Oct. 3, 1939. B. C. BECKER 2,174,560

SUCTION CLEANER

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Fig. 1

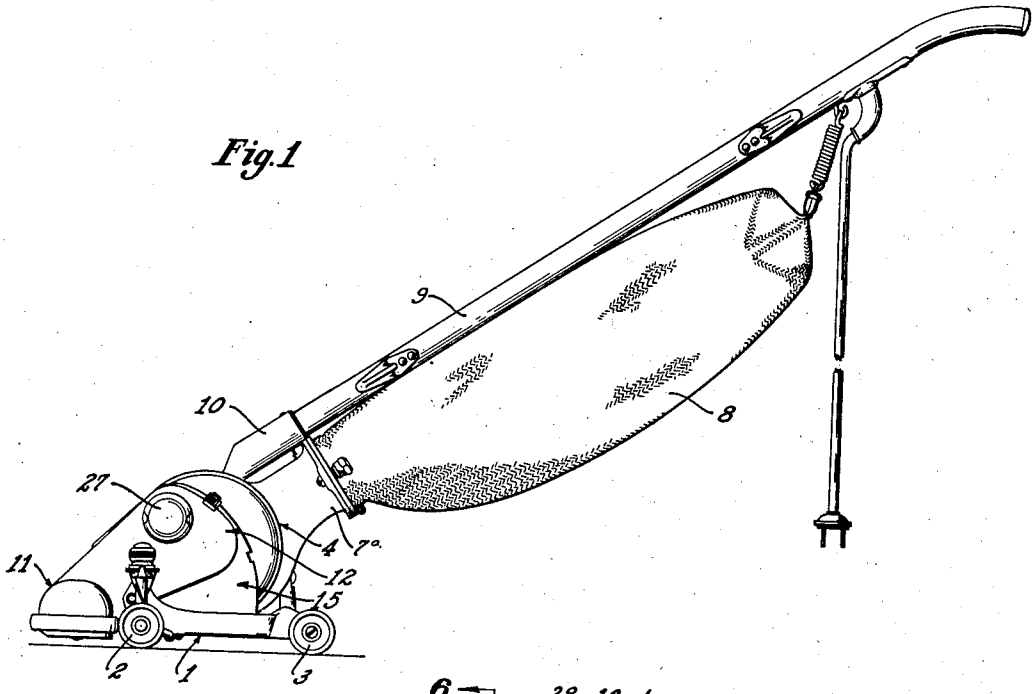
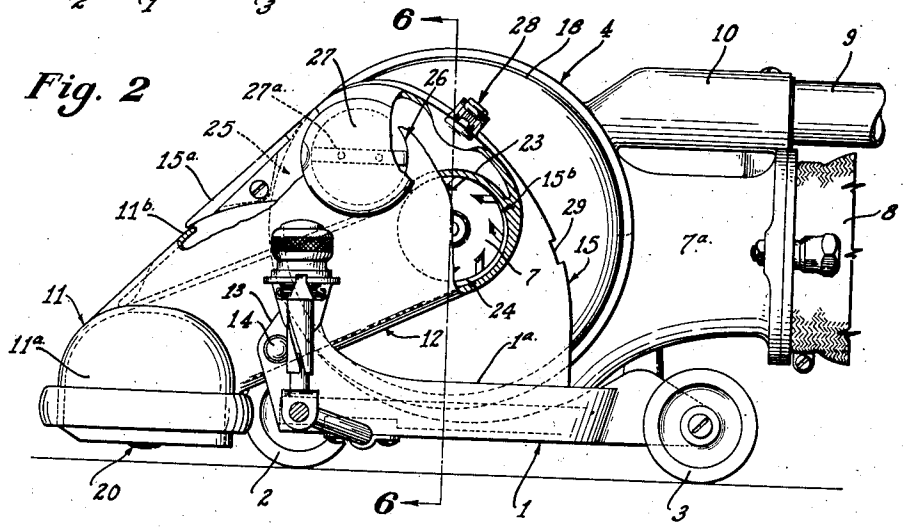


Fig. 2



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SUCTION CLEANER

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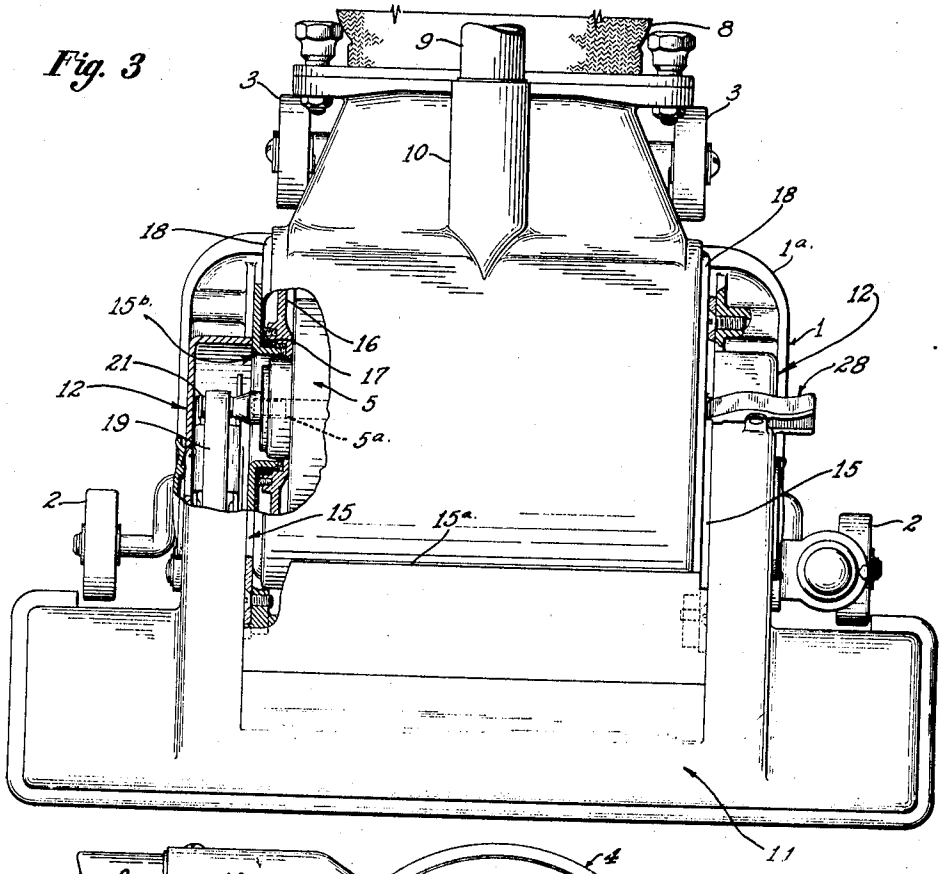
Fig. 3



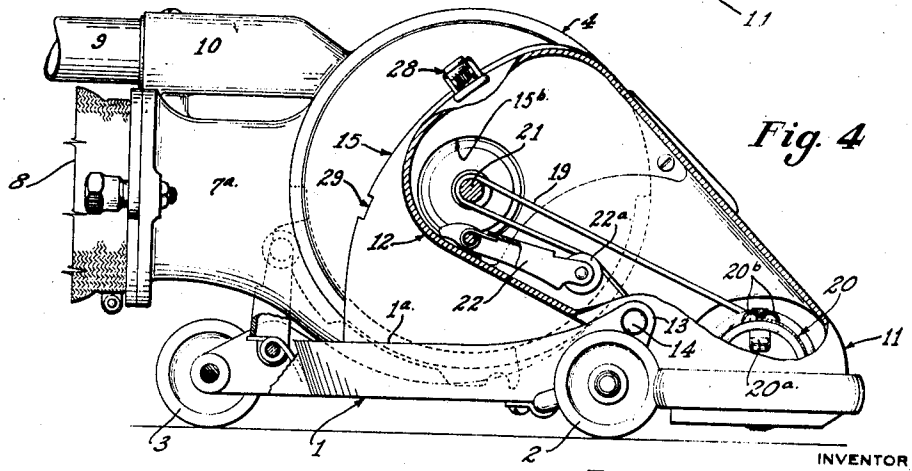


Fig. 4

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SUCTION CLEANER

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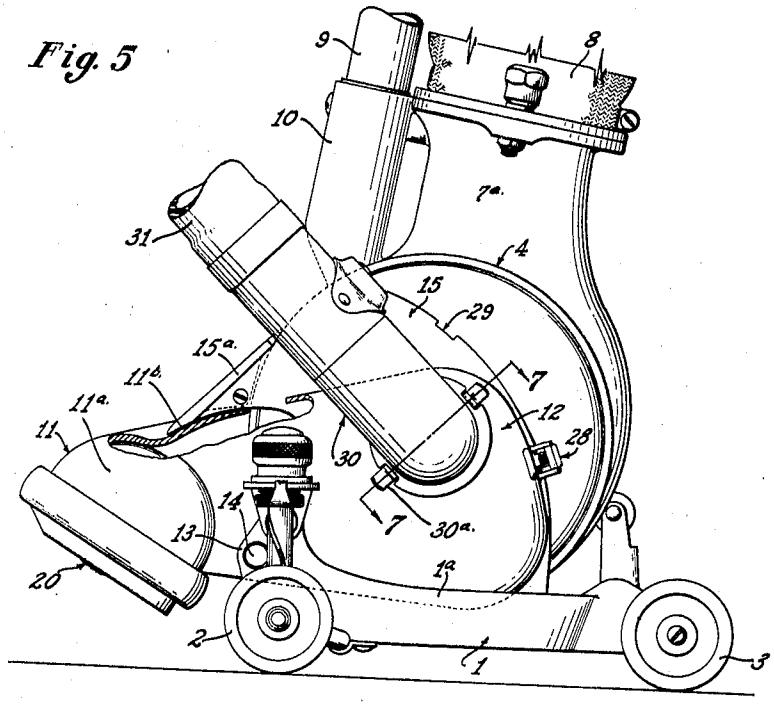
Fig. 5



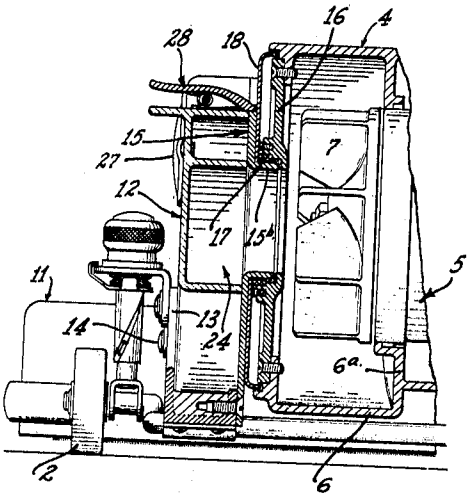


Fig. 6

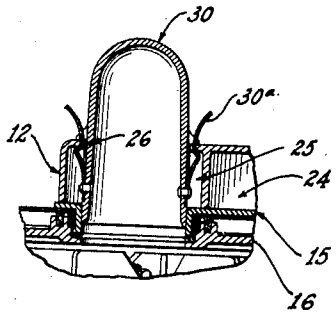


Fig. 7

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SUCTION CLEANER

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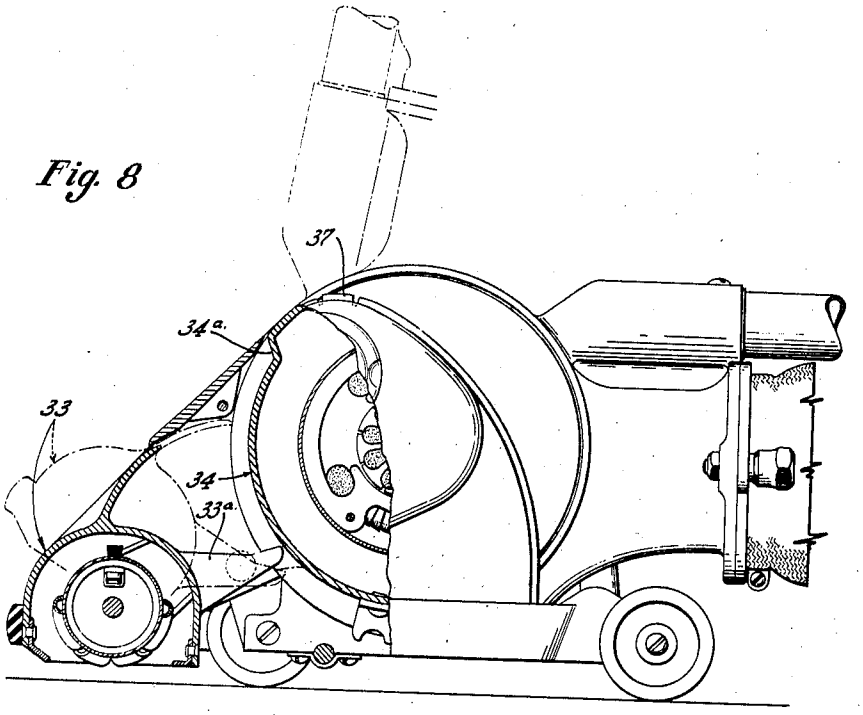
Fig. 8



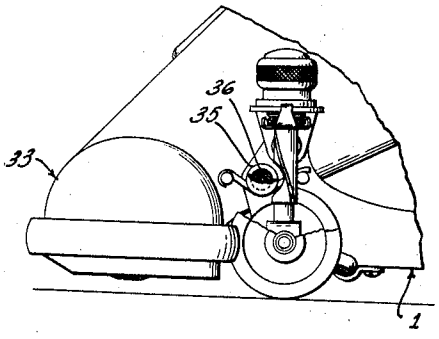


Fig. 9

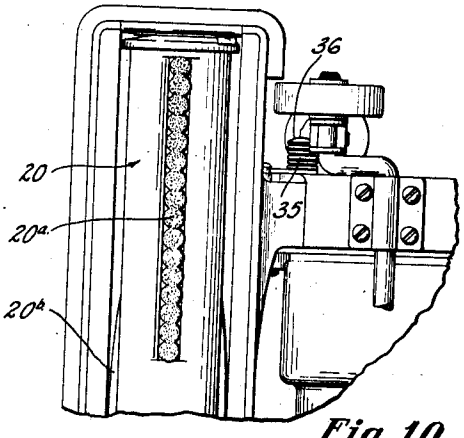


Fig. 10

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UNITED STATES PATENT OFFICE

2,174,560

SUCTION CLEANER

Bernard C. Becker, Canton, Ohio, assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application December 7, 1936, Serial No. 114,633

12 Claims. (Cl. 15—9)

This invention relates to improvements in suction cleaners and more particularly to suction cleaners of the portable handle-maneuvered type, capable of being converted into a suction producing unit for carrying on cleaning operation through a hose extension and auxiliary dusting tools.

The type of suction cleaner embodying the novel features hereinafter to be set forth may be characterized generally by a cylindric housing which forms a combined motor casing and fan chamber, this housing being rotative about its central axis extending horizontally and transversely of the cleaner and journalled at its ends in trunnion-like supports forming integral parts of a carriage carrying the main nozzle of the cleaner. This type of suction cleaner may also be characterized by the mounting of the handle directly upon the rotative housing so that the two swing together and as parts of the same unit that includes the dirt bag attached at its lower end to an exhaust outlet from the fan chamber and its outer end to the handle.

This so-called handle rotative horizontal axis motor and fan housing arrangement has been shown and described in an earlier application to Chandos Burkhardt filed January 31, 1934, and bearing Serial No. 709,073, but the present disclosure embodies an improved feature, namely, a nozzle that is capable of being tilted bodily upward from its normal position with respect to the carpet surface, as a necessary step in the conversion of the cleaner to off-the-floor operation and for the following reasons:

The cleaning effectiveness of a suction cleaner is materially increased by mounting a rotary agitator in the nozzle chamber, the same preferably having the form of a cylinder with brush and beater elements projecting from the surface thereof. The agitator extends lengthwise of the suction mouth and otherwise positioned so that the beater and brush elements come into contact with the carpet surface in the normal operation of cleaning rugs and carpets. However, when the cleaner is operating with auxiliary dust tools, it may stand at one place on the carpet for some length of time and unless the contact between the carpet and agitator is interrupted, there is likelihood of undue carpet wear. Consequently, it is desirable either to temporarily disconnect the agitator from the motor or to raise the nozzle above its normal operating level during the converted operation of the cleaner. It may be added in this connection, that manually operative devices have been in common use for raising the nozzle portion of the cleaner bodily above the floor level, but manifestly the manipulation of these devices and hence the safeguarding of the carpet or rug against possible injury, depends entirely upon the care exercised by the operator in making this precautionary adjustment.

The object of the present invention is to eliminate the uncertain dependence upon the user by making it compulsory to raise the nozzle out of contact with the carpet surface before it is possible to make the conversion to dusting tool operation. In other words, the converter and nozzle raising means are so associated that the conversion automatically includes the nozzle raising, all of which will now be described in greater detail and in connection with the accompanying drawings in which,

Figure 1 is a general view in side elevation of a complete cleaner type and including the novel features hereinbefore alluded to,

Figure 2 is an enlarged view in side elevation showing the main part of the cleaner with the nozzle in its normal relation to the carpet surface,

Figure 3 is a top plan view of the cleaner with portions of the outer walls removed to show the internal construction,

Figure 4 is a view in side elevation taken from the opposite side of the cleaner from that shown in Figure 2, and with portions of the side wall removed to show the belt drive for the agitator,

Figure 5 is another view in side elevation corresponding to the showing of Figure 2, but with the cleaner adjusted for dusting tool operation, namely, with the handle in its upright or storage position, the converter member attached and the nozzle in its elevated position,

Figure 6 is a fragmentary view in vertical section through the fan chamber of the cleaner as taken on line 6—6 of Figure 2,

Figure 7 is a detail view in cross section through the converter port showing the converter member in position as taken on line 7—7 of Figure 5.

Figure 8 is a view in side elevation of the same type of cleaner, but showing a slightly modified arrangement for lifting the nozzle.

Figure 9 is a fragmentary view of the cleaner showing in detail the nozzle portion of the cleaner casing in side elevation and,

Figure 10 is a fragmentary bottom plan view of the portion of the cleaner immediately adjacent one end of the nozzle.

Referring first to the general design of the suction cleaner embodying the novel features of the present disclosure, the same comprises a carriage 1 consisting generally of a horizontal U-shaped frame extending transversely beneath the body of the cleaner with its open side facing forwardly. At the front and rear ends of the carriage frame 1a are mounted pairs of supporting wheels 2 and 3 respectively, positioned well outwardly along the sides of the cleaner as shown in Figure 3. Supported by the carriage

is a cylindric housing 4 forming a casing at one end for the motor 5, the space adjacent the opposite end forming a fan chamber 6 separated from the motor casing by a transverse partition wall 6a, as shown in Figure 6. A suction fan 7 directly connected with the motor 5 is located within the fan chamber, the latter including a radially projecting exhaust passage 7a terminating in a flanged connection to which a dirt bag 8 is removably attached at its lower end and suitably suspended at its upper end from the handle 9 as clearly shown in Figure 1. The handle, preferably of a tubular form, is supported within a socket 10 formed integral with the rotative housing 4 and extending substantially tangentially therefrom in parallel relation with and just above the exhaust outlet 7a as shown in Figure 2.

Carried by the carriage 1 and having pivotal connection therewith, is a nozzle casing 11 which comprises not only the main nozzle or nozzle chamber 11a extending transversely of the front of the cleaner, but also a pair of transversely spaced hollow sections 12, 12 extending rearwardly and upwardly from the main part of the nozzle casing and embracing the cylindric housing 4 between them, although, as will presently be pointed out, there is no direct or operative connection between housing 4 and the nozzle casing 11, inasmuch as they are independently supported upon the wheeled carriage 1. Briefly, the nozzle casing 11 is pivotally hung or suspended between two upstanding brackets 13, 13 formed integral with the forward ends of the carriage frame 1a and located just inwardly from the front wheels 2. Pivot pins 14, 14 pass through the upper ends of the brackets 13, 13 and are anchored in the side walls of the casing just rearwardly of the nozzle chamber and along the lower edge of the rearwardly extending sections 12, 12, as clearly shown in Figure 6.

Referring now to the trunnion mounting of the motor and fan housing 4 upon the carriage 1, the latter is provided with a pair of upstanding bearing plates 15, 15 fastened along the sides of the carriage frame 1a and lying in vertical planes just outwardly from the ends of the rotative housing 4. As clearly shown in Figure 2 these bearing plates are somewhat irregular in contour, extending vertically from the rear of the carriage frame, thence curving forwardly in an arc of 45 degrees to form a sector passing above the central axis of the housing 4 and upon reaching a point tangential with the periphery of the said housing, continued downwardly and forwardly for a short distance in straight edges inclined at angles of 45 degrees to the vertical, and supporting a transverse closure plate 15a which covers the cavity formed between the cylindric surfaces of the housing 4 and the rounded lip 11b projecting upwardly and rearwardly from the nozzle chamber between the sections 12, 12.

Spaced inwardly from the arcuate sectors of the bearing plates 15, 15 which are parallel and substantially coincident with the curved upper ends of the casing section 12, 12, are annular openings 15b, 15b concentric with the central axis of the housing 4 and formed by inwardly turned annular flanges.

At each end of the housing 4 is an annular end plate 16 having a central opening concentric with and located just inwardly beyond the flanged openings 15b, 15b in the bearing plates 15, 15. Moreover, the end plates 16, 16 are provided with annular bearing rings 17 which surround the flanges defining the openings 15b, 15b, in the bearing plates and with sealing plates 18 of thin metal fastened to the inner faces of the bearing plates 15, 15, complete the trunnion bearings at each end of the rotative housing 4, as clearly shown in Figures 3 and 6.

At this point it should be noted that while the construction and design of the cleaner is generally the same on opposite sides including the mounting of the rotative housing and the tiltable nozzle with its rearwardly extending sections 12, 12, it should be pointed out that functionally the two sides of the cleaner are essentially different. Thus at the fan or air inlet side of the cleaner, the hollow section 12 of the nozzle casing forms an air passage from the nozzle chamber to the opening to the fan chamber or "fan eye", although it should be noted that the inner sides of these sections are entirely open, but with the bearing plates 15, 15 in sealing contact with the edges of the transverse walls, fairly tight passages are formed. On the opposite side of the cleaner the corresponding section 12 likewise communicates with the nozzle chamber but serves only as a housing for a belt 19 for driving the agitator 20 extending lengthwise of the nozzle chamber and suitably journalled at its ends for comparatively high speed operation. This belt 19 is driven from a pulley 21 forming an extension of the motor armature shaft 5a, and which, as clearly shown in Figure 3, projects or extends through the annular opening 15b in the adjacent bearing plate 15 and into the upper end of the casing section 12 just beyond. And finally, co-acting with the belt 19 is a belt tensioning member 22 mounted within the section 12 and arranged lengthwise along its bottom wall. This tensioning member consists essentially of a spring-pressed arm carrying a roller 22a contacting the lower lead of the driving belt 19 and serves to maintain the belt tight for reasons that presently may be seen.

The agitator 20, of a standard design and construction, consists primarily of a cylindric metal shell provided with longitudinal brush elements 20a and helically arranged beater elements 20b in the form of rounded bars on its outer surface. A recessed annular belt groove in the agitator shell carries the driving belt 19.

Returning now to the inlet side of the cleaner, attention is directed to Figure 2, wherein the air passage formed within the casing section 12 is shown as being divided substantially lengthwise by an integral partition of the wall 23 which starts at its forward end in a line tangential to the dome-like top wall of the nozzle chamber, thence upwardly and rearwardly substantially parallel with the bottom wall of the section and finally terminating in a rounded arcuate wall section which merges with the bottom wall section of the casing section to complete a semi-circular closure around the upper half of the opening 15b to the fan chamber. This internal partition wall thus divides the internal space of the hollow casing section 12 into a passage 24 of uniform area directly connecting the nozzle chamber with the fan chamber and a somewhat triangular shaped space 25 which is entirely closed off from the nozzle chamber but has an annular opening 26 from the exterior, although normally this opening is closed by a removable circular cover plate 27 held in place by a suitable retaining spring 27a riveted to its inner face. This covered opening 26 is of the same diameter

as the opening 15b to the fan chamber and forms the port into which the converter member is inserted in the operation of converting the cleaner to off-the-floor operation as will presently be explained.

Now, in the normal operation of the cleaner, that is to say, when the cleaning is carried on through the main nozzle, the dirt-laden air is carried directly to the fan chamber through the connecting passageway 24 within the casing section 12, and thence exhausted in the dirt bag 8 in the usual manner. Moreover, during the normal operation of the cleaner, the nozzle casing is held stationary with the suction mouth thereof parallel with and in contact with the carpet surface, notwithstanding it is mounted to swing bodily about its pivot points 14 from the position shown in Figure 2 to that in Figure 5 and by merely pressing downwardly upon the upper end of one of the hollow sections 12 thereof. However, to prevent the movement of the nozzle casing from its normal position, spring-pressed latch members 28 are mounted at the upper end of each of the two casing sections 12, 12 and which bear at their inner ends against the edge of the arcuate sector portion of the bearing plates 15, 15. In these sectors are formed notches 29, 29 spaced apart at an angle of approximately 30 degrees, the uppermost notch corresponding to the normal position of the casing section as shown in Figure 2, and the lower notch corresponding to the elevated or tilted position shown in Figure 5. Obviously, the latch members engaging either one notch or the other, lock the casing section in either position until released for shifting to the other position.

Now, assuming that it is desired to convert the cleaner to off-the-floor cleaning operation by using an extension hose and dusting tools, it is first desirable to swing the handle into its vertical position as shown in Figure 5, although in this particular type of cleaner, the movement of the handle plays no part in the converting operation,—it simply being more convenient to have the handle so positioned. In any case, the actual conversion is accomplished by releasing the latch members 28, 28 and then depressing the upper ends of the nozzle casing sections 12, 12 until the latch members engage the lowermost notches 29 as in Figure 5. This swinging movement of the nozzle not only raises the agitator out of contact with the carpet surface, but also shifts the upper end of the passage 24 within the nozzle casing out of register with the entrance to the fan chamber and brings the converter port 26 into register therewith. And finally, after removing the converter port cover plate 27, a converter fitting 30 is then inserted through the port 26 with its inner end seating tightly in the fan "eye" as clearly shown in Figure 7. The converter member 30 is essentially a metal L-shaped fitting or elbow provided at its attaching end with suitable spring clips 30a, 30a for holding it in converting position and suitably coupled with the end of the dusting tool hose 31. In this manner, the air inlet from the main nozzle has been entirely shut off and the only inlet to the fan chamber is now through the hose 31 and the converter member 30.

Now referring to Figure 4, it will be apparent that in the tilting of the nozzle casing 11, that the axis of this movement is at the pivot mountings 14 and therefore about an axis between the axes of rotation of the agitator 20 and its driving pulley 21. As a consequence therefore, the distance between the extreme axes will not remain constant as the nozzle is tilted upwardly, but rather will be decreased thus introducing considerable slack in the driving belt 19. Thus visualizing the tilting of the nozzle section 11 in an upward or counterclockwise direction through an arc of about 30 degrees from the position, it follows that the upper end portion of the casing section 12 enclosing the driving belt, will be swung downwardly carrying with it the belt tightening or tensioning member 22 and out of contact with the belt entirely. The driving pulley 21, of course, remains stationary but the agitator 20 is elevated slightly and hence is swung toward the driving pulley just enough to cause a slackening of the belt and a consequent interruption in the driving force. In other words, the pulley continues to rotate with the motor but does not drive the agitator.

Thus it follows that while the conversion operation is accomplished by manually depressing the nozzle casing 11 preparatory to introducing the converter member 30 into the fan "eye", the other functional changes in the cleaner take place; namely, the elevation of the nozzle out of contact with the floor and the temporary interruption of the agitator drive. And, in this connection, it might be observed that having elevated the agitator above the floor surface, it could continue to be driven, but inasmuch as a certain amount of power is required to drive it, it is preferred to interrupt the agitator drive temporarily by the slackening of the belt in the manner already described. And this accounts for the presence of the belt tensioning device 22, for it is to be noted that the belt is slightly longer than otherwise necessary, so that when the nozzle is tilted there will be sufficient slack to insure the disengagement of the agitator. The tensioning device takes up this slack when the nozzle is in its normal operating position.

Referring now to Figures 8, 9 and 10, a modified arrangement of the adjustable nozzle casing is disclosed wherein the tilting is accomplished automatically by the swinging movement of the handle into a vertical or a storage position, rather than by hand as in the arrangement just described. In describing this modified arrangement it may be assumed that the construction of the cleaner is identical with that previously described except in those particulars specifically referred to. Thus, the nozzle casing 33 is the same as before except that at some point adjacent its central portion, it is provided with an arm 33a extending rearwardly and horizontally from its curved rear wall and terminating in a slightly upturned pointed end which just clears the outer surface of the rotative housing 34. On the surface of the rotative housing 34 is a radial projection or lug 34a preferably formed by upsetting the housing wall outwardly as clearly shown in Figure 8, and so located circumferentially of the housing that, as the latter is rotated in a counterclockwise direction with the swinging of the handle toward its vertical position, the lug strikes the contact arm 33a and tilts the nozzle casing upwardly into the dotted line position. As long as the handle remains in its vertical position, the nozzle is held in its raised or tilted position and the conversion can thus be completed in the same manner as before described. Moreover, when it is desired to restore the cleaner to its normal operating position, the converter member is removed; then by swinging the handle downwardly from its storage position, the

nozzle is released and is free to drop into its normal position. However, it is not desirable to depend entirely on the force of gravity either to return the nozzle to its normal position or to hold it in that position and therefore it is proposed to apply spring tension at one and preferably both of the points of pivotal mounting of the tiltable nozzle casing. Thus, a torsion spring **35** is coiled several times around the head of each of the pivot pins **36**, with the ends thereof extending forwardly and rearwardly in opposite directions, the forward end being anchored to the nozzle casing and the rearwardly projecting end being anchored to the frame of the carriage **1** as clearly shown in Figure 9. Thus the springs act to yieldingly force the nozzle in a downward direction and against the force tending to tilt the same upwardly. And therefore, in place of the positive latching means of the manually tiltable nozzle casing previously described, are provided suitable stop members **37** to limit the downward swinging movement of the nozzle casing **33** after it has been released and forced downwardly by the tension of the springs **35**.

Thus the feature of the modified arrangement is the tilting of the nozzle automatically by the raising of the handle into its vertical position and conversely, the lowering of the nozzle into its normal position in the act of displacing the handle from its storage position.

But whether the nozzle be actuated manually or automatically as the preliminary step in the converting operation, the arrangement herein shown has as its essential and novel features the lifting of the agitator out of contact with the carpet surface and simultaneously interrupting its driving connection with the motor before the conversion to dusting tool operation can be effected.

Having set forth a preferred embodiment of my invention, I claim:

1. In a suction cleaner adapted to be converted to and from off-the-floor operation, the combination of a casing including suction-creating means, a nozzle pivotally mounted on said casing for limited tilting movement about a horizontal transverse axis and having an air passage normally communicating with an inlet opening to said suction-creating means and a port offset from said air passage and adapted to register with said inlet opening in the tilted position of said nozzle to permit a converter member to be inserted externally therethrough and into said inlet opening.

2. In a suction cleaner adapted to be converted to and from off-the-floor cleaning operation, the combination of a casing including a fan chamber having an air inlet opening, a fan mounted in said fan chamber, a motor for driving said fan, a nozzle pivotally mounted on said casing for bodily tilting movement relative thereto and having an air passage normally communicating with the opening to said fan chamber, and an agitator driven by said motor mounted in said nozzle and adapted in the tilting movement of said nozzle to be raised out of contact with the floor as said passage is swung out of registering relation with the opening to said fan chamber to permit the insertion of a converter member.

3. In a suction cleaner adapted to be converted to and from off-the-floor cleaning operation, the combination of a casing including a fan chamber having an inlet opening, a fan mounted in said fan chamber, a motor for driving said fan, a nozzle pivotally mounted on said casing for bodily tilting movement and having an air passage normally communicating with the opening to said fan chamber and a separate converter port normally out of register with said opening, and an agitator driven by said motor mounted in said nozzle and adapted to be raised above the floor in the tilting movement of said nozzle to bring said port into registering relation with the opening to said fan chamber to receive a converter member.

4. In a suction cleaner adapted to be converted to and from off-the-floor cleaning operation, the combination of a casing enclosing a motor-driven fan rotative about a horizontal axis and having an inlet opening, a nozzle casing pivotally mounted to swing about a horizontal axis relative to said fan casing and having a nozzle chamber and an extension thereof forming an air passage normally communicating with said inlet opening, said extension of the nozzle casing also having an externally accessible converter port adjacent to but separated from said air passage and adapted, in the swinging movement of said nozzle casing in a direction to raise its mouth above the floor to be brought into register with the inlet opening to said fan chamber, and a closure plate for said converter port adapted to be removed to permit the insertion of a converter member therethrough and into said opening to convert said cleaner for off-the-floor cleaning operation.

5. In a suction cleaner adapted to be converted to and from off-the-floor cleaning operation, the combination of a casing having a chamber enclosing a motor-driven fan rotative about a horizontal axis and having an inlet opening at one end, a nozzle casing pivotally mounted to swing about a horizontal axis relative to said fan casing and having a nozzle chamber and an air passage from said nozzle chamber to said inlet opening to said fan chamber, said nozzle casing section also having an externally accessible converter port adjacent to but separated from said air passage and adapted, in the swinging movement of said nozzle casing in a direction to raise the same above the floor, to be brought into register with said inlet opening to said fan chamber to permit the insertion of a converter member therethrough and into said opening to convert said cleaner to off-the-floor operation, and means for holding said nozzle casing in its elevated position.

6. In a suction cleaner adapted to be converted to and from off-the-floor operation, the combination of a wheel supported casing provided with a fan chamber having an air inlet opening at one end thereof, a motor-driven fan mounted in said fan chamber, a nozzle pivotally mounted to swing about a horizontal transverse axis relative to said wheel supported casing, an agitator journalled in said nozzle, the latter including a hollow section forming an air passageway normally connecting said nozzle with the inlet opening to said fan chamber and having an externally accessible converter port offset from said air passageway, said port being adapted to be brought into register with said inlet opening in the swinging movement of said nozzle in a direction to raise said agitator out of contact with the floor to permit the attachment of a converter member.

7. In a suction cleaner adapted for conversion to and from off-the-floor cleaning operation, the combination of suction-creating means including a motor-driven fan housed within a fan chamber having its axis extending horizontally, a nozzle pivotally mounted to swing about an axis

parallel with the axis of said fan chamber and comprising a nozzle chamber and a pair of transversely extending casing sections embracing said fan chamber and forming passages communicating with said nozzle chamber at their lower end, said fan chamber having an inlet opening adapted to communicate with one of said passages, a rotataive agitator journalled in said nozzle chamber, and a motor-driven agitator driving belt housed within the other of said nozzle casing sections, said nozzle casing being adapted to be tilted bodily in a direction to raise the nozzle above the floor level and to bring the axes of said motor and agitator toward each other, whereby said air passage from the nozzle is shifted out of register with the inlet to said fan chamber thereby exposing the same to permit the insertion of a converter member and simultaneously slackening said drive belt sufficiently to disconnect said agitator from said motor.

8. In a suction cleaner adapted for conversion to and from off-the-floor cleaning operation, the combination of a carriage, a cylindric casing supported by said carriage, a nozzle pivotally mounted on said carriage for limited rotative movement about a horizontal axis parallel with the axis of said casing, the latter including a fan chamber having an axially arranged inlet opening at one end thereof, a fan mounted in said fan chamber, a motor having driving connection with said fan, a rotative agitator journalled in said nozzle casing, a pair of transversely extending casing sections integral with said nozzle casing and forming passages connecting said nozzle with the ends of said casing, one of said passages being connected with the inlet opening to said fan chamber, and a drive belt from said motor to said agitator located in the other passage, said nozzle casing being shiftable in a direction to raise the agitator above the floor level and simultaneously to expose the inlet opening to said fan chamber to the introduction of a converter member.

9. In a suction cleaner adapted for conversion to and from off-the-floor cleaning operation, the combination of a wheeled carriage, a cylindric casing mounted on said carriage with its axis extending horizontally and transversely thereof, a motor and a fan mounted in said casing, a nozzle pivotally mounted on said carriage for limited tilting movement about a horizontal axis offset from the axis of said casing and comprising a pair of hollow casing sections embracing the ends of said casing and forming passageways communicating with said nozzle, the passageway adjacent the fan chamber end of said housing being adapted normally to register with an inlet opening to said fan chamber, a rotary agitator mounted in said nozzle, a belt connecting said motor with said agitator and housed within the other of said passageways, said nozzle being rotative bodily to raise the agitator out of contact with the carpet surface and to depress the free end portion of said sections through an arc sufficient to expose the inlet opening to said fan chamber to the introduction of a converter member, and latching means adapted to hold said nozzle in its extreme positions of movement.

10. In a suction cleaner adapted for conversion to and from off-the-floor cleaning operation, the combination of a wheeled carriage including spaced upright bearing members, a cylindric casing mounted between said bearing members with its axis arranged horizontally, a motor and a fan enclosed within a fan chamber at one end of said casing, a nozzle pivotally mounted on said carriage and adapted for tilting movement about a horizontal axis offset from the axis of said casing and having a pair of hollow casing sections extending substantially radially from its pivotal axis and embracing the ends of said casing exterior of said upright bearing members, said casing sections forming passageways communicating at their lower ends with the nozzle, the passageway at the fan chamber end of said casing normally communicating at its outer end with an inlet opening to said fan chamber, an agitator mounted in said nozzle, a drive belt for said agitator enclosed within the other of said passageways, the pivotal axis of said nozzle being offset from and below the center line of said belt, thereby effecting a slackening of the belt and exposing the inlet opening to said fan chamber to the introduction of a converter fitting through an externally accessible port in the adjacent nozzle section as the nozzle is tilted bodily to raise the agitator out of contact with the carpet surface.

11. In a suction cleaner adapted to be converted to and from off-the-floor cleaning operation, the combination of a carriage, a motor and fan casing rotatively mounted upon said carriage to turn about a horizontal axis, a handle integral with said fan casing, a nozzle casing mounted upon said carriage and adapted to tilt about a horizontal axis parallel to and offset from the axis of rotation of said fan casing, said nozzle casing having a radially disposed hollow section forming an air passage normally communicating with an inlet opening to said fan casing, a motor-driven agitator carried by said nozzle casing and adapted in the normal position of said nozzle casing to contact with the floor covering, and co-acting cam members carried by said fan casing and nozzle casing and adapted, in the swinging movement of said handle, to tilt said nozzle casing in a direction to raise said agitator out of contact with the floor covering, and tension means acting on said nozzle casing to oppose its movement into tilted position.

12. In a suction cleaner adapted to be converted to and from off-the-floor cleaning operation, the combination of a carriage, a casing enclosing a motor-driven fan journalled upon said carriage for limited rotation about a horizontal axis, a handle integral with said casing and adapted to swing to and from a vertical storage position, a nozzle pivotally mounted on said carriage to tilt about a horizontal axis offset from the axis of said casing, a motor-driven agitator rotatively mounted in said nozzle and adapted to contact the floor covering during on-the-floor cleaning operations, said casing having an air inlet opening at one end and said nozzle having a hollow section forming an air passage normally communicating with said air inlet opening and co-acting cam members on said casing and nozzle and adapted in the rotation of said casing by said handle in its movement into storage position to lift said nozzle thereby simultaneously raising said agitator out of contact with the floor surface and displacing said nozzle section to permit the insertion of a converter member into said inlet opening.

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