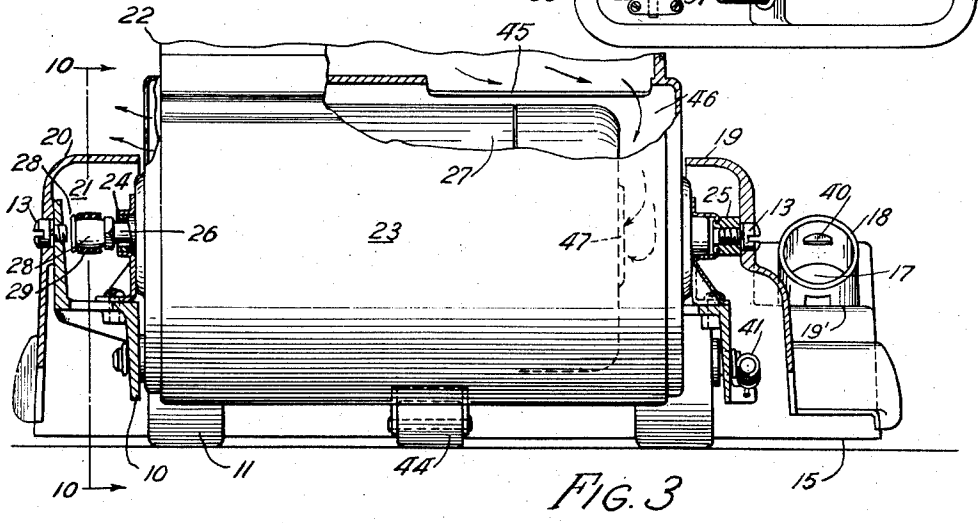


FIG. 3

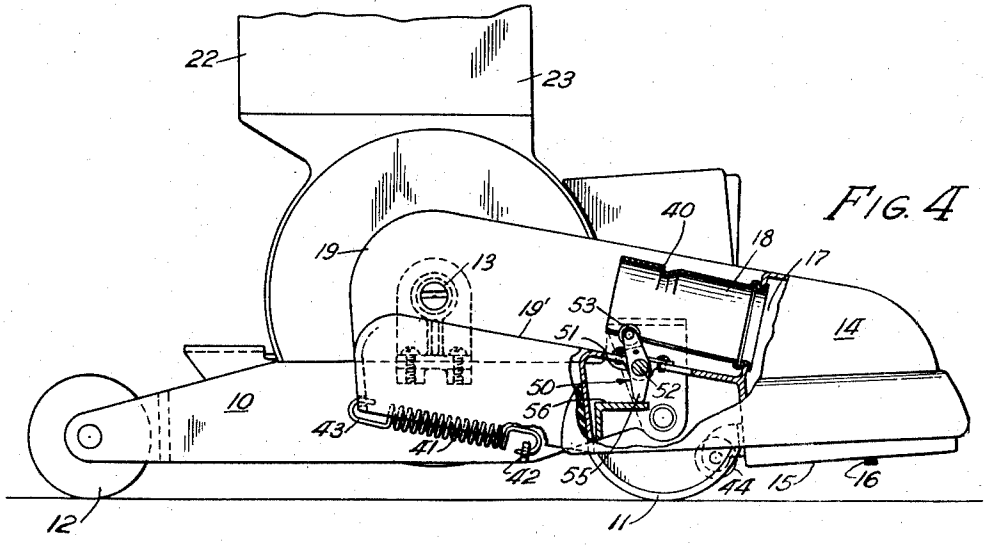


FIG. 4

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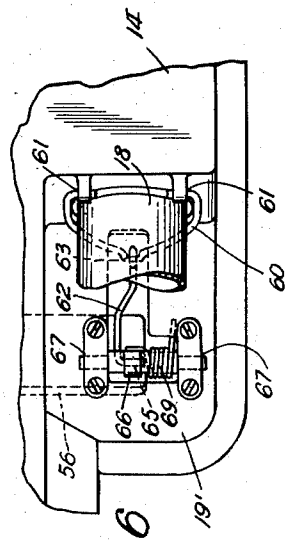


FIG. 6

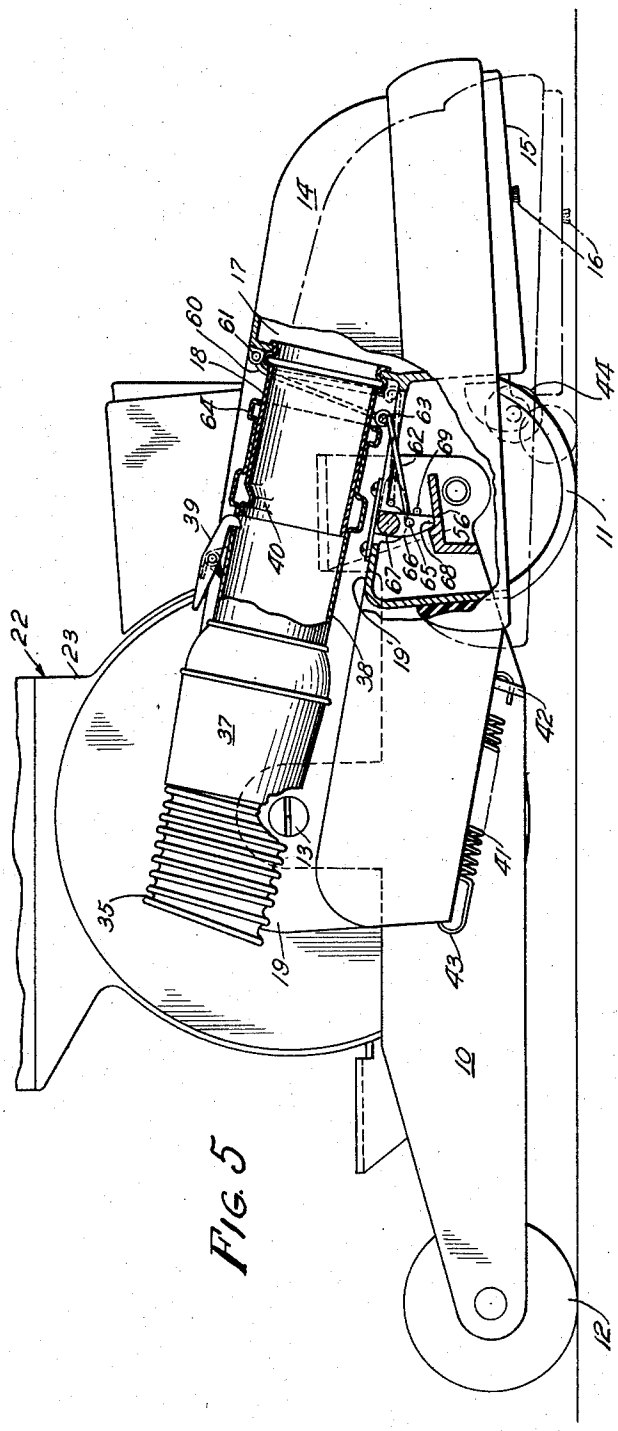


FIG. 5

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FIG. 8

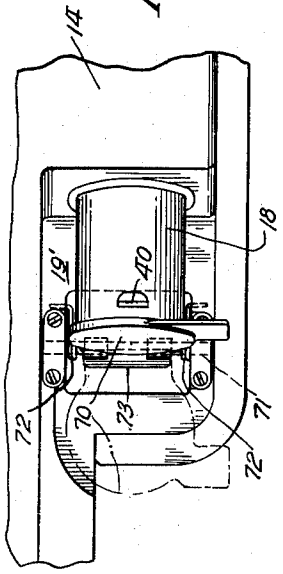
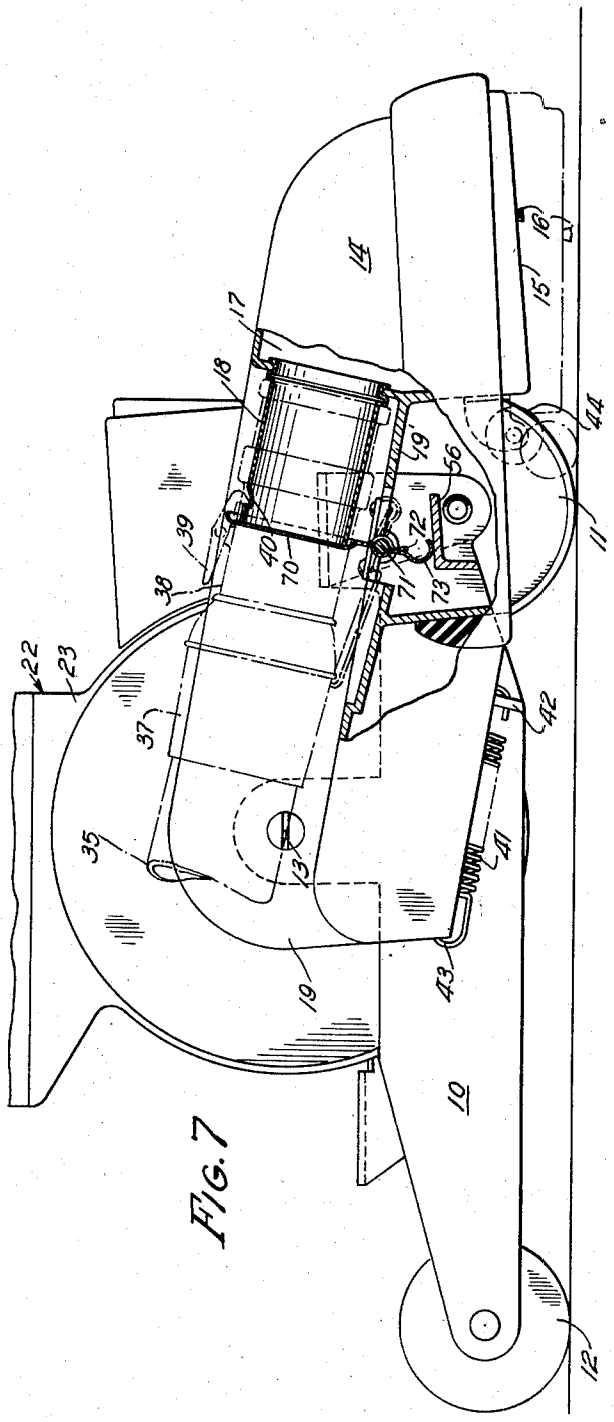


FIG. 7



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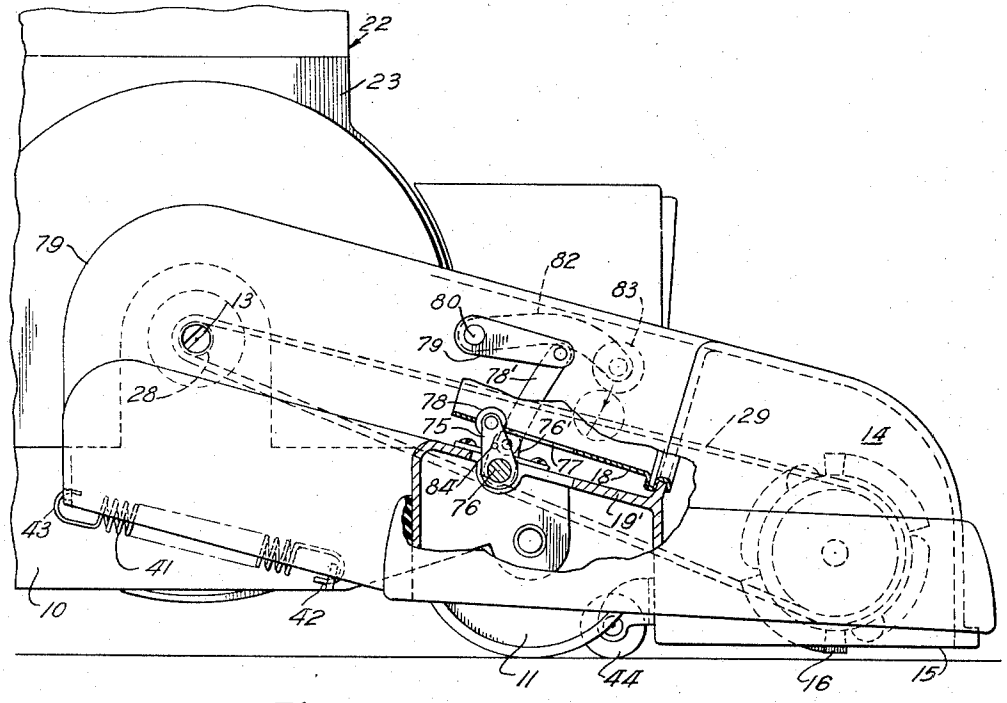


FIG. 9

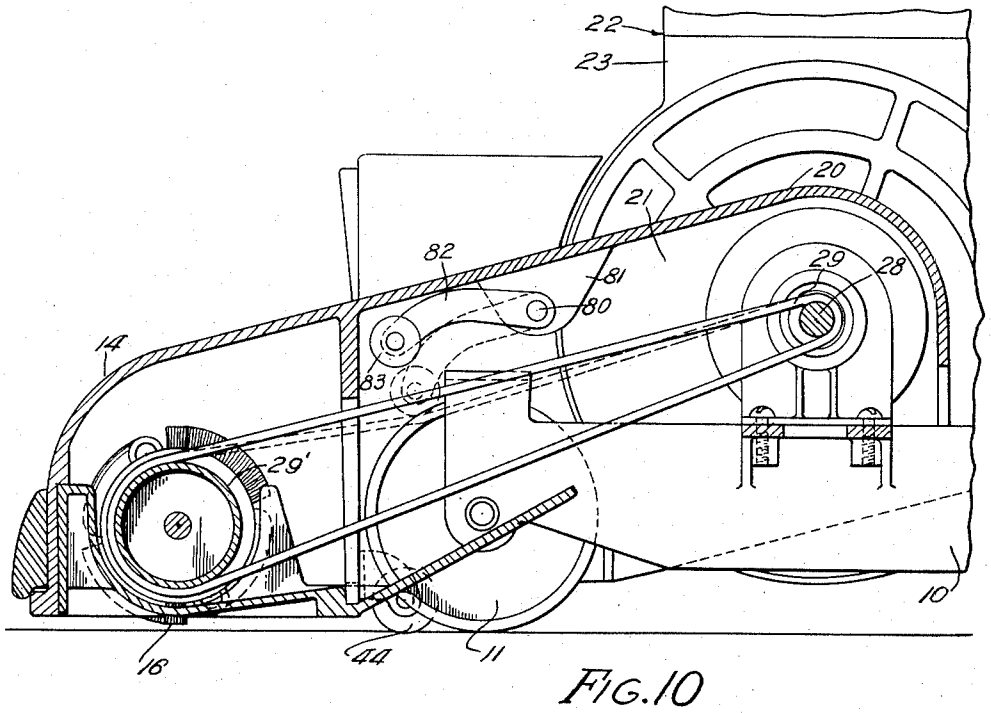


FIG. 10

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COMBINATION SUCTION CLEANERS

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Application November 30, 1955, Serial No. 550,138

1 Claim. (Cl. 15—333)

The present invention relates to suction cleaners and more particularly to a conversion arrangement therefore 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.

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. A 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 a 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 within the casing and forms a portion of the propelling handle. The suction inlet is 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 from 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 be exhausted from the motor casing.

When it is desired to use the cleaner for general purpose cleaning 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 circumstances it is desirable that the agitator be deactivated so that no harm will be done to the surface upon which the cleaner rests by the rotation of the agitator with the cleaner standing still.

According to the broadest aspects of the present invention, the agitator is deactivated when the cleaner is converted for general purpose cleaning by some means incident to the detachment of the lower end of the flexible hose from the suction nozzle outlet.

According to some disclosed forms of the invention the nozzle is raised upwardly to deactivate the agitator. In another disclosed form the agitator is declutched by loosening the belt when the hose is detached. Obviously the agitator could be declutched in other known ways to obtain the same result.

According to some disclosed forms of the invention the act of removing the hose from the suction nozzle outlet activates a mechanism which deactivates the agitator.

It is also within the purview of the present invention to lock the agitator deactivator in its activating position when the hose is attached to the suction nozzle outlet and to release the lock by some means incident to the release of the hose and to thereafter manually actuate the agitator deactivator.

A latch is usually provided for latching the lower end of the hose to the suction nozzle outlet. It is within the purview of the present invention to utilize the releasing movement of that latch for deactivating the agitator.

According to one modification of the present invention the agitator is deactivated by the closing of a closure for the outlet from the suction nozzle which operates when the hose is detached from that outlet.

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,

Fig. 1 is a side view of a suction cleaner according to the present invention with the parts broken away to show the details of construction,

Fig. 2 is a segmental view partly in section taken on line 2—2 of Fig. 1 and looking in the direction of the arrows,

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1, looking in the direction of the arrows and with certain parts broken away to show the path of air circulation,

Fig. 4 is a segmental view of the cleaner of Fig. 1 showing the hose disconnected from the suction nozzle outlet and the nozzle in its raised position to deactivate the agitator,

Fig. 5 is a side segmental view of a cleaner according to the invention partly in section to show the details of a modified agitator deactivator,

Fig. 6 is a segmental top view showing the details of the agitator deactivator of Fig. 5,

Fig. 7 is a side view of a cleaner according to the invention partly in section and showing another form of agitator deactivator,

Fig. 8 is a segmental top view showing the details of the agitator deactivator of Fig. 7,

Fig. 9 is a side view of a cleaner according to the invention partly in section showing still another form of the agitator deactivator according to the invention,

Fig. 10 is a side view of a cleaner taken on line 10—10 of Fig. 3 and showing the details of the opposite end of the agitator deactivator of Fig. 9.

Referring to Figs. 1 to 4 inclusive of the drawings, the cleaner to which the invention is applied includes a chassis 10 mounted for ambulatory movement on pairs of front and rear wheels 11 and 12 respectfully. Pivotally mounted on the chassis 10 at 13 is a suction nozzle generally indicated by the reference numeral 14.

The nozzle 14 includes a downwardly facing suction mouth 15 in which an agitator 16 is rotatably mounted, a rearwardly extending suction passage 17 including an

air outlet tube or fitting 18 and rearwardly extending aprons 19 and 20 the latter of which forms a belt passage 21. The casing of the nozzle 14 is recessed to form a recess for receiving the fitting 18 the lower wall of the recess being shown at 19'.

The motor-fan-filter unit 22 includes a casing 23 pivotally mounted on the chassis 10 at 24 and 25 which is on the same axis as the pivotal mounting 13 for the nozzle 14 and on the same axis as the shaft 26 of the motor-fan assembly 27. The shaft 26 is extended into the belt passage 21 to form a pulley 28. An endless belt 29 surrounds the pulley 28, extends downwardly and forwardly through the belt passage 21 and surrounds a pulley 29' (Fig. 10) on the end of agitator 16.

As shown in Fig. 1, the motor-fan assembly is housed within the lower end of casing 23 beneath the filter bag 30 suitably supported to the top of the casing 23. The bag 30 may be removed and replaced from an opening cover 31 which is hinged to the casing 23 at 32 and held in closed position by any known type of releasable latch 33. Hand piece 34 is suitably attached to the cover plate 31.

A flexible and extensible hose 35 is suitably attached at its upper end 36 to a suction inlet opening in the cover 31 and its lower end 37 is provided with a fitting 38 for detachable connection to the suction nozzle outlet fitting 18, by means of a pivoted latch 39 which is spring biased to latching position into engagement with a shoulder 40 formed in the wall of the fitting 18.

The weight of the nozzle 14 is counterbalanced by spring 41 attached to the chassis 10 at 42 and to the apron 19' at 43. The spring 41 permits the nozzle mouth 15 to rest lightly on the surface being cleaned, the nozzle being held from digging in by a roller 44 attached centrally to the rear of the nozzle mouth 15. The motor may be electrically connected to a conventional electric cord in any suitable manner.

For on-the-floor cleaning the motor is energized and the cleaner propelled about over the carpet to be cleaned, the roller 44 holding the mouth 15 slightly above the carpet. The suction produced by the fan will draw air into the nozzle mouth 15 and in so doing will raise the carpet upwardly against the nozzle mouth where it will be agitated by the rotating agitator 16. The dirt removed by the combined action of the agitator and suction will be carried by the air stream through the suction nozzle, the outlet fitting 18, the hose 35 into the filter 30 where the dirt will be removed and the cleaned air will pass through the walls of the filter into the interior of casing 23.

The cleaned air will go through an opening 45 into the motor-fan chamber 46 and be drawn into the suction opening 47 of the fan chamber so as to be circulated through the motor to cool the same and be discharged to atmosphere from the upper end of the motor-fan casing as shown by the arrows in Fig. 3.

In order to use the cleaner as a general purpose cleaner it is only necessary to release the latch 39, remove the fitting 38 from the fitting 18 and apply a wand and the necessary cleaning tools to the free end 37 of the flexible hose 35.

In order to deactivate the agitator 16 and prevent it from injuring the carpet upon which the cleaner rests while the cleaner is stationary and being used for general cleaning purposes the nozzle 14 is raised upwardly as an incident to the detachment to the lower end 37 of the hose from the fitting 18 in order to remove the agitator 16 from any possible contact with the carpet.

For that purpose a spring biased cam arrangement generally indicated by the reference numeral 50 is provided. The cam arrangement 50 includes a cam arm 51 pivoted at 52 to the wall 19' of nozzle 14 beneath the fitting 18. The arm 51 is provided with a roller 53 at one end for contact with an annular protuberance 54 on the hose fitting 38 and at its opposite end with cam surface 55 for contact with an extension 56 on the chassis 10 beneath the apron wall 19'. The arm 51 is spring biased to move counterclockwise by a spring 57 (Fig. 2) to bring the cam surface 55 into contact with the extension 56 when free to do so, the spring 55 being strong enough to raise the nozzle to the position shown in Fig. 4.

Thus, when the fitting 38 is removed from the fitting 18 the annulus 54 rides free of the roller 53 permitting the spring 57 to bring the cam 55 into contact with the extension 56 and raise the nozzle to the position shown in Fig. 4.

During the use of the cleaner for general purpose cleaning there will be no air flow through the nozzle 14.

When it is again desired to reconvert the cleaner to use as an upright on-the-floor cleaner, fitting 38 is slid over the fitting 18 whereby the annular collar 54 will engage the roller 53 and pivot the arm 51 clockwise and raise the cam surface 55 from contact with the extension 56 and permit the nozzle to move downwardly under its own weight until the roller 44 contacts the surface upon which the cleaner rests, spring 41 partially counterbalancing the weight of the nozzle during such movement.

The cleaner of Figs. 5 and 6 is substantially the same as that of the first modification except for the agitator deactivating mechanism and where parts are the same they have been given the same reference numerals.

The agitator deactivator of this modification also is responsive to the removal of the fitting 38 from the fitting 18 and Fig. 5 shows it in the process of being removed.

The agitator deactivator comprises a wire ring 60 pivoted at 61 to the nozzle 14 above the fitting 18 and surrounding the same. A wire link 62 is pivoted to the lower side of the ring 60 at 63 beneath the fitting 18 in a position to come into contact with an annular collar 64 on the fitting 38 when the latter is attached to the fitting 18. The other end of link 62 is pivoted at 65 to a cam arm 66 pivoted at 67 to the wall 19' of the nozzle 14. The cam arm 66 is provided with cam surface 68 for contact with the extension 56 and is spring biased clockwise by the spring 69.

In the position shown by the full lines of Fig. 5 the nozzle 14 is in its raised position and the collar 64 is just leaving contact with the ring 60 and link 62. The dot-dash line position of Fig. 5 shows the position of the parts when the nozzle is down in its on-the-floor cleaning position. The operation is substantially the same as that of the first modification.

The cleaner of Figs. 7 and 8 is also substantially the same as that of the other modifications except for the agitator deactivator and where the same, the parts have been given the same reference numerals.

According to this modification the agitator deactivator is responsive to the closure of a closure plate for the outlet opening of the fitting 18.

A closure plate 70 is pivoted at 71 to the wall 19' of nozzle 14 beneath the end of fitting 18 so as to normally swing upwardly against the end of the fitting 18 and close the same under the bias of the spring 72. The closure 70 is provided with cam extension 73 which contacts the extension 56 when the closure is closed.

In the position shown by full lines of Fig. 7 the lower end of the hose 35 is removed from the fitting 18 and the nozzle 14 is in its raised position, the spring 72 being strong enough to rotate the closure 70 clockwise, to engage the cam 73 with the extension 56 and raise the nozzle 14. In this position the agitator 16 will be free of any possible contact with the surface upon which the cleaner rests and the cleaner may be used for general cleaning purposes by attaching the necessary wand and cleaning tools to the end of the flexible and extensible hose 35.

When it is desired to reconvert the cleaner for upright on-the-floor cleaning the closure 70 is grasped and

rotated counterclockwise to open position. That will cause the cam **73** to rise free of extension **56** and the nozzle **14** will drop by its own weight against the tension of counterbalancing spring **41** until roller **44** comes into contact with the surface upon which the cleaner rests. The fitting **38** may then be slid over the fitting **18** and latched in position by the latch **39**. The end **37** of the hose **35** will then hold the cover **70** open and accordingly hold the parts in their dot-dash line position of Fig. 7.

The cleaner proper of Figs. 9 and 10 is substantially the same as that of the other modifications and where the parts are the same have been given the same reference numerals. It differs over the other modifications in that the agitator is deactivated by means of a belt tightener instead of by raising the nozzle as in the other modifications.

In Fig. 9 the hose is detached and the cleaner is set for general purpose cleaning and there is no air flow through the nozzle **14**.

A crank arm **75** is pivoted to the wall **19'** by shaft **76** and extends upwardly through an elongated slot **77** in the fitting **18**. At its upper end the arm **75** is provided with a roller **78** adapted to be engaged by the end of fitting **38** when the hose is attached.

At its opposite end in a position to clear the fitting **18**, the shaft **76** is provided with crank arm **76'** rigid therewith. A connecting rod or link **78'** extends upwardly and forwardly between the fitting **18** and the apron **19** as shown in Fig. 9. At its lower end the rod **78'** is pivoted to crank arm **76'** and at its upper end is pivoted to a crank arm **79** which is rigid with a shaft **80** extending through the body of the nozzle into the belt passage **21** where it is pivotally mounted on bracket **81**. A crank arm **82** is rigid with shaft **80**, extends downwardly and forwardly into belt passage **21** and its free end carries an idler pulley **83** which is normally in contact with the belt **29** to hold it taut and in driving engagement with the pulleys **28** and **29'**.

The linkage just described is spring biased to hold the pulley **83** free of the belt **29** as shown in Fig. 10 by a torsion spring **84** surrounding shaft **76** and having one end anchored to the crank arm **76'** and the other to the wall **19'**, which is the position shown by the full lines of Figs. 9 and 10.

When it is desired to use the cleaner as an upright cleaner for on-the-floor cleaning the nozzle **38** on the end of the hose **35** is slid over the fitting **18**, whereby it will contact roller **78** and pivot crank arms **75** and **76'** clockwise. The link **78'** will move downwardly and thus pivot the crank arm **79** clockwise as viewed in Fig. 9 which will rotate crank arm **82** counterclockwise as viewed in Fig. 10 and bring the idler pulley **83** into contact with the belt **29** as shown in dotted lines of Fig. 10 to activate the agitator **16**. In the position shown by full lines of Fig. 10 the belt **29** is slackened sufficiently that the belt will slip at the pulley **28** and the agitator **16** will remain idle.

From the foregoing description it may be seen that the present invention provides a simple arrangement by which the agitator may be automatically deactivated by the removal of the hose from the outlet leading from the suction nozzle, in a cleaner of the type in which the hose may be disconnected in converting the cleaner from an upright on-the-floor cleaner type to a general purpose cleaner and in which cleaning tools may be attached to the free end of the attached extensible hose.

While I have shown a number of modifications of my invention it is to be understood that those modifications are to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described but wish to include all equivalent variations thereof except as limited by the claim.

I claim:

In combination, a suction cleaner of the upright type which may be moved about over the surface being cleaned for on-the-floor cleaning including, a body, a downwardly facing suction nozzle pivoted at its rear end to said body with its front end free to rest on the surface being cleaned, an agitator rotatably mounted in said nozzle, a motor-fan-filter unit having a suction inlet, means for rotatably driving said agitator from said motor-fan-filter unit, an outlet connection leading from said nozzle, an extensible flexible hose connected to the suction inlet of said motor-fan-filter unit, means for detachably connecting the free end of said hose to said outlet connection, means for pivoting the front end of said nozzle upwardly free of the surface being cleaned, spring means for biasing said nozzle pivoting means to its nozzle raising position, means on said detachable connecting means engageable with and disengageable from means on said nozzle pivoting means and operable upon attachment of said detachable connecting means to said outlet connection to move said nozzle pivoting means to its inactive position and operable upon detachment of said detachable connecting means from said outlet connection to cause said nozzle pivoting means to move under the bias of said spring means to its nozzle raising position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,024,260	White	Dec. 17, 1935
2,076,390	White	Apr. 6, 1937
2,174,560	Becker	Oct. 3, 1939
2,210,950	Replogle	Aug. 13, 1940
2,266,075	Replogle	Dec. 16, 1941
2,605,493	Vance	Aug. 5, 1952
2,758,329	Brace	Aug. 14, 1956

FOREIGN PATENTS

523,551	Great Britain	July 17, 1940