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April 6, 1937. H. B. WHITE 2,076,390

SUCTION CLEANER

Filed Dec. 1, 1933 3 Sheets-Sheet 1

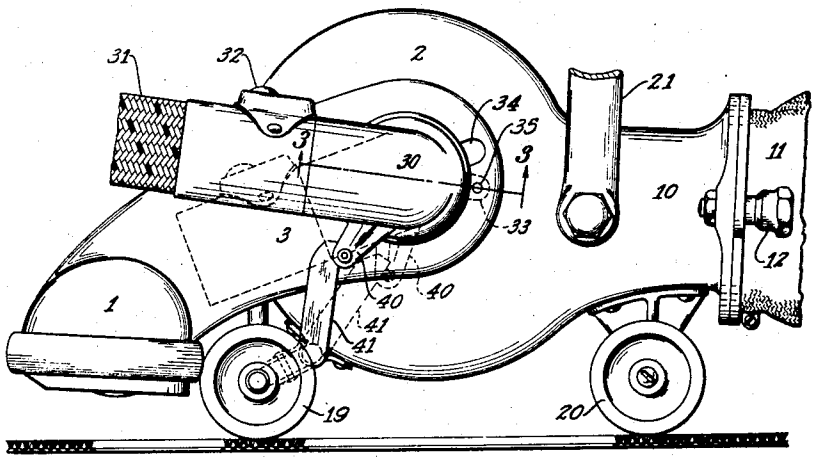


Fig. 1

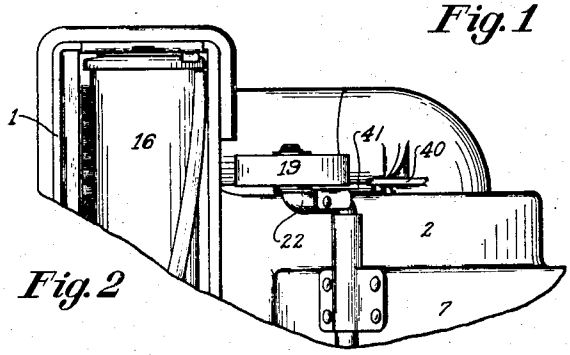


Fig. 2

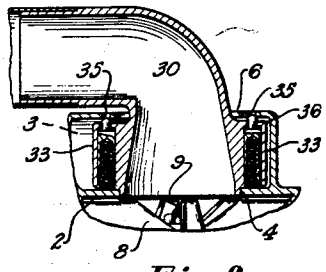


Fig. 3

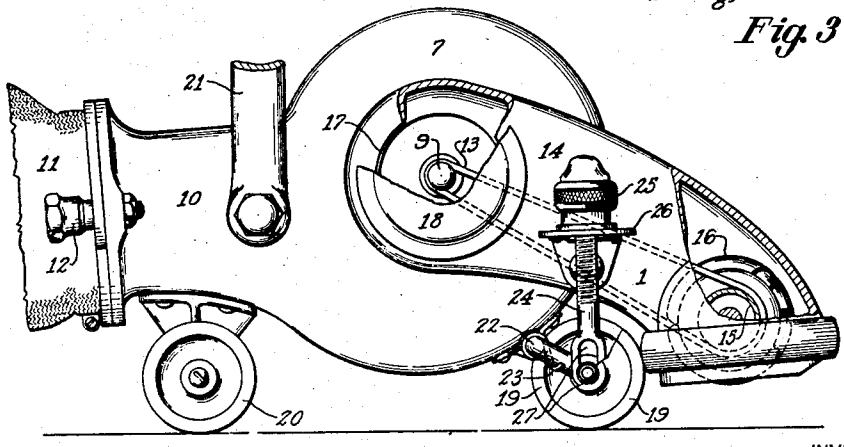


Fig. 4

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SUCTION CLEANER

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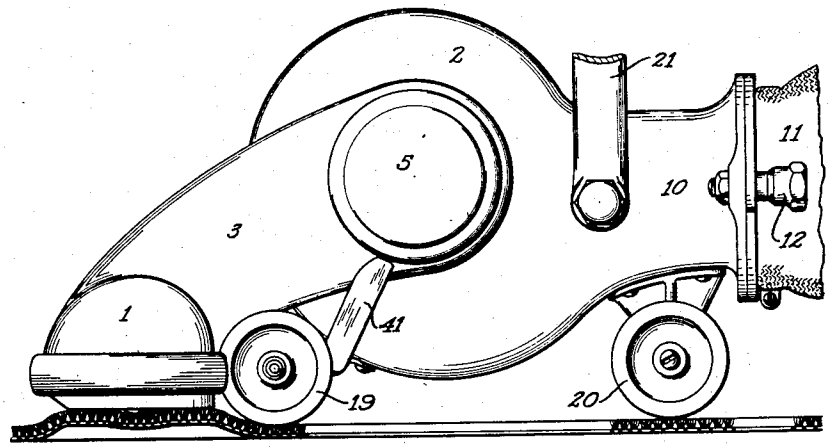


Fig. 5

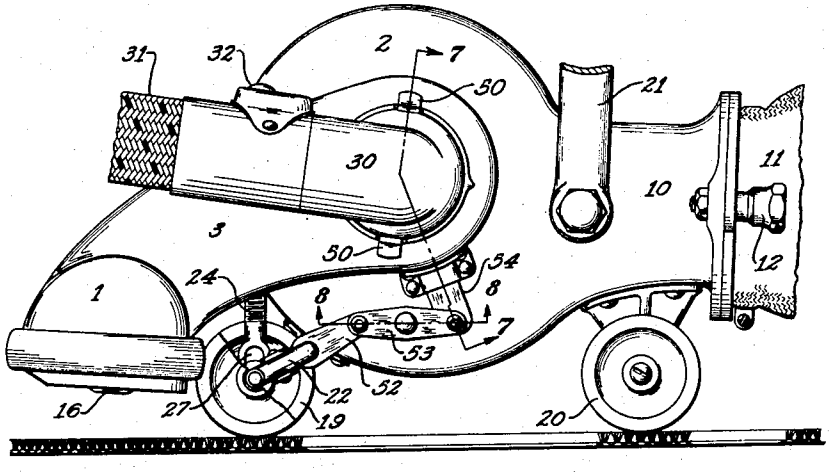


Fig. 6

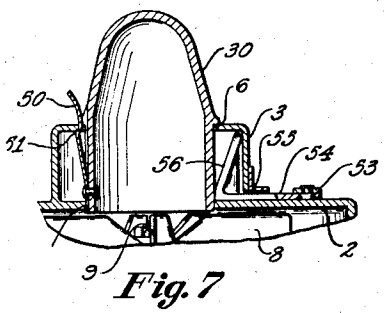


Fig. 7

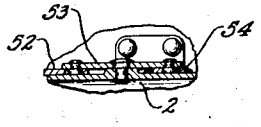


Fig. 8

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SUCTION CLEANER

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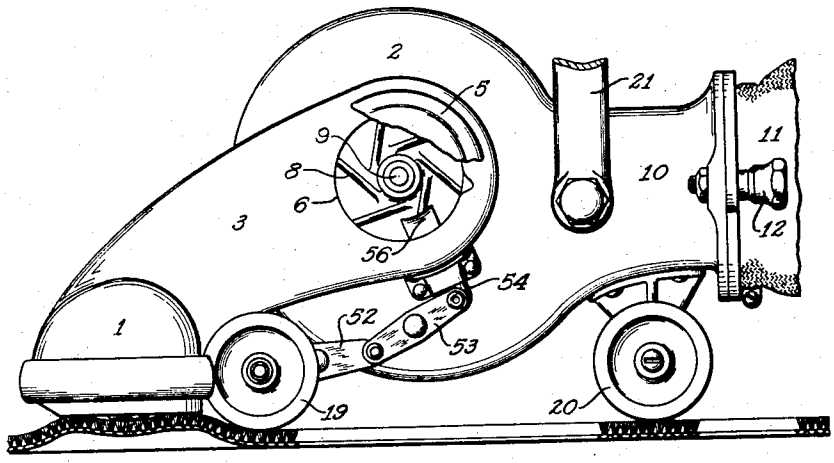


Fig. 9

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UNITED STATES PATENT OFFICE

2,076,390

SUCTION CLEANER

Harry B. White, Canton, Ohio, assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application December 1, 1933, Serial No. 700,386

18 Claims. (Cl. 15—9)

The present invention relates to suction cleaners in general and particularly to new and novel improvements in combined suction cleaners and dusting tool combinations. More specifically the invention comprises the improvement in a suction cleaner which insures that the surface covering agitator is lifted from the surface covering undergoing cleaning when the dusting tools are connected to the machine for off-the-floor cleaning.

It is an object of the present invention to provide a new and novel suction cleaner construction. It is a further object to provide a new and improved suction cleaner in which the attachment of the dusting tools automatically lifts the cleaner nozzle from the surface covering undergoing cleaning. Still another object is the provision of new and novel improvements in combined suction cleaners and dusting tools which function to prevent the contacting of the surface covering by the agitator when the cleaner is used with the dusting tools. These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

In the drawings in which the same reference character is used to refer to the same part throughout:

Figure 1 is a side elevation of a suction cleaner with dusting tools attached and the cleaner nozzle spaced above the surface covering undergoing cleaning.

Figure 2 is a partial bottom view of the front end of the cleaner shown in Figure 1;

Figure 3 is a section upon the line 3—3 of Figure 1;

Figure 4 is a side view, with certain parts broken away, showing the opposite side of the cleaner disclosed in Figure 1;

Figure 5 is a side view of the cleaner with the dusting tools removed and the cleaner in its on-the-floor cleaning relationship.

Figure 6 is a view similar to Figure 1 of a second preferred embodiment of the invention;

Figure 7 is a section upon the line 7—7 of Figure 6;

Figure 8 is a section upon the line 8—8 of Figure 6;

Figure 9 is a side view of the cleaner shown in Figure 6 with the dusting tools removed and the cleaner in its on-the-floor relationship, the cover plate being broken away.

The modern suction cleaner is designed to perform two functions. Its primary duty is the cleaning of surface coverings. Its important secondary duty is the cleaning of drapes, curtains, etc. which are positioned above the floor. The well designed cleaner is much too heavy to be carried by the operator for the cleaning of drapes, etc. In order to accomplish the secondary function, therefore, dusting tool units are provided which are adapted to be attached to the cleaner units and to make available the suction of that unit at a distance therefrom. These dusting tools usually comprise an article-contacting nozzle, a flexible hose, and a converter member which is adapted to be secured to the cleaner proper in such a manner that the suction-creating device thereof is made effective through the hose and at the tool nozzle. The most efficient present day cleaners are provided with rotary agitators in their nozzles. While these agitators perform a beneficial function in the cleaning operation of the machine in the on-the-floor cleaning they serve no function in off-the-floor cleaning. It is obviously undesirable for the agitator to rotate in contact with the surface covering for unlimited periods of time in one location. This fact is true with agitators comprising bristles of the most flexible type, as well as agitators formed of rigid beating elements. When the dusting tool unit is attached to the cleaner there is little cleaner movement, the operator generally leaving the cleaner in one particular position and moving from article to article within the range of the flexible tool hose. In order to prevent injury to the surface covering, therefore, means should be provided which automatically render the agitator ineffective when the dusting tools are used. The present invention accomplishes this function in a new and novel manner.

Referring again to the drawings, and Figures 1 to 5, inclusive, in particular, a preferred embodiment of the present invention is disclosed. An improved type of modern suction cleaner is disclosed in which the nozzle 1 is connected to the fan chamber 2 at one side of the motor casing 7, the cleaner being of the type in which the motor axis extends parallel to the nozzle. The air passageway 3 extends from one side of the nozzle to the inlet 4 of the fan chamber, and is provided in its floor-cleaning relationship with a removable cover plate 5 opposite that inlet which covers an opening 6 therein. An unshown motor of an ordinary type is positioned within the casing 7, the shaft 9 of which extends into the fan chamber 2 where it carries a suction-creating fan 8. Fan 8 is effective in the opera-

tion of the machine to draw air through the nozzle 1, into the passageway 3 and fan chamber 2, and exhaust it through the outlet 10 into the dust bag 11 which is removably secured by means 12.

The opposite end of the motor shaft 9 is extended beyond the motor casing 7 and is formed at its end as a pulley. A driving belt 13 connects to this pulley and extends through a belt passageway 14 down to the end of the nozzle 1 where it encircles the pulley 15 positioned at that point upon the rotary agitator 16 mounted within the nozzle. This agitator is of a common well-known design, comprising a cylindrical body and elongated rigid beating elements and brushes. Its particular design, however, is not of the essence of the invention, it being sufficient that it is an agitator removably mounted within the nozzle 1 and adapted to contact the surface covering between the lips thereof. The belt channel 14 is provided with an opening, indicated by reference character 17, adjacent the pulley on the shaft 9 and a removable cover plate 18 is provided therefor, the construction being such that with the cover plate removed the belt 13 may be removed from or attached to the shaft pulley.

The entire machine, which is shown in its floor-cleaning relationship in Figure 5, is movably supported upon front and rear wheels 19 and 20, and there is provided a pivoted handle 21 by which the operator can exert a propelling force. In order that the nozzle may be adjusted vertically relative to the surface covering undergoing cleaning the front wheels 19 are pivoted upon a crank shaft 22 which is spring-pressed upwardly by a spring 23, the upward movement of the crank shaft being determined by the vertically movable arm 24 which is screw-threaded at its top and extends through the manually rotatable nut member 25 carried by the plate 26. The lower end of arm 24 is slotted, as at 27, making possible a limited movement of crank arm 22 with no manual adjustment of the nut 25 and arm 24. In its normal operation the crank shaft 22 is pivoted, under the force exerted by the spring 23, to the top of the slot 27 and any vertical movement of arm 24 is accompanied by a corresponding vertical movement or angular adjustment of the crank shaft.

The suction cleaner described is shown in Figure 5 with the air passageway cover plate 5 in place and the surface covering undergoing cleaning lifted into contact with the mouth of the nozzle 1. In this relationship the front wheels 19 have been adjusted by their adjusting means 25 to such a position that the nozzle 1 is positioned as shown and the surface covering undergoing cleaning is lifted from its supporting surface in order that the agitator within the nozzle may function with maximum efficiency.

In the relationship shown in Figure 1 the cleaner end of the dusting tool unit, comprising a converter member 30 and a flexible tubular hose 31 removably attached thereto by manually operable means 32, is attached to the cleaner; the cover plate 5 having been removed that the converter member 30 can extend through the opening 6 and into mating relationship with the eye 4 of the fan chamber 2. Converter member 30 is removably secured in place relative to the fan chamber by outwardly extending lugs 33, 33 each of which is adapted to pass through a similarly shaped opening 34 in the air passageway wall as the converter moves axially in the direction of the eye 4 of the fan chamber. After the lugs 33, 33 have passed completely into the air passageway, and the converter member has made sealing contact with the eye 4 of the fan chamber, it is rotated upon its seat about an axis parallel to the motor shaft 9 until the lugs 33, 33 are positioned below openings 35, 35, shown in Figures 1 and 3, at which time a spring-pressed detent 36 carried by each lug 33 seats in each opening 35. Each detent 36 is slightly greater in size than its seating opening 35 and is rounded at its end, the relationship being such that the exertion of an appreciable rotating force upon the converter member is sufficient to dislocate the detent from its seat and permit the realinement of the lugs 33, 33 with the openings 34, 34 that the converter member may be removed. The springs of the detents also exert a force to hold the converter member to its seat in the fan chamber eye.

In order that the agitator 16 will not contact the surface covering during the use of the dusting tool units a downwardly extending arm 40 is integrally formed on the converter element 30. A second rigid arm 41 is rigidly secured to the wheel-carrying crank shaft 22 and extends upwardly toward the passageway opening 6 and at the side of the passageway 3. The normal position of the arm 41 in on-the-floor cleaning is shown in full lines in Figure 5 and in dotted lines in Figure 1. With a converter member in its first position relative to the fan chamber, that is, with each lug 33 immediately inside its opening 34, the rigid arm 40 on the converter extends to the rear of the arm 41, the exact angular position of which would be varied somewhat by the adjustment of the nozzle height by the aforedescribed adjusting means 25. Upon the rotation of the converter member 30, however, arm 40 contacts and pivots arm 41, rotating the crank shaft counter-clockwise, as viewed in Figure 1, and moving the wheels 19, 19 downwardly. This movement is accomplished with no adjustment in the manual adjusting means 25 as the shaft 22 merely slides in the vertical slot 27 of the arm 24.

In Figure 4 the relationship in which the nozzle has been raised by the insertion of the converter member to its working position is disclosed. With the crank shaft pivoted and the wheels lowered to the position shown in Figures 1 and 4 the nozzle 1 is raised to a height above the floor covering such that the agitator cannot contact therewith.

Referring now to Figures 6 to 9, inclusive, the second preferred embodiment of the invention is disclosed. This embodiment of the invention differs from that aforedescribed in the means by which the converter unit is secured to the cleaner proper, and also in the details by which the nozzle is raised when the unit is attached.

In the present embodiment of the invention the lugs 33, 33 with their spring-pressed detents 36, 36 together with the openings 34 and 35, all of the first described embodiment, have been eliminated. The converter 30 is secured in place relative to the eye 4 of the fan chamber through being provided on its sides with spaced leaf springs 50, 50. The movement of the converter member 30 toward the eye of the fan chamber compresses the springs 50, 50 against the sides of the converter member until the shoulder 51 on each spring has passed through the opening 6 of the passageway 3. Thereafter spring 50 flexes outwardly and the shoulder 51 underlies the edge of opening 6, the outward displacement of the converter member being prevented until the extended outer end of the spring is manually

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compressed moving the shoulder 51 within the diameter of the opening 6.

In place of the cooperating arms 40 and 41 of the last embodiment a linkage system is provided comprising a rigid arm 52 carried by the crank shaft 22. Arm 52 is pivotally attached to a centrally pivoted lever 53, the opposite end of which is pivotally attached to a plunger member 54. Member 54 extends in substantially sealed relationship through an opening 55 in the passageway 3 and is provided at its inner end with an outwardly sloping shoulder or cam face 56 which is adapted to be contacted and moved by the inner end of the converter member 30.

In the cleaner assembled for on-the-floor cleaning with the cover plate 5 in place over the opening 6 in the air passageway 3, and with the front wheels 19, 19 adjusted so that the nozzle 1 is in effective position relative to the surface covering, the relationship of the parts is as shown in Figure 9. The crank-shaft-contacting spring 23 urges the shaft to the top of the slot 27 in the arm 24 and the rigidly carried arm 52 is pivoted downwardly and the cam face of the arm 54 is positioned ahead of the eye 4 of the fan chamber. Upon attachment of the converter member 30, the cover plate 5 having been removed, the inward movement of the converter results in its forward edge contacting the slanting shoulder 56 of plunger 54 and the movement of that member radially outward from the motor shaft axis as the converter member advances towards its seat against the eye. The outward movement of the plunger 54 results in a pivotal movement of the lever 53 and the upward pivotal movement of the arm 52 carried by the crank shaft which accordingly produces a downward movement of the wheels 19, 19, the shaft sliding within the slot 27 in the arm 24. With the converter member positioned in its seat, as shown in Figure 7, the member 54 has been moved to its outer position and the nozzle is raised clear of the covering. Upon the removal of the converter member the lever system, including the plunger 54, returns to its original position, the shaft being raised upwardly in the slot 27 under the pivotal force exerted by the crank-shaft-contacting spring 23, described in connection with the first embodiment.

I claim:

1. In a suction cleaner of the type including suction-creating means, and a driven agitator; means supporting said agitator relative to a surface covering undergoing cleaning, a dusting tool unit adapted to be connected to said suction-creating means, said unit being movable to and from a seating position relative to said means, and cooperating means on said cleaner and on said unit functioning upon the moving of said unit into its seating position to raise said agitator above the surface covering undergoing cleaning.

2. The construction defined by claim 1 wherein the means supporting said agitator relative to the surface covering are combined with means to adjust its height relative thereto, said height-adjusting means being so constructed that the raising of said agitator upon the seating of said unit is accomplished without change in said height-adjusting means.

3. In a suction cleaner of the type including a portable body, suction-creating means, and agitating means; means supporting said agitating means relative to a surface covering undergoing cleaning, means to adjust the height of said supporting means relative to said agitating means, a dusting tool unit adapted to be connected to said body and to said suction-creating means, means to lock said unit to said body upon moving said unit to a certain position, and means on said unit to operate said adjusting means to raise said agitator relative to said surface upon the moving of said unit to locking position.

4. In a suction cleaner of the type including a body, suction-creating means in said body, and an agitator carried by said body; means movably supporting said body, manually adjustable means to adjust said supporting means to raise and lower said body and agitator relative to the surface covering, additional means to adjust said supporting means independently of said manually adjustable means, a dusting tool unit adapted to be connected to said body and to said suction-creating means and to be locked relative thereto in a certain position, and means operative upon said unit being adjusted to its locked position to actuate said additional means to raise said body and agitator relative to the surface covering undergoing cleaning.

5. The construction defined by claim 4 characterized by the fact that said body includes a nozzle, that said agitator is positioned in said nozzle, that said manually adjustable means adjusts said nozzle relative to the surface covering undergoing cleaning within a range of working positions, and in that said additional adjusting means moves said nozzle to a position outside its working range.

6. The construction defined in claim 4 characterized by the fact that the variation of body height and agitator height by said additional adjusting means is accomplished without change in said manually adjustable means.

7. The construction defined by claim 4 characterized by the fact that said unit is turned upon its seat on said body in order to move it to locking position.

8. In a suction cleaner of the type including a body having a nozzle, agitating means in said nozzle, suction-creating means connected to said nozzle, supporting means including a crankarm with wheels, and adjusting means to pivot said crankarm to vary the height of said nozzle and agitating means relative to the surface covering undergoing cleaning, said body being provided with a dusting tool unit seat; a rigid arm member connected to said crankarm and extended adjacent said seat, a dusting tool unit adapted to be connected to said body on said seat, said unit being adapted to be locked relative to said body in a certain position, said unit being formed with a rigid arm member so positioned that it extends into the space normally occuped by the rigid arm member carried by said crank shaft with said nozzle positioned for floor cleaning, said rigid arm on said crank shaft being movable from the path of said rigid arm on said unit upon the pivoting of said crank shaft to raise said nozzle.

9. The construction recited by claim 8 characterized by the fact that said dusting tool unit contacts its seat with said arms spaced and is rotated on its seat to locking position, the arm on said unit contacting and moving the arm on said crankshaft thereby raising said nozzle when said unit is so rotated.

10. In a suction cleaner, suction-creating means, an agitator, a body including a dusting tool seat, means to support said agitator above a surface covering undergoing cleaning, and means to adjust said supporting means to raise and lower

said agitator; a movable member obstructing said dusting tool seat, and means connecting said obstructing member to said agitator-supporting means to move same, and a dusting tool unit adapted to contact and force said obstructing member from its path and seat on said seat, the movement of said obstructing member resulting in the lowering of said supporting means and the raising of said agitator out of contact with the surface covering undergoing cleaning.

11. In a suction cleaner of the type adapted for on-the-floor and off-the-floor cleaning, suction creating means, agitating means arranged for on-the-floor cleaning, means to convert said cleaner from an on-the-floor unit to an off-the-floor unit, and means on said cleaner to raise and lower said agitating means, and means to actuate said last mentioned means upon the conversion of said cleaner to an off-the-floor unit to raise said agitating means from contact with a supporting surface covering.

12. In a suction cleaner, air moving means, an air passageway connected to said means, a second air passageway adapted to be connected to said means and movable relative thereto, means to support said first-mentioned air passageway, and means interconnecting said last-mentioned means and said second air passageway and operated by said second air passageway upon its movement to adjust said supporting means to vary the position of said first-mentioned air passageway relative to the supporting surface.

13. In a suction cleaner, suction-creating means, an air passageway connected to said means having an inlet adapted to contact a surface covering undergoing cleaning, a second air passageway connected to said means and movable relative thereto while so connected, and means to change the position of said first-mentioned air passageway relative to the supporting surface being controlled by said second air passageway, said last-mentioned means comprising adjustable supporting means and means connecting said supporting means to said second air passageway.

14. In a suction cleaner, suction-creating means, a nozzle, an auxiliary air passageway connected to the intake of said means and movable between certain positions while so positioned, and means comprising surface-contacting means and power-transmission means operated by said auxiliary air passageway to raise said nozzle relative to a supporting surface upon the movement of said auxiliary air passageway to a certain position.

15. In a suction cleaner having suction-creating means, a body having a dusting tool seat open to said means, a surface-contacting agitator carried by said body, and means to support said agitator above a surface covering undergoing cleaning; a movable member obstructing said seat in certain positions, means to adjust said agitator-supporting means and said movable member, said agitator-supporting means being connected to said movable member, whereby upon the movement of said obstructing member to a non-obstructing position said supporting means moves to certain positions.

16. In a suction cleaner of the type adapted for on-the-floor and for off-the-floor cleaning, air moving means, a nozzle for on-the-floor cleaning connected to said means, means to convert said cleaner from an on-the-floor unit to an off-the-floor unit, means to support said nozzle relative to a surface covering undergoing cleaning, and means interconnecting said supporting means and said converting means to move said supporting means upon the conversion of said cleaner to an off-the-floor unit to raise said nozzle from contact with a supporting surface covering.

17. In a suction cleaner of the type adapted for on-the-floor and for off-the-floor cleaning, air-moving means, a nozzle for on-the-floor cleaning connected to said means, means obstructing the conversion of said cleaner from an on-the-floor unit to an off-the-floor unit, means to position said nozzle relative to a surface covering undergoing cleaning, and means interconnecting said conversion-obstructing means and said nozzle-positioning means, characterized in that said interconnecting means insures the positioning of said conversion-obstructing means in inoperative position and the positioning of said nozzle-positioning means to support the nozzle above and out of contact with a supporting surface at the same adjustment.

18. In a suction cleaner of the type adapted for on-the-floor and for off-the-floor cleaning, air-moving means, a nozzle for on-the-floor cleaning connected to said means, means obstructing the conversion of said cleaner from an on-the-floor unit to an off-the-floor unit, means to position said nozzle relative to a surface covering undergoing cleaning and connected to said conversion obstructing means for conjoint movement, characterized in that with said nozzle-positioning means supporting said nozzle above and entirely out of operative relationship with a supporting surface covering said conversion-obstructing means is in an inoperative position.

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