April 14, 1959 J. E. DUFF 2,881,465

SUCTION CLEANER NOZZLE SUPPORT

Filed Dec. 2, 1954 3 Sheets-Sheet 1

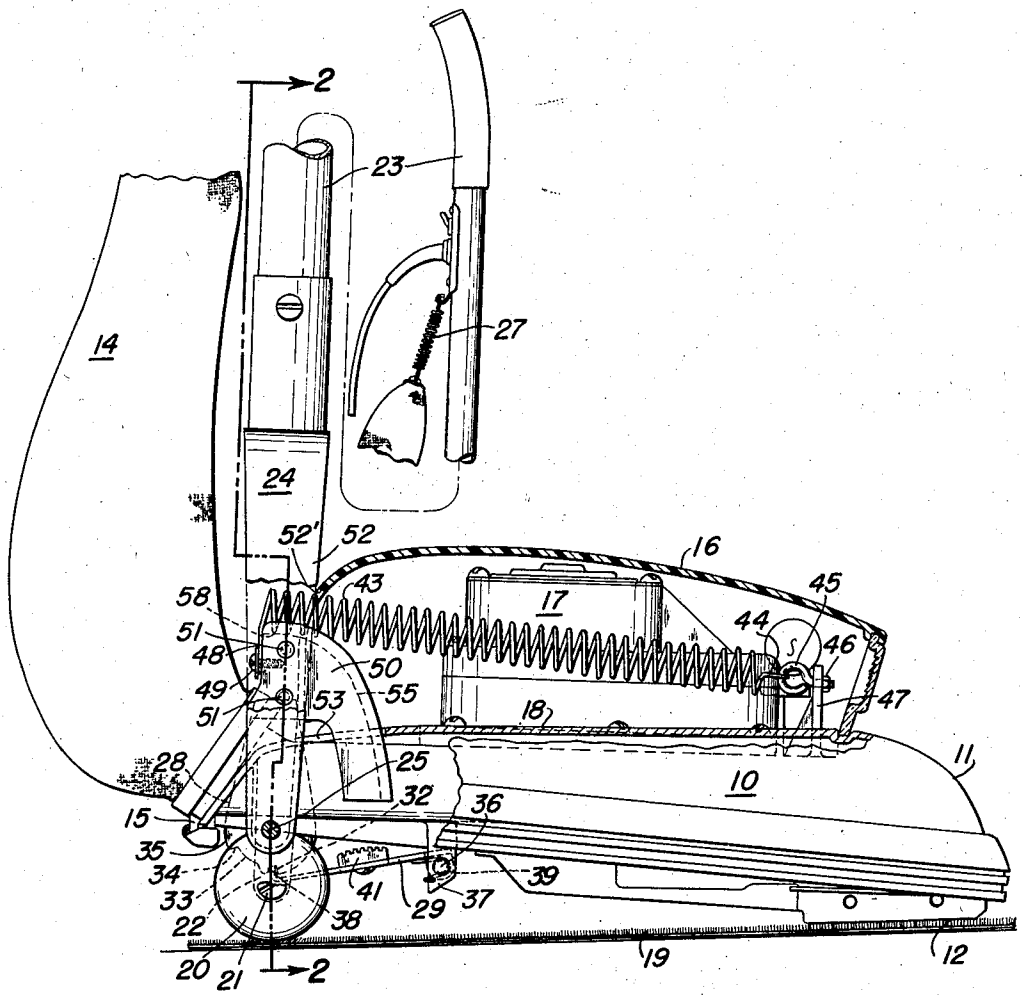


Fig. 1

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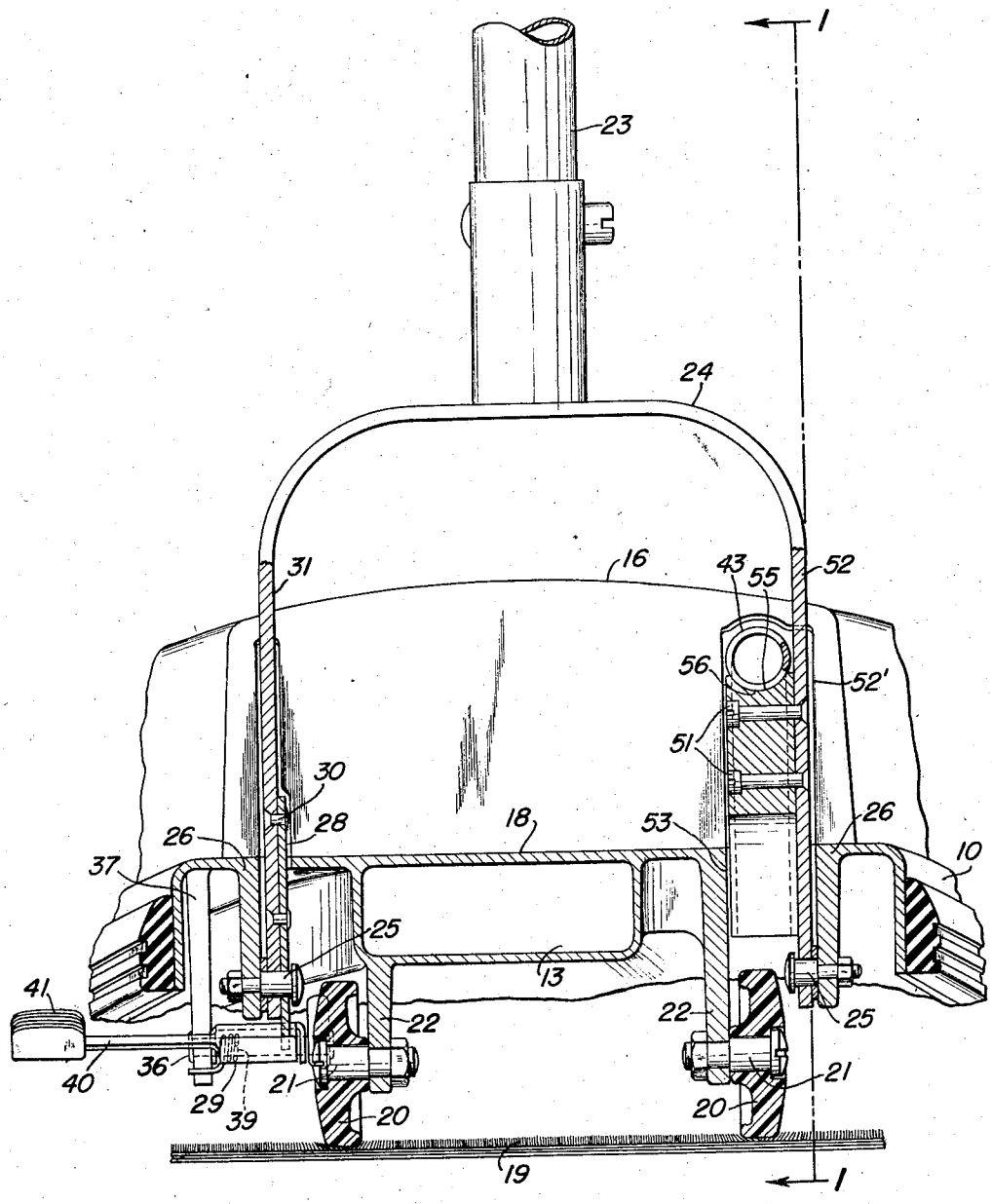


Fig.2

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SUCTION CLEANER NOZZLE SUPPORT

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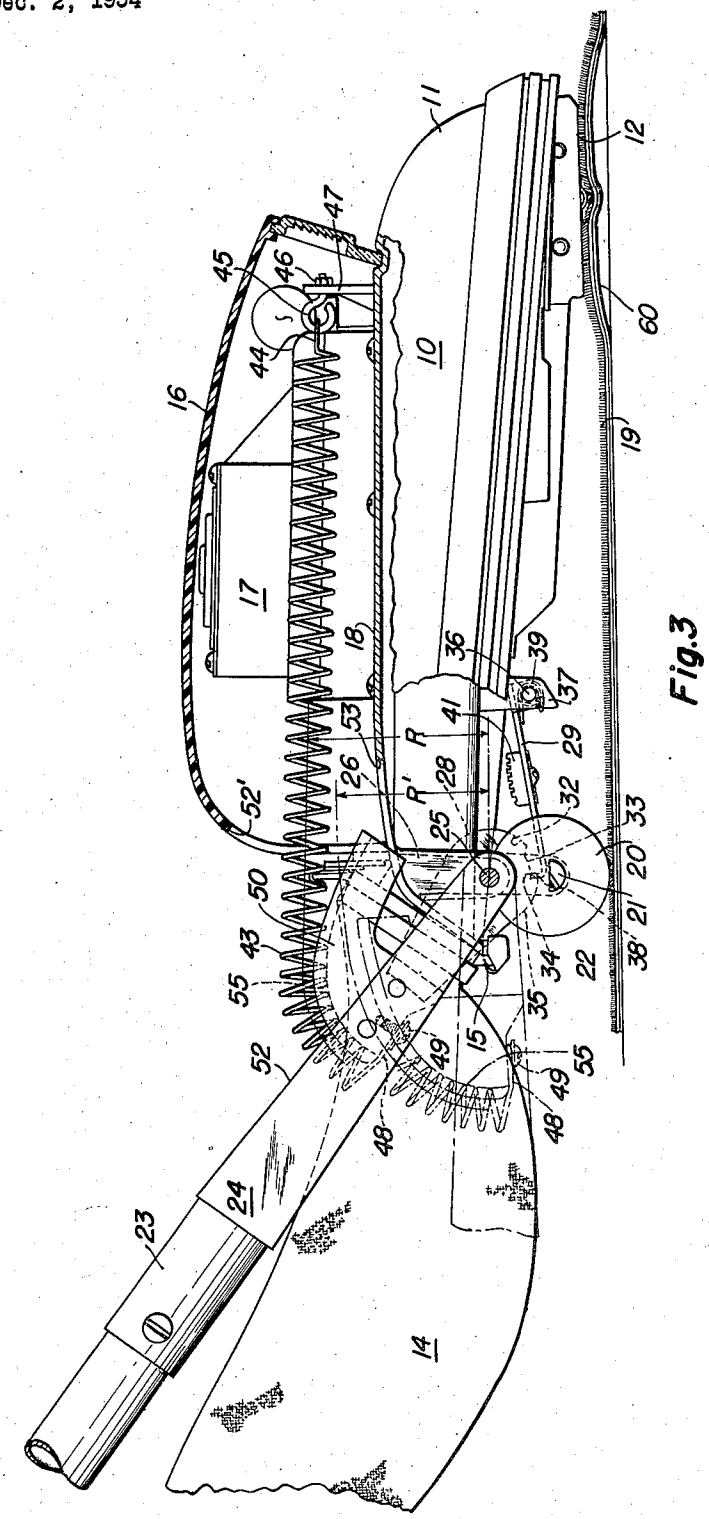


Fig.3

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SUCTION CLEANER NOZZLE SUPPORT

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3 Claims. (Cl. 15—360)

The present invention relates to suction cleaners and more particularly to supporting the cleaner nozzle with respect to the surface being cleaned.

An object of the invention is to provide a suction cleaner having a pivotally mounted nozzle body counterbalanced to eliminate the usual nozzle supporting wheels. Another object is to provide a suction cleaner having a pivotally mounted nozzle body the weight of which is supported from the cleaner propelling handle. A further object is to provide a pivotally mounted cleaner body having resilient means connected to the propelling handle and the nozzle to support the weight of the latter. Another object is to provide a suction cleaner having a pivotally mounted nozzle connected to the cleaner propelling handle and a device for maintaining a constant lifting force at the nozzle in all operative positions of the propelling handle. A further object is to provide a suction cleaner wherein the cleaner nozzle is supported to obtain substantially a zero vertical force of the nozzle against the carpet surface. Other objects and advantages of the invention will become apparent from the following description and drawings wherein:

Figure 1 is a section along the line 1—1 of Figure 2 showing the handle in storage position,

Figure 2 is a section along the line 2—2 in Figure 1, and

Figure 3 is a view similar to Figure 1 showing in full lines the handle at the lower end of its inclined working position, and in dotted lines arranged in a horizontal operating position.

The embodiment of the invention herein disclosed comprises a suction cleaner body 10, having a nozzle 11 at its forward end provided with a perimeter surface engaging lip 12 communicating with an unshown fan chamber from which dirt-laden air is discharged through an exhaust passageway 13 into a dirt filtering bag 14 removably attached by a clamp 15 to the body 10. A housing 16 encloses a motor 17 mounted on a wall 18 of the body and drives an unshown fan in the fan chamber to create suction in the nozzle 11 for removing dirt from the carpet 19 and expelling the dirt through the exhaust passageway 13 into the bag 14. At the rear end of the cleaner body 10 is a pair of wheels 20 each rotatably mounted on a pin 21 secured to a bracket 22 forming part of the body. The wheels 20 support the rear end of the cleaner body on the surface 19 and the body is pivotally mounted on an axis passing through the pins 21—21.

A propelling handle 23 is provided at its lower end with a bail 24 pivotally mounted on pins 25—25 supported in brackets 26—26 depending from the body 10, and a spring 27 at the upper end of the handle 23 supports the bag 14. The pivotal axis of the handle 23 is defined by the pins 25 and is arranged vertically above the pivotal axis of the cleaner body 10. If desired the handle 23 may be pivoted concentric with the pivotal axis of the cleaner body.

The handle 23 is maintained in different adjusted positions by a sector 28 cooperating with a lever 29. The sector 28 is attached at 30 to the arm 31 of the handle bail 24 and at the lower end is provided with a locking recess 32 representing the handle storage position, a surface 33 extending from the recess 32 to a shoulder 34 defines the upper inclined operating range of handle movement, and a surface 35 from the shoulder 34 permits movement of the handle in its lower inclined operating range. The lever 29 is pivotally mounted at its forward end by a pin 36 supported in a bracket 37, and at its rear end is provided with a lug 38 at all times biased into engagement with the lower end of the sector 28 by a torsion spring 39 about the pin 36. Extending laterally from the lever 29 between the opposite ends thereof is an arm 40 provided with a pad 41 to receive the operator's foot for depressing the end of lever 29 out of engagement with the sector 28 against the force of the torsion spring 39.

The body portion forwardly of the rear wheels 20 is supported by a helical tension spring 43 having one end 44 attached to a hook 45 adjustably mounted by a nut 46 to a post 47 upstanding from the body 10, and the rear end 48 of the spring 43 is secured by a screw 49 to one end of a cam member 50 mounted by bolts 51 to the arm 52 of the handle bail 24. The spring is partly within the motor housing 16 and projects through an elongated opening 52' for attachment to the cam member 50 which projects through a slot 53 in the body wall 18 when the handle is in its storage position shown in Figure 1.

Extending between the opposite ends of the member 50 is a cam surface 55 which is arcuate in cross section as indicated at 56 to provide a seat for the spring 43 when the handle 23 is pivoted with respect to the body 10. When the handle 23 is in its storage position shown in Figure 1 the supporting spring 43 rests on the portion 58 of the cam surface 55 and is not tensioned, whereby the nozzle lip 12 rests on the surface 19 to support the weight of the body forwardly of its pivotal axis.

In order to compensate for the variable nozzle lifting force exerted by the spring 43 as its tension is increased and decreased upon reciprocation of the handle 23 through its operating ranges, the cam surface 55 along which the spring 43 rides is so contoured that the effective lever arms, as indicated for example at R and R' in Figure 3, between the handle pivot 25 and the center of the spring axis is altered so the lifting force of the spring remains fixed to support the weight of the nozzle and maintain the latter at a constant height with respect to the surface being cleaned for all operating positions of the handle.

When the handle 23 is moved out of storage position the cam surface 55 places sufficient tension on the spring 43 to raise the nozzle lip 12 to its optimum position from the carpet 19 against the force of suction, and thus the actual resultant pressure of the nozzle lip 12 against the surface of the carpet 19 is reduced to substantially that created by the suction in restricting movement of the nozzle along the surface of the carpet 19, accordingly the cleaner is easily propelled over the carpet.

When the handle 23 is in its storage position shown in Figure 1 the end 38 of the lever 29 is seated in the recess 32 by the torsion spring 39 to lock the handle 23 relative to the body so that the cleaner can be carried from place to place. In this position of the handle 23 and the cam 55 the tension on the spring 43 is such that the nozzle 12 is supported on the surface 19.

In order to shift the handle 23 into its upper inclined operating range the operator places her foot on the pad 41 to move the lever 29 out of the recess 32 whereby the handle can be freely reciprocated through an angle of about 45 degrees as defined by the shoulder 34 and the recess 32 on the sector 28, and the end 38 of the lever is

biased against the surface **33** by the torsion spring **39**. Upon initially moving the handle out of its storage position the spring **43** is elongated to increase its tension and apply a lifting force to the nozzle **11** to elevate the nozzle lip **12** from the carpet **19**, and the force of suction raises the carpet **19**, as indicated at **60** in Figure 3, into engagement with the nozzle lip **12**. The nozzle position remains unaltered during movement of the handle **23** in its upper inclined operating range since the cam surface **55** is contoured to alter the effective lever arm R between the handle pivot **21** and the central axis of the spring 43 to compensate for the varied tension in the spring and thus its lifting force on the nozzle **11**.

The handle **23** is moved to its lower inclined operating range by depressing the lever **29** and the lifting force of the spring **43** remains constant due to the contour of the cam surface which compensates for the varied lifting power of the spring **43** as it is elongated and contracted.

From the foregoing it will perceived I have provided a suction cleaner wherein the nozzle weight is supported solely by resilient means connected to the handle, and the cam surface compensates for the various lifting forces of the spring upon movement of the handle so that the nozzle is maintained in a constant position with respect to the carpet to reduce to a minimum the pressure of the nozzle lip against the carpet **19**.

While I have shown and described but one embodiment of my invention, it is to be understood that this embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described but to include all equivalent variations except as limited by the scope of the claims.

I claim:

1. A suction cleaning tool comprising a body having a nozzle at its forward end, means toward the rear end of said body pivotally supporting the latter and its nozzle relative to the surface being cleaned, a propelling handle pivotally mounted adjacent the pivotal axis of said body, resilient means connecting said forward end of said body to said handle above its pivot point and

exerting a lifting force to support the forward weight of said body, the tension in said resilient means varying depending upon the position of said handle relative to said body, and compensating means responsive to pivotal movement of said handle to compensate for the varied tension exerted by said resilient connecting means during movement of said handle to different positions to thereby maintain the effective lifting force constant.

2. A suction cleaning tool as described in claim 1, and said compensating means comprising cam means movable with said handle and engaging said resilient means.

3. A suction cleaning tool comprising a body having a nozzle at its forward end, means toward the rear of said body pivotally supporting the latter and its nozzle, a propelling handle pivotally mounted adjacent the pivotal axis of said body, additional nozzle supporting means including resilient means connected to said forward end of said body and to said handle above its pivot point and exerting a lifting force to support said nozzle relative to the surface to be cleaned, and said additional nozzle supporting means including means responsive to pivotal movement of said handle to maintain the nozzle lifting force constant during movement of said handle to different positions and thus said nozzle in one position relative to the surface being cleaned.

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