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Q. BERG

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SUCTION CLEANER

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2 Sheets-Sheet 1

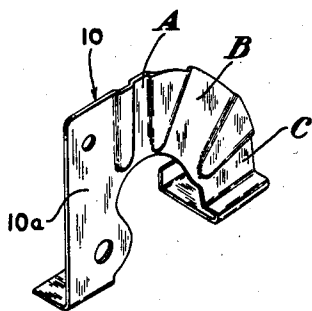


Fig. 5

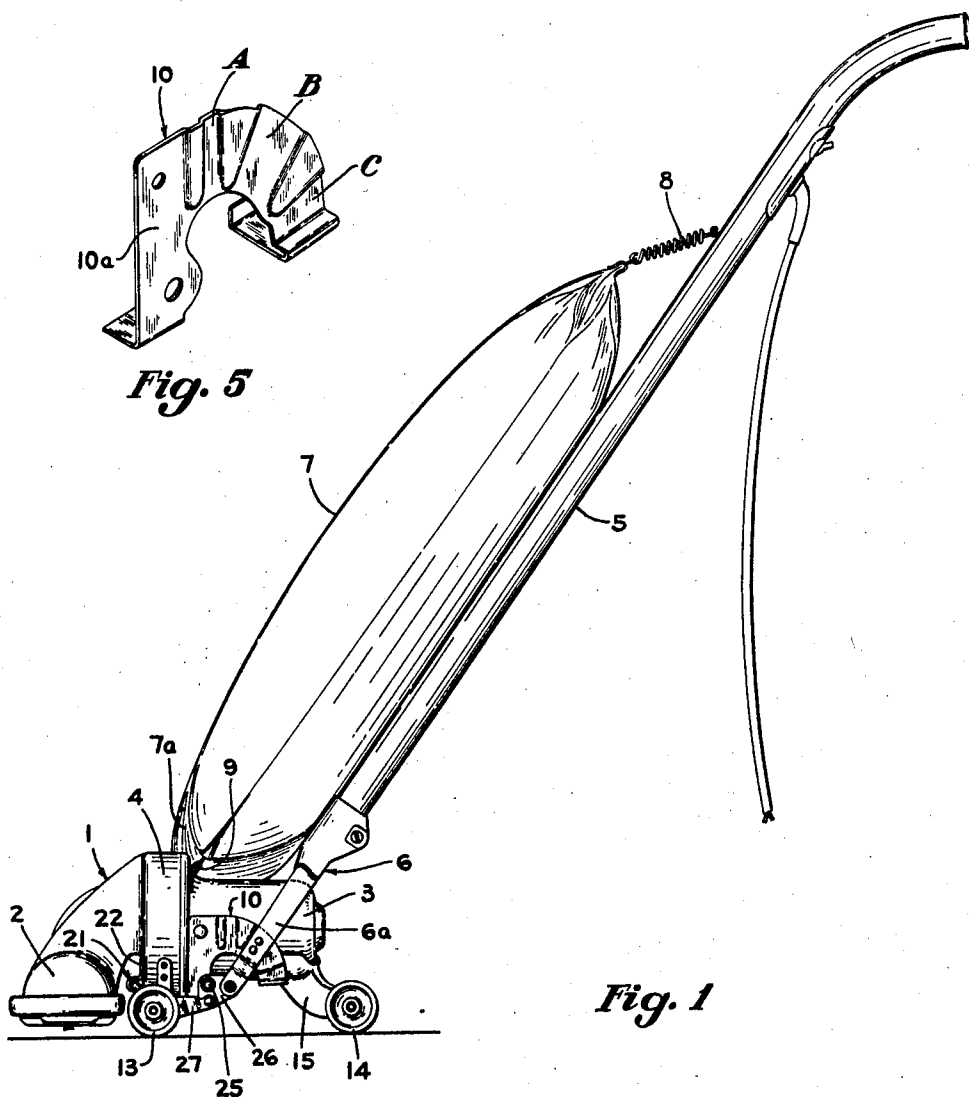


Fig. 1

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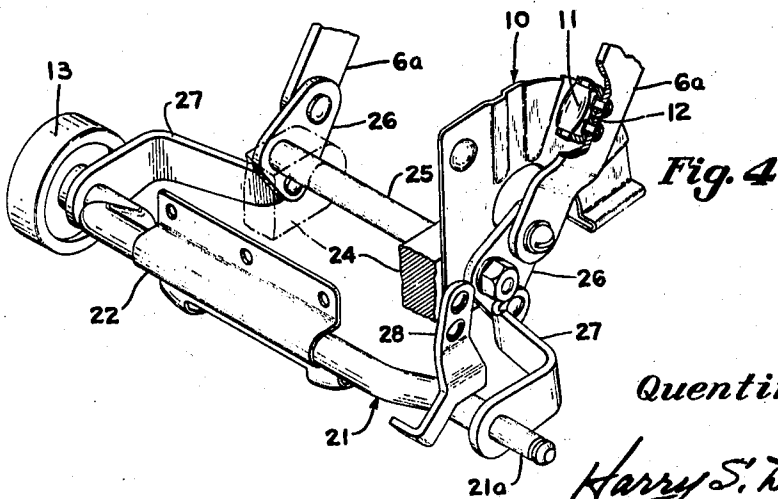
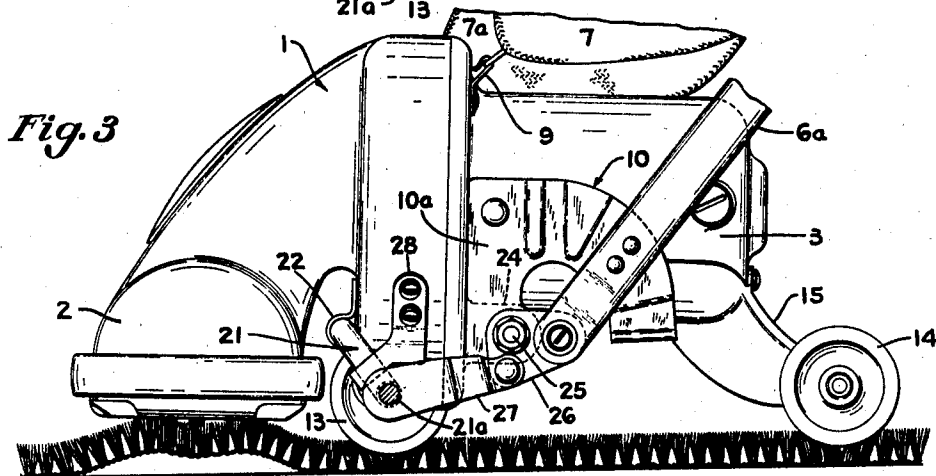
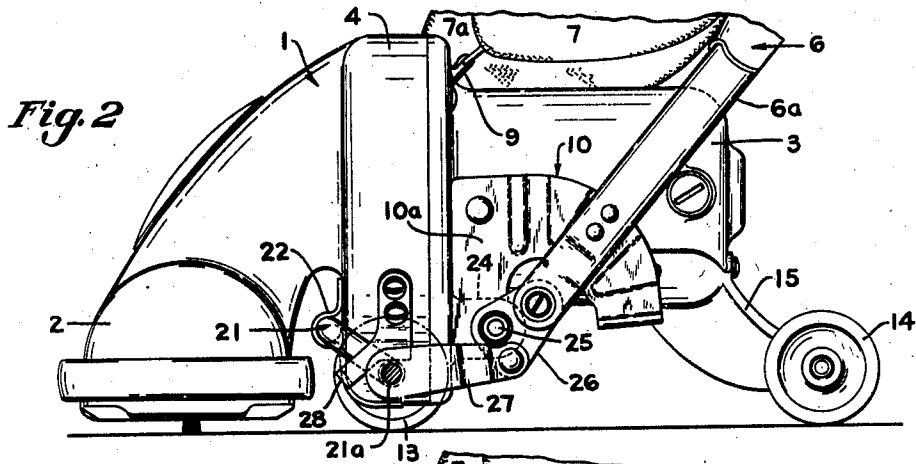
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SUCTION CLEANER

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2 Sheets-Sheet 2

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SUCTION CLEANER

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8 Claims. (Cl. 15—16)

This invention relates to improvements in suction cleaners and more particularly to novel means for regulating the height of the nozzle above the surface of the carpet being cleaned, such means functioning automatically and through the pressure exerted through the handle in maneuvering the cleaner over the carpet surface.

Heretofore, it has been common practice to provide for the adjustment of the nozzle height to the particular carpet being cleaned through the medium of adjustable pairs of front or rear wheels coupled with a suitable manual adjustment to be manipulated by the operator at his judgment of the varying carpet conditions may dictate, but without any guide for insuring the correctness of adjustment being made.

The object of the present invention is to substitute for the more common manual adjustment, a so-called automatic adjustment wherein the height of the nozzle is governed by the pressure exerted through the handle in the act of maneuvering the cleaner over the carpet being cleaned. Such a relationship between the immediate nozzle adjusting element, in this case a pair of front wheels journaled on crank arms, suggests some operative connection between the handle mounting and the adjustable front wheels so that the relative movement of the latter to the cleaner body responds to the force exerted through the handle and which manifestly, varies in direct proportion to the resistance offered by the particular carpet being cleaned to the movement of the cleaner.

Therefore, a further object of the invention is to provide a novel mechanism for transmitting the pressure exerted through the handle to the adjustable front wheel mounting whereby an approximately constant relationship between nozzle height and handle pressure may be maintained throughout the range of ordinary cleaning operations.

A preferred embodiment of the invention is disclosed in the accompanying drawings, in which:

Figure 1 is a general view in side elevation of a standard type of handle-maneuvered cleaner equipped with handle-pressure actuated nozzle adjusting means;

Figure 2 is an enlarged view in side elevation of the cleaner body showing the nozzle adjusting mechanism as it would function with the cleaner operating upon a bare floor or hard surface covering;

Figure 3 is a view similar to Figure 2 but show-

ing the cleaner being operated upon a carpet having a relatively thick pile and the manner in which the nozzle adjusting mechanism responds to the resistance offered thereby;

5 Figure 4 is a perspective view of the nozzle height adjusting mechanism as it appears with the body of the cleaner removed; and

10 Figure 5 is a perspective view of the handle position control sector as it appears when removed from the cleaner.

Although the nozzle height adjusting device disclosed herein is applicable to any standard cleaner of the portable handle-maneuvered type, it is here embodied in a cleaner wherein the fan chamber and nozzle are included in a single main casting 1 with the nozzle 2 extending transversely across the front of the main casing 1 and the motor 3 extending horizontally and in axial alignment with the fan chamber 4.

20 Forming a part of the cleaner assembly, although not having direct connection with the body, is a handle 5 having at its lower end an inverted U-shaped yoke or bail 6 straddling the motor 3 and pivotally connected at its lower extremities with the nozzle adjusting mechanism presently to be described in detail.

As is common in cleaners of the type herein disclosed, the exhaust outlet from the fan chamber 4 is at one side and opens in an upwardly direction, although not shown herein because it is located on the far side of the cleaner body. In any case, the exhaust outlet from the fan chamber opens into the lower end of a dirt bag 7 which extends upwardly along the handle and is supported thereby through a short extensible connection, preferably in the form of a light coil spring 8 having detachable connection with the upper end of the handle.

40 The dirt bag 7 is of the customary shape and construction, namely, an elongated tube of a porous woven fabric or equivalent filtering material closed at both ends but with the upper end capable of being opened for the purpose of emptying the bag of its contents.

45 However, the dirt bag 7 differs somewhat from the more common arrangement in that it is supported in front or on top of the handle 5 instead of being suspended below it. And again, the lower end of the bag has detachable connection directly with the body of the cleaner through a loop and hook connection as at 9, with the hook being mounted on top of the cleaner body just rearwardly of the fan chamber and the attaching loop or ring at the lower end of the bag and in line with the point of attachment of the upper

end of the bag with the cleaner handle through the extensible attaching spring 8. It may be added that the ring and hook connection between the lower end of the bag and the cleaner body is provided because the exhaust outlet from the fan chamber is offset, and in order to support the bag symmetrically on the handle, it is preferred to provide the bag with an offset extension 7a having direct connection with the exhaust outlet. Thus it follows that as the handle swings forwardly and rearwardly, the bag will be placed under an increasing tension as the inclination of the handle approaches its horizontal or lowered position. Ordinarily, the tensioning of the bag merely prevents the bag from sagging and, on account of the extensible nature of the connecting spring 8, is not excessive, although it does exert an upward pull on the cleaner body which contributes somewhat to the maintenance of the correct nozzle height adjustment as will presently be explained.

As mentioned, the handle 5 is carried by, although it does not have the pivotal connection directly with the cleaner body. In any case, the handle pivots about a horizontal transverse axis and through an arc of about 90 degrees, the limits of which are represented by the vertical or storage position of the handle and a horizontal or lowered position. To control in some degree the swinging movement of the handle, there is preferably mounted on one side of the cleaner body and immediately adjacent the inner face of one of the arms of the handle bail 6, a position control sector 10 consisting primarily of a plate describing an arc of substantially 90 degrees and having an attaching portion 10a suitably fashioned for attachment to the cleaner body. Thus, as clearly shown in Figures 2 and 4, the handle control sector 10 is mounted directly to the rear of the fan chamber 4, curving rearwardly and downwardly and terminating at the level of the underside of the motor casing 3. As shown more clearly in Figure 5, the sector is divided into three radially disposed position grooves by the simple process of upsetting the sector in such a manner as to define elevated areas between the grooves or radial depressions. Thus, there is provided a narrow upright groove A defining the vertical or storage position of the handle, a considerably wider and angularly extended groove B defining the working range of the handle and finally, a lower horizontal groove C defining the lowered position of the handle.

Mounted on the inner face of the arm 6a of the handle bail 6 adjacent the sector 10, is a roller 11 journaled in a suitable bracket 12 with its axis extending parallel with the bail arm on which it is mounted, so that the roller extends radially with respect to the handle control sector 10. The roller 11 bears against the outer face of the sector and, being yieldably mounted, exerts sufficient pressure through the roller to hold the handle in the position to which it is swung by the operator.

Referring now to the supporting wheels for the cleaner body, there is a pair of front wheels 12, 13 located immediately to the rear of the nozzle 2 and a pair of rear wheels 14, 14 preferably arranged in the form of a two wheeled caster journaled at the outer end of a bracket 15 secured to the underside of the motor casing 3 and projecting a short distance beyond its rear end. The rear wheels 14, 14 rotate upon a fixed axle carried by the bracket 15 and hence, their posi-

tion relative to the cleaner body remains fixed. The front wheels have a limited degree of vertical adjustment relative to the cleaner body and the mounting of these front wheels and their connection with the handle will now be described in detail:

Extending transversely of the cleaner body and within the space separating the nozzle and the fan chamber is a horizontal transversely extending rock shaft 21 supported in a bearing bracket 22. The outer ends of the shaft 21 are bent at right angles to form crank arms 21a, extending downwardly and inclined rearwardly in a slight degree, and at the ends of these crank arms are journaled the front supporting wheels 13, 13.

Now, projecting from the rear face of the fan chamber and substantially at the level of the rock shaft 21 is a pair of ears 24 lying just inwardly from the lower extremities of the arms 6a, 6a of the handle bail 6 (Figure 4). Extending transversely between and through the ends of the ears 24, 24 is a transverse shaft 25, the ends of said shaft projecting laterally a short distance beyond the ears 24 and carrying a pair of triangular shaped plates 26, 26 which are actually bell crank levers with lever arms disposed at right angles.

The longer and horizontal rearwardly extending lever arms of the bell crank levers 26, 26 support the handle through pivotal connections with the lower extremities of the handle bail 6. And pivotally connected with the shorter and downwardly extending arms of the bell crank levers is a pair of links 27, 27 bent in S-form to permit them to diverge or spread outwardly to straddle the fan chamber and to have pivotal bearing on the end portions of the crank arms 21a, 21a just inside of the adjustable front wheels 13, 13. And finally, attached to one side of the fan chamber and immediately above one of the crank arms 21a is a stop member 28 having angularly disposed edges forming abutments to limit the swinging movement of the rock shaft 21 through an arc of approximately 15 degrees in either direction from its normal position of about 45 degrees to the vertical.

Now, with this arrangement, it is obvious that in maneuvering the cleaner forwardly over a carpet surface a part of the force exerted downwardly through the handle will be transmitted directly to the cleaner body and a part through the bell crank levers 26, 26 and links 27, 27 and thence to the crank arms 21a, 21a to rock the shaft 21 in a clockwise direction, this movement causing the front wheels to be depressed and the nozzle to be raised in a corresponding degree.

Thus, in Figure 2 the cleaner is shown as resting upon a plane surface such as a bare floor or a relatively thin carpet and showing the nozzle spaced a short distance from the supporting surface, the distance being assumed to be proper for cleaning such a surface. Under these conditions, the force exerted through the handle will be largely applied directly to the cleaner body in propelling it over the surface and hence not enough will be transmitted to the shaft 21 to swing the crank arms and depress the front wheels against the weight carried thereby.

However, should the cleaner be transferred onto a comparatively thick carpet, as illustrated in Figure 3, it follows that the greater effort required to push the cleaner over the carpet surface due to the increased resistance offered by

the carpet nap, will cause sufficient force to be transmitted to the crank arms to overcome the weight of the cleaner and rock the shaft 21 forwardly, thereby elevating the nozzle to a height for the most effective cleaning of that particular carpet.

In connection with this automatic adjustment of nozzle height by the force exerted to the handle, it should be added that the upward pull on the cleaner body exerted through the bag 7 from the handle aids in a considerable degree in the adjusting movement by counterbalancing a part of the weight of the cleaner which normally opposes any lifting of the nozzle. Thus, it will be apparent that with the lower end of the cleaner bag connected at 9 with the cleaner body at a point forwardly and above the pivotal connection of the handle with the body, and the handle moved to its inclined or working position, that the tension exerted by the bag and only partially relieved by the spring connector 8, is exerted in a direction to lift or tilt the body upwardly with the rear wheels as a fulcrum. This lifting force therefore, counterbalances a part of the weight carried upon the front wheels and is especially helpful during the rearward stroke of the cleaner when there would be no adjustment of the nozzle because of the pull on the handle. But with the handle lowered to an angle somewhat greater than 45 degrees to the vertical during the rearward or return stroke, the tension exerted through the bag tends to maintain the nozzle at the same height during both strokes. In any case, the tension exerted through the bag is advantageous in that it renders the cleaner body more responsive to the force exerted through the handle and the adjusting mechanism more sensitive to varying carpet conditions.

Thus, regardless of the particular grade or texture of the floor covering to be cleaned, a constant relationship is maintained between the force required to propel the cleaner over the carpet surface, the resistance offered by that surface to the bodily movement of the cleaner, and the nozzle height best suited for effective cleaning, since for all practical intents and purposes the resistance is equal to the propelling force. Hence, it follows that the nozzle will be maintained at a height which varies directly as the pressure exerted through the handle, and at a height substantially correct for the particular carpet being cleaned.

Having set forth the invention in one of its more practical embodiments, but without limiting it thereto, I claim:

1. A suction cleaner comprising a body having a nozzle at its forward end, supporting wheels mounted adjacent opposite ends of said body with the foremost wheels offset from said nozzle and journaled upon crank arms for limited rocking movement relative to said body, a lever on said body rotative about an axis parallel with the axis of said crank arms, a handle having pivotal connection at its lower end with one arm of said lever, and a link connecting the other arm of said lever with said crank arms whereby the force exerted through said handle is transmitted to said crank arms to raise or lower the front wheels and thereby adjust the height of the nozzle to the character of the surface being cleaned.

2. A suction cleaner comprising a body having a nozzle at its forward end, supporting wheels mounted adjacent the opposite ends of said body with the front wheels offset from said nozzle, a transverse shaft mounted on said body and hav-

ing crank arms carrying the wheels adjacent one end of said body, levers mounted on said body to pivot about a common axis parallel with said shaft, a handle having a bail connected at its lower ends with one arm of each of said levers, and links connecting the other arm of each lever with said crank arms, whereby the force exerted through said handle in maneuvering the cleaner over the carpet rocks said shaft to raise or lower the wheels carried thereby to adjust the height of the nozzle to the character of the particular surface being cleaned.

3. A suction cleaner comprising a body supported upon wheels and having a nozzle at its forward end, the wheels adjacent the nozzle being journaled on crank arms pivotally mounted on said body for limited swinging movement relative thereto, a handle, a lever of the bell crank type pivotally mounted on said body and having one arm connected with the lower end of said handle, and a link connecting the other arm of said lever with said crank arms whereby the force exerted through said handle in maneuvering the cleaner is transmitted to said crank arms to swing the same in a direction to raise or lower said last mentioned wheels and to adjust the nozzle to the particular carpet being cleaned.

4. A suction cleaner comprising a body supported upon wheels mounted adjacent its opposite ends and having a nozzle at its forward end, a transverse rock shaft mounted on said body adjacent said nozzle and having crank arms on which the front supporting wheels are journaled, a handle, a bell crank lever pivotally mounted on said body and having pivotal connection with the lower end of said handle, a link connecting said lever with said rock shaft whereby the pressure exerted through said handle in maneuvering the cleaner is transmitted to said rock shaft to displace said wheels bodily in a direction to adjust the height of the nozzle to the surface characteristics of the particular carpet being cleaned.

5. A suction cleaner comprising a body supported upon wheels and having a nozzle at its forward end, a transverse rock shaft mounted on said body rearwardly of said nozzle and having crank arms on which the front supporting wheels are journaled, a handle having a U-shaped bail, levers mounted upon said body to pivot about a common axis parallel with the axis of said rock shaft and having pivotal connection with the lower ends of said handle bail, and links connecting said levers with said crank arms whereby the pressure applied to said handle in maneuvering the cleaner in a forward direction acts to adjust said wheels bodily to raise or lower the nozzle to the correct operating height regardless of the surface characteristics of the particular carpet being cleaned.

6. A suction cleaner comprising a body supported upon wheels having a nozzle at its forward end, a transverse rock shaft mounted adjacent said nozzle and having crank arms at its ends on which the wheels adjacent said nozzle are journaled, a handle having an inverted U-shaped bail at its lower end adapted to straddle said body, bell crank levers pivotally mounted on opposite sides of said body and to which the ends of said bail are pivotally connected, and links connecting said levers with said crank arms whereby the pressure exerted through said handle in maneuvering the cleaner over the surface being cleaned is transmitted to said crank arms to rock said shaft in a direction to depress said

adjustable wheels and thereby raise the nozzle automatically to a height suitable for the particular character of the surface being cleaned.

7. A suction cleaner comprising a body having a nozzle at its forward end and front and rear supporting wheels, crank arms on which said front wheels are journaled, a lever mounted on said body, a handle connected with one arm of said lever, links connecting the other arm of said lever with said crank arms whereby the force applied to said handle in maneuvering the cleaner is transmitted to said shaft to rock the same in a direction to raise or lower the wheels and to adjust automatically the height of the nozzle to the particular carpet being cleaned, a filter bag connected at one end of said body forwardly of said handle, and an extensible member connecting the upper end of the bag with the handle.

8. A suction cleaner comprising a body having a nozzle at its forward end and front and rear supporting wheels, a shaft extending transversely

of said body rearwardly of said nozzle and having crank arms on which said front wheels are journaled, levers mounted on said body and rotative about a common axis parallel with said shaft, a handle having a bail at its lower end connected with one arm of each of said levers, links connecting the other arm of said levers with said crank arms whereby the force exerted through said handle in maneuvering the cleaner is transmitted to said shaft to rock the same in a direction to raise or lower the wheels and to adjust automatically the height of the nozzle to the particular carpet being cleaned, and a filter bag extensibly connected at one end to said body at a point substantially above said front wheels and at its other end to the handle, said bag thus acting as a tension member to lift the forward end of said cleaner in the downward swinging movement of said handle.

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