Nov. 4, 1952 W. A. HUMPHREY 2,616,116

SUCTION CLEANER NOZZLE ADJUSTMENT AND CONVERTER GUIDE

Original Filed Sept. 16, 1944 2 SHEETS—SHEET 1

Fig. 1

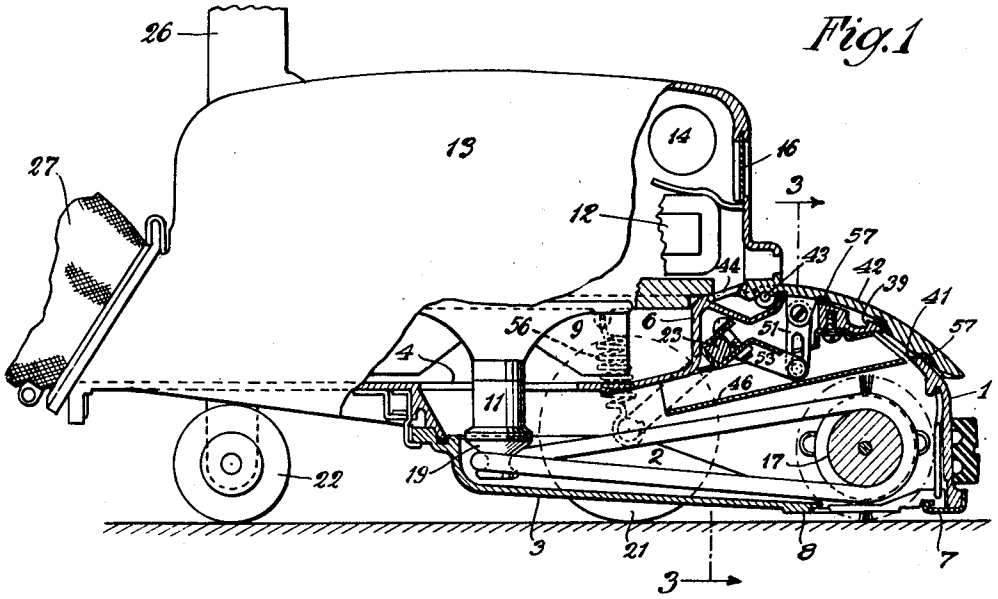
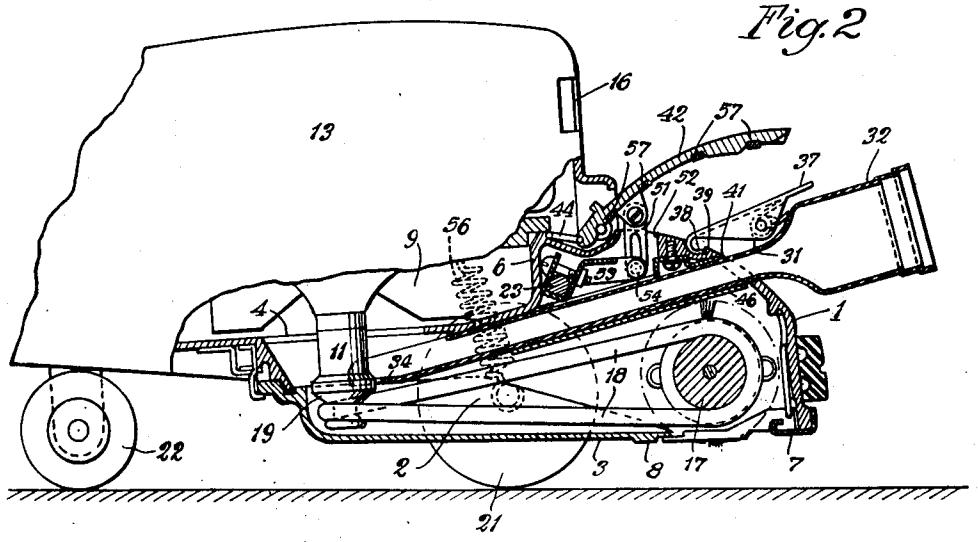


Fig. 2



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Fig. 3

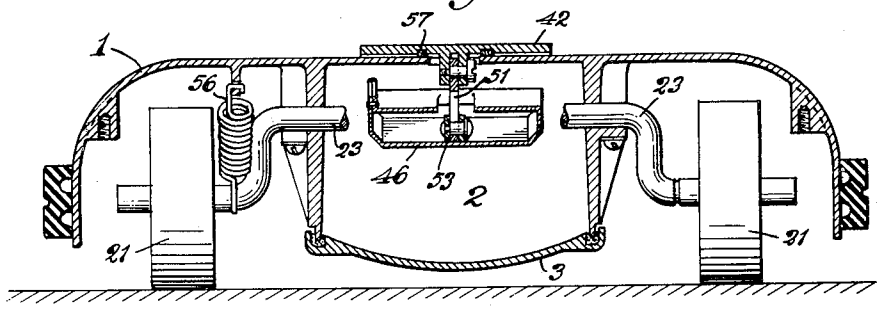


Fig. 4

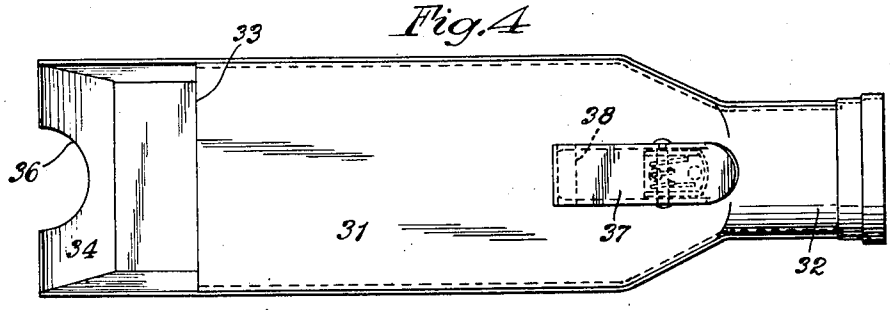


Fig. 5



Fig. 6

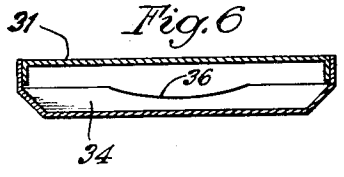


Fig. 7

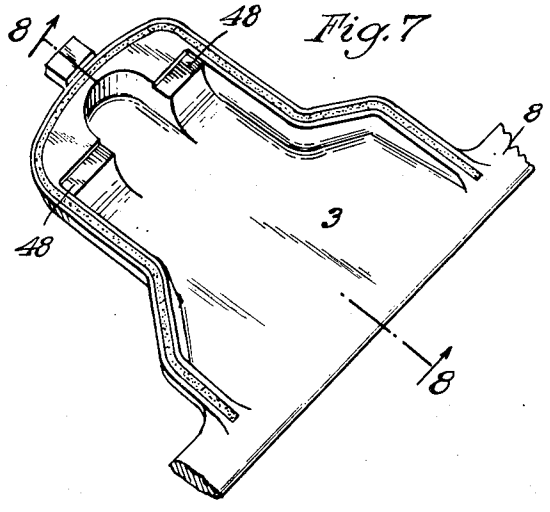
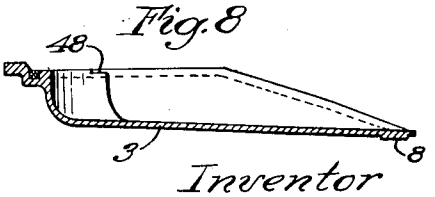


Fig. 8



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2,616,116

SUCTION CLEANER NOZZLE ADJUSTMENT AND CONVERTER GUIDE

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Original application September 16, 1944, Serial No. 554,379, now Patent No. 2,517,670, dated August 8, 1950. Divided and this application May 21, 1948, Serial No. 28,475

5 Claims. (Cl. 15—333)

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This application is a division of my co-pending application Serial No. 554,379, filed September 16, 1944, now Patent No. 2,517,670, directed to a suction cleaner having means to seat a converter when the cleaner is employed for off-the-floor cleaning.

The present invention relates to suction cleaners in general and more particularly to a new and novel construction for converting the cleaner from an on-the-floor unit to an off-the-floor unit.

It is an object of the present invention to provide a new and improved suction cleaner. Another object of the invention is to provide new and improved conversion means in a suction cleaner for converting from on-the-floor to off-the-floor cleaning. A further object is to provide a construction for raising the nozzle into an inoperative position by moving a converter port cover to its open position to receive a converter for off-the-floor cleaning. 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.

Figure 1 is a side view, partly in section, of a cleaner constructed in accordance with the present invention in its on-the-floor cleaning relationship;

Figure 2 is a side view of the cleaner illustrated in Figure 1 with the dusting tool converter inserted, the nozzle raised to inoperative position, and the machine in its off-the-floor cleaning relationship;

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

Figure 4 is a top view of the converter element per se;

Figure 5 is a side view of the converter element per se;

Figure 6 is a section through the converter element upon the section 6—6 of Figure 5;

Figure 7 is a partial top view of the removable bottom plate of the air passageway connecting the nozzle with the suction-creating fan;

Figure 8 is a section upon the line 8—8 of Figure 7.

Today the modern suction cleaner must be designed for the cleaning of floor coverings and also for the cleaning of articles positioned thereabove. A preferred type of suction cleaner to which this invention relates is provided with a permanent floor-cleaning nozzle which, in the on-the-floor cleaning operation, moves at all times in operative relationship with the surface covering undergoing cleaning. The machine is adapted to be propelled by the operator through the exertion of a force upon the cleaner handle and the entrance of cleaning air into the nozzle, in cooperation with the agitation function performed by the agitator positioned therein, dislodges and removes the foreign material from the surface covering undergoing cleaning. In order to clean the articles positioned at a level higher than the floor the machine is adapted to be converted into an off-the-floor cleaner by the insertion of a converter element. In accordance with the present invention this converter element is inserted easily and readily into a normally covered aperture in the top front wall of the cleaner nozzle. Through this wall the converter element extends rearwardly to contact the contoured walls of the air passageway connecting the nozzle with the fan chamber to make sealing contact therewith in order to prevent substantially all air flow from the nozzle to the fan chamber. The arrangement is such that the belt connecting the motor shaft with the agitator in the nozzle continues to drive the agitator. However, the nozzle end of the machine having been raised by the movement of the port closure to open position, the agitator rotates out of contact with the surface covering position therebelow. The construction is simple and is easily operated.

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Referring to the drawings a suction cleaner constructed in accordance with the present invention is illustrated in Figure 1 in its on-the-floor cleaning relationship. The cleaner body is seen to comprise a nozzle 1 which is interiorly connected by an air passageway 2, including a removable bottom plate 3, to the eye 4 of the fan chamber 6. Nozzle 1 is provided with surface-contacting front and rear lips 7 and 8 through which cleaning air is drawn into the nozzle. This air passes through the air passageway 2 and into the fan chamber 6 under the suction effect created by the rotation of a suction-creating fan 9 carried upon the lower end of the shaft 11 which forms a part of the driving motor 12. The latter is positioned within the enclosing casing 13 immediately above the fan chamber 6. An electric light 14 is provided within the housing 13 and is positioned adjacent a window 16 that light rays may be directed over the cleaner nozzle 1 and forward of the machine in order that the operator can better see the surface covering to be cleaned.

Within the nozzle 1, and directly above the mouth as defined by the surface-contacting lips 7 and 8, is a rotary agitator 17 which includes

suitable surface-contacting elements of the rigid beater and flexible brush types. Agitator 17 is connected by means of a power-transmitting belt 18 to a pulley 19 at the lowermost end of the motor shaft 11 and the agitator rotates at all times upon the rotation of the motor shaft 11 and the fan 9. Agitator 17 functions to dislodge, by brushing and beating, all foreign material positioned within a surface covering contacted by the nozzle lips 7 and 8.

The cleaner is movably supported upon front and rear wheels 21 and 22, the former being mounted upon the extremities of a crank shaft 23 pivotally mounted in the cleaner casing and extends across the interior of the air passageway 2 immediately forward of the front of the fan chamber 6. A pivoted handle through which the operator can exert a propelling force is provided, the lower extremity thereof being shown in Figure 1, and being indicated by the reference character 26. A filter bag 27 is removably attached to the rear of the cleaner body in such position as to receive interiorly the dirt-laden air stream from the nozzle 1 which is exhausted by the suction-creating fan 9 after passing through the fan chamber 6.

With the cleaner functioning as an on-the-floor cleaner the parts are arranged as illustrated in Figure 1. The motor shaft 11 rotates, thereby driving the suction-creating fan 9 and the agitator 17. Cleaning air is drawn into the nozzle, the surface covering is lifted into contact with the lips 7 and 8 and is thereupon contacted by the rotating agitator 17. The agitator dislocates the foreign material and the moving air stream carries it through the air passageway 2, into the fan chamber 6, and exhausts it into the filter bag 27.

To transform the machine into an off-the-floor cleaner certain additional constructional features are provided. In the off-the-floor cleaning operation a dusting tool unit of well known design comprising a long flexible hose is connected to the cleaner by means of a converter element, the hose carrying at its outer end a second cleaning nozzle of any common type which the operator moves about and over the object to be cleaned. This general relationship is well known. The converter element 31 is illustrated in Figures 4, 5 and 6 and is seen to comprise a flattened main portion having a substantially rectangular cross-section. At one end the main body portion is provided with a hose-seating portion 32 which is preferably cylindrical and on which the dusting tool hose is retained in any suitable manner. At its opposite end the main body portion is seen to be somewhat scoop-like in form, the top wall ending far back of the lower wall at 33 while the side and bottom walls extend therebeyond, the extreme forward end of the bottom wall being slanted upwardly at 34 to provide an abutting base and also being cut-out at 36 in order to extend around and more closely to the motor shaft 11, as will become apparent. The converter element is also provided with a pivoted retaining latch 37 upon its surface which has a hooked forward end, as indicated at 38.

To receive and seat the dusting tool converter element the cleaner proper is provided with a converter port 41 in the front top wall of the nozzle 1 which port is normally closed by a cover or closure plate 42 pivoted at 43 and held, by means of an overcenter spring 44, in either the closed position of Figure 1 or the open position of Figure 2.

A converter casing 46 extends inwardly from the port 41 through the nozzle 1 and into the air passageway 2 extending adjacent and below the forward portion of the fan chamber 6. Casing 46 is of a size adapted to make a sliding sealing fit about the main portion of the converter element 31 and to guide that element, when inserted through the port 41 in the manner illustrated in Figure 2, rearwardly and downwardly to a point at which the forward end 34 thereof is positioned with cut-out portion 36 closely enclosing the drive shaft 11.

To receive and seat the forward lower end of the converter element 31 and to cooperate therewith in substantially sealing the air passageway and so the nozzle 1 from the eye 4 of the fan chamber 6 the bottom wall 3 of the air passageway 2 is contoured adjacent the shaft 11 as illustrated in Figures 7 and 8.

A raised transversely extending platform at each side of the driving pulley 19 and formed in the bottom plate 3 seats and cooperates with the forward portion 34 of the converter 31 to form a substantial seal excepting only leakage around the pulley. The bottom wall curves closely about the lower end of the shaft 11, as does the forward end of the converter at 36, and the cooperative relationship is such that with the converter element in place a substantial seal with but slight leakage is provided, it being noted that adjacent the fan eye and at the line at which the converter element seats upon the bottom plate that plate has a width which is adapted to closely enclose the side walls of the converter element.

Upon conversion to off-the-floor cleaning the cleaner may remain for a considerable period of time in a single place upon the surface covering. Under such conditions it is desirable that the cleaner nozzle be lifted out of contact with the covering. To accomplish this result in the cleaner constructed in accordance with the present invention the pivoted closure plate 42 is connected by a linkage with the crank shaft 23 which carries the front wheels 21. As is clearly illustrated in Figures 1 and 2 a pivoted link 51 is carried by the closure plate 42 and is adapted to move upwardly through a second aperture 52 in the top wall of the nozzle when the plate 42 is pivoted to its open position, as illustrated in Figure 2. The lower end of link 51 slidingly encloses a pivot pin 54 carried by a bracket 53 nonrotatably fixed upon the central portion of the crank shaft 23. The crank shaft is at all times spring urged to raise the wheels and to lower the nozzle by a coil spring 56. Upon the operator pivotally moving the closure plate 42 to its open position, as illustrated in Figure 2, the link 51 pivots the bracket 53 which thereupon turns the central portion of the crank shaft 23 thereby pivoting the wheels 21 downwardly, against the force of spring 56, and so raises the nozzle. With the closure plate 42 in the closed position, as illustrated in Figure 1, the link 51 and bracket 53 extend into the unused converter casing 46 thereby economizing space. With the closure plate 42 moved to the open position, as illustrated in Figure 2, the linkage is spaced above the converter casing 46 which is then open to the converter element. The latter is retained in place by the cooperation of the hooked end 38 of the latch 37 with an abutment 39 positioned upon the nozzle wall. To prevent air leakage the cover

plate 42 is provided with air seals at 57 which contact the boundaries of the apertures 41 and 52 with the closure plate in closed position.

I claim:

1. In a suction cleaner of the type having a body including a nozzle, suction-creating means, and an air passageway connecting said nozzle and suction-creating means; an opening in the top wall of the nozzle for receiving a converter, a movable closure for said opening, means for supporting the nozzle relative to a supporting surface and having a portion of said means extending through the air passageway, linkage means for connecting said closure to said supporting means, and a casing in the air passageway for receiving a converter, said linkage means when said closure is in its closed position having a portion disposed in said casing, movement of said closure to its open position shifting said portion of said linkage means out of said casing to permit insertion of the converter in said casing for connection with the suction-creating means and effecting movement of said supporting means relative to the nozzle for raising the latter with respect to the supporting surface.

2. In a suction cleaner of the type having a body including a nozzle, suction-creating means, and an air passageway connecting said nozzle and suction-creating means; an opening in the top wall of the nozzle for receiving a converter, a movable closure for said opening, spaced wheels supporting said nozzle on a supporting surface, a crank shaft carrying said wheels and having a portion extending through said air passageway, linkage means connecting said closure to said crank shaft, and a casing in the air passageway for receiving a converter, said linkage means when said closure is in its closed position having a portion disposed in said casing, movement of said closure to its open position shifting said portion of said linkage means out of said casing to permit insertion of the converter in said casing for connection with the suction-creating means and actuating said linkage means and crank shaft to move said wheels relative to the nozzle to raise the latter from the supporting surface.

3. A suction cleaner comprising a body including a nozzle, suction creating means, and an air passageway between said nozzle and said suction creating means, a port in the top wall of said nozzle for receiving a converter, a closure for said port, means pivotally mounting said closure on said body for movement from closed position to an open position exteriorly of said air passageway, a pair of wheels supporting said nozzle with respect to a supporting surface, a crank shaft for said wheels and movably mounted on said body, linkage means connecting said closure to said crank shaft for movement of the latter upon said movement of said closure to its open and closed positions, movement of said closure to its said open position exteriorly of said air passageway operating said linkage means and crank shaft to move said wheels with respect to said body to raise said nozzle from the supporting surface for off-the-floor cleaning, said closure when in said open position uncovering said port for free insertion of a converter into said air passageway in communication with said suction creating means, and over-center spring means connected to said closure with respect to said closure pivot independently of said linkage means for maintaining said closure in its said open position and thus said wheels and nozzle in said position for off-the-floor cleaning.

4. In a suction cleaner of the type having a body including a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye, a vertical motor shaft extended through said fan eye into said air passageway, a fan on said shaft in said chamber, a pulley on said shaft in said air passageway and spaced from said fan eye, an agitator rotatably mounted in said nozzle, and a belt in said air passageway connecting said agitator and pulley; a port in the top wall of said nozzle above said agitator for receiving a converter, a closure movably mounted on said body for said port, a converter guide in said air passageway above said belt and said agitator and defining a guiding path for the converter from said port toward said fan eye above said pulley, wheel supporting means movably mounted on said body for supporting said nozzle with respect to a surface, means connecting said closure to said wheel supporting means for movement of the latter by said closure, movement of said closure to its open position actuating said wheel supporting means to raise said nozzle above the surface, said closure when in its open position uncovering said port and converter guide for inserting the converter, said guide directing the converter above said belt and pulley into communication with said fan eye.

5. In a suction cleaner of the type having a body including a nozzle, a fan chamber having a fan eye, a suction air passageway between said nozzle and fan eye, a motor driving a fan in said chamber and a pulley in said air passageway, an agitator rotatably mounted in said nozzle and a belt in said passageway connecting said agitator and pulley; a port in the top wall of said nozzle above said agitator for receiving a converter, a closure movably mounted on said body for said port, a converter guide in said air passageway above said belt and said agitator to define a guiding path for the converter from said port to said fan eye above said pulley, spaced wheels supporting said nozzle and agitator with respect to a surface, a crank shaft carrying said wheels and having a portion extending through said air passageway, linkage means in said air passageway connecting said closure to said crank shaft, movement of said closure to its open position actuating said linkage means and crank shaft to move said wheels downwardly to raise said nozzle and agitator above the surface, said closure when in its open position uncovering said port and converter guide for inserting the converter, said guide directing the converter above said belt into communication with said fan eye.

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