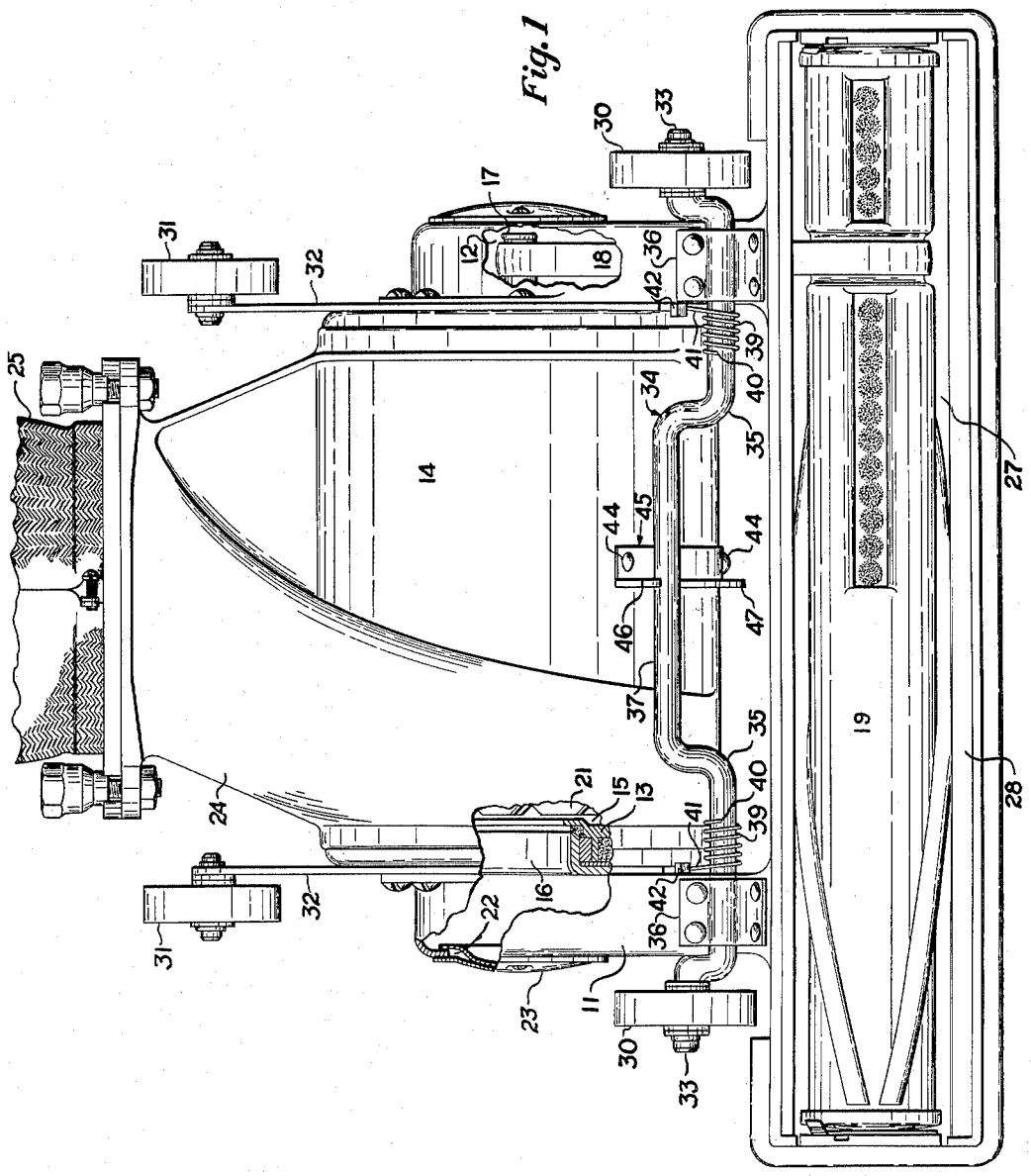
Jan. 17, 1956 W. G. SECK 2,730,752

NOZZLE ADJUSTMENT FOR SUCTION CLEANER

Filed July 26, 1950 3 Sheets-Sheet 1

Fig. 1



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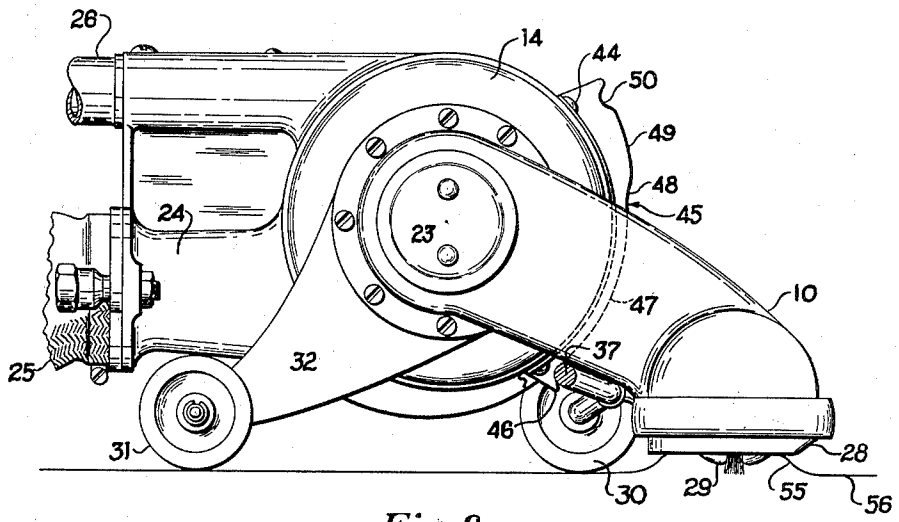


Fig. 2

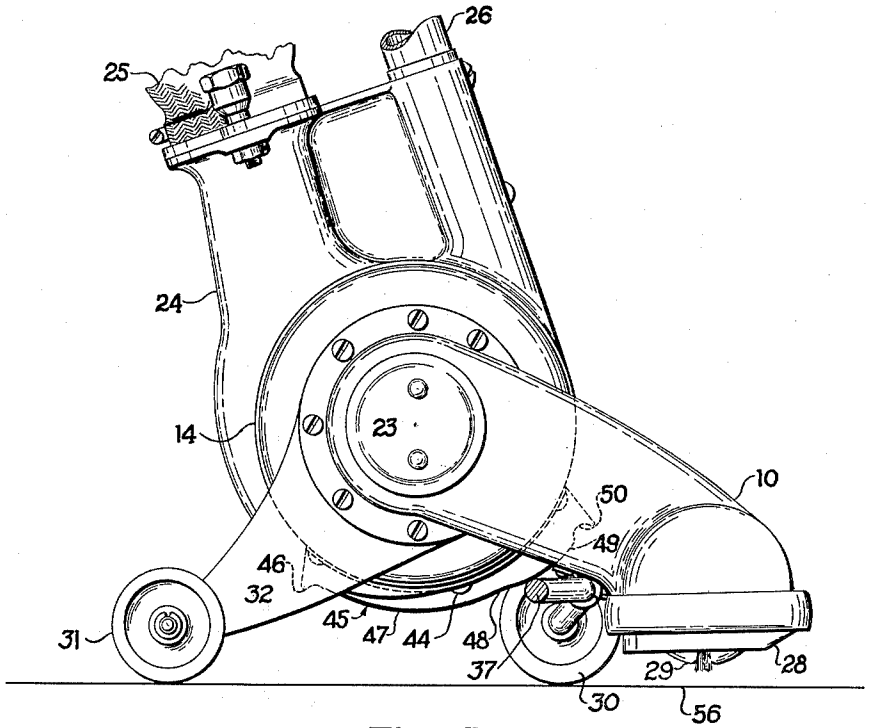


Fig. 3

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NOZZLE ADJUSTMENT FOR SUCTION CLEANER

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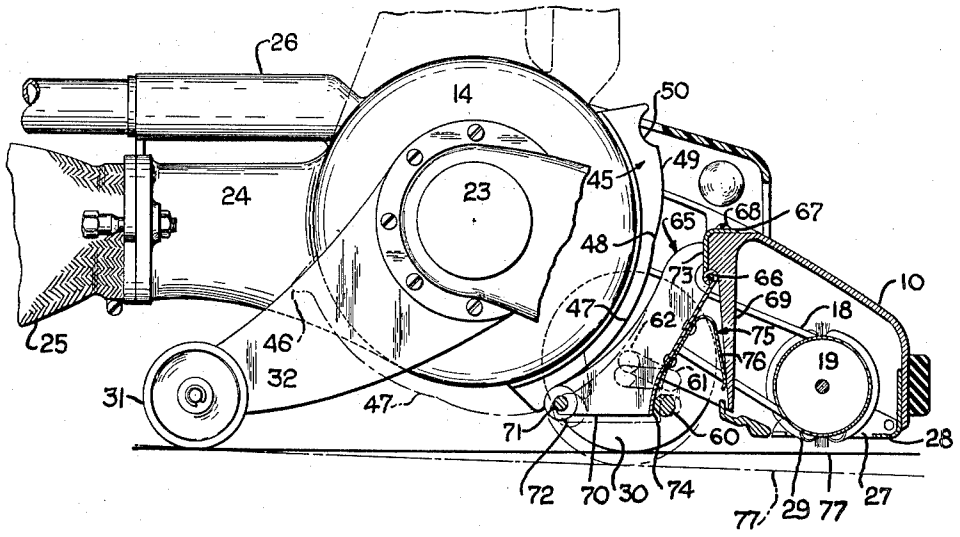


Fig. 4

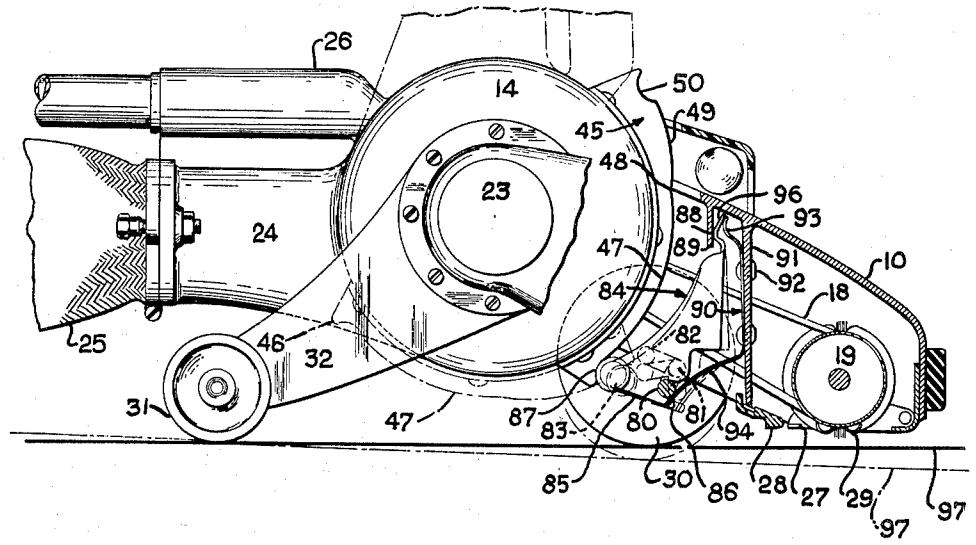


Fig. 5

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2,730,752

NOZZLE ADJUSTMENT FOR SUCTION CLEANER

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2 Claims. (Cl. 15—361)

The present invention relates to suction cleaners and more particularly to a suction cleaner provided with a device which facilitates propelling the cleaner over the surface being cleaned when the handle is in its upper inclined operating position.

In suction cleaners of the type provided with a pivotally mounted handle for moving the cleaner over the carpet being cleaned the end of the handle is raised during rearward movement of the cleaner and lowered during forward movement. At the end of the rearward movement of the cleaner the top of the handle is frequently disposed at a sharp angle to the cleaner body and when in such a position the operator finds it more difficult to initiate forward movement of the cleaner. The resistance to such forward movement of the cleaner is caused in part by the carpet clinging to the nozzle mouth. In the present invention a device is provided to break the suction seal between the nozzle lip and the carpet when the handle is toward the upper end of its operating range to eliminate the frictional resistance between the defining edge of the nozzle mouth and carpet to thereby reduce the effort required to begin the forward movement of the cleaner.

An object of the invention is to provide a new and improved suction cleaner for reducing the physical force required to initiate the forward movement of the cleaner. Another object is to provide a suction cleaner having a device to break the suction seal between the nozzle lip and the carpet being cleaned when the handle is toward the upper end of its operating range to thereby reduce the frictional resistance to movement of the cleaner over the carpet being cleaned. A further object is to provide a suction cleaner having a device to adjust the supporting wheels with respect to the cleaner body to break the suction seal between the nozzle lip and carpet when the handle is toward the upper limit of its operating range. Another object is to provide a device for controlling the handle positions. Other objects and advantages of the invention will become apparent from the following description and drawings wherein:

Figure 1 is a bottom view of a suction cleaner showing one embodiment of the invention;

Figure 2 is a side elevation showing the handle in the low operating position and the carpet engaging the nozzle mouth;

Figure 3 is a side elevation showing the handle toward the top of its operating range with the nozzle mouth raised from the carpet being cleaned;

Figure 4 is a side elevational view partly in section of another embodiment of the invention showing the handle and nozzle in different positions; and

Figure 5 is a view similar to Figure 4 but showing a third embodiment of the invention.

The embodiment of the invention disclosed in Figures 1 to 3 comprises a cleaner body provided with a nozzle 10 from which extends an air passageway 11 and a belt conduit 12 each terminating in a trunnion 13 on which is rotatably mounted a motor-fan unit housing 14 having a

fan chamber 15 provided with an inlet 16. Disposed in the housing 14 is an unshown motor having its shaft provided with a belt pulley 17 projecting into the belt conduit 12. A belt 18 extends from the pulley 17 through the conduit 12 to a surface agitating member 19 rotatably mounted in the nozzle 10. Disposed in the fan chamber 15 is a fan 21 driven by the unshown motor to create suction in the air passageway 11 and nozzle 10. An opening 22 is provided in the air passageway 11 opposite the fan eye 16 for reception of an unshown converter when it is desired to employ the cleaner for off-the-floor cleaning, and the opening 22 is normally closed by a removable cover 23. Extending from the fan chamber 15 is an outlet 24 to which the lower end of a bag 25, only partly shown, is attached and the latter is supported at its upper end to a handle 26 mounted on the housing 14 of the motor-fan unit for movement therewith. The nozzle 10 has a nozzle mouth 27 defined by a perimeter lip 28, and the agitator 19 projects below the lip 28 as indicated at 29 for engagement with the surface being cleaned.

The cleaner is supported on front wheels 30—30 and rear wheels 31—31, the latter being mounted on brackets 32—32 extending from the cleaner body. The front wheels 30 are rotatably mounted on the offset ends 33—33 of a shaft 34 having intermediate offset portions 35—35 which are rotatably attached to the cleaner body by brackets 36—36, and the mid-portion 37 of the shaft 34 is offset towards the rear of the cleaner. A pair of torsion springs 39 are each arranged about the shaft offsets 35 and have one end 40 attached to the shaft offset 35 and the opposite end 41 bears against a lug 42 projecting from the walls of the air passageway 11 and belt conduit 12. The torsion springs 39 rotate the wheel shaft 34 clockwise, as viewed in Figure 2, to urge the front wheels 30 toward the cleaner body and maintain the nozzle lip 28 in proper position with respect to the carpet being cleaned.

Mounted on the exterior of the housing 14 by means of a plurality of rivets 44 is a member 45 for controlling the position of the handle 26 and adjustment of the nozzle 10. The member 45 is provided with a projecting portion having a stop 46 at one end, a uniform arcuate sector 47 which merges at 48 into a bulged portion 49 terminating in a recess 50, all of which are adapted to move along the central section 37 of the front wheel shaft 34. The torsion springs 39 urge the shaft portion 37 against the member 45 to resistingly maintain the handle 26 in its different positions.

When the shaft portion 37 is against the stop 46 the handle 26 is supported in its lowest operating position as shown in Figure 2, and during oscillation of the handle 26 between the stop 46 and the bulge 49 the handle is resistingly held in position by engaging the shaft portion 37. Upon further upward movement of the handle 26 the bulge 49 rotates the shaft 34 about the pivotal axis 35—35 to depress the front wheels 30 with respect to the cleaner body and thereby raise the nozzle lip 28 from the carpet to break the suction seal. The bulge 49 is effective to break the carpet suction seal for substantially twenty degrees of handle movement. If the handle is moved to its storage position the shaft portion 37 seats in the recess 50 to hold the handle in such position.

In operating the cleaner the suction created by the fan 21 raises the portion 55 of the carpet 56 into engagement with the nozzle lip 28 and the belt 18 rotates the agitator 19 to vibrate the carpet portion 55 to loosen the dirt therefrom, and the suction air stream carries the dirt through the air passageway 11 into the fan chamber 15 from which it is discharged into the bag 25.

During forward and rearward movement of the cleaner over the carpet 56 the handle 26 is pivoted upwardly and downwardly. At the end of the rearward stroke of the

cleaner the handle is at its highest position of its normal operating range and such limit includes a portion of the bulge **49**, as shown in Figure 3. In this upper position of the handle **26** a greater physical force is required by the operator to initiate the forward stroke of the cleaner due to the high angular relation of the handle with respect to the cleaner body. However when the handle is in the position shown in Figure 3 the bulge **49** rotates the shaft **34** counterclockwise to move the front wheels **30** away from the cleaner body and thus raise the nozzle lip **28** from the carpet portion **55** to break the carpet suction seal. In breaking the suction seal the frictional resistance between the carpet **56** and the nozzle lip **28** is reduced as is also the downward pulling force of suction, whereby less force is required to move the cleaner on its forward stroke. After the cleaner has moved forward a relatively short distance it causes the handle **26** to pivot downwardly and the shaft portion **37** to engage the uniform arcuate sector **47**, and the torsion springs **39** urge the front wheels **30** toward the cleaner body to again position the nozzle lip **28** in suction sealing relation with the carpet portion **55** as shown in Figure 2.

During movement of the handle **26** to its different positions the torsion springs **39** urge the shaft portion **37** against the member **45** to resistingly maintain the handle in its different positions. The shaft portion **37** is in engagement with either the arcuate sector **47**, bulge **49** or recess **50** and thus the latter function to maintain the nozzle lip in different adjusted positions with respect to the carpet **56**. When the shaft portion **37** engages the arcuate sector **47**, the nozzle lip is adjusted for normal carpet cleaning, if the bulge **49** engages the shaft portion **37** the nozzle is adjusted to a suction seal breaking position, and when the recess **50** receives the shaft portion **37** the handle is in storage position and the nozzle is moved to another position with respect to the carpet **56**.

The embodiment of the invention disclosed in Figure 4 comprises a cleaner body substanially similar to that shown in Figures 1 to 3 and differs therefrom in the means for controlling the nozzle and handle positions. In the present construction the front wheel shaft is provided with a central portion **60** terminating at its opposite ends in an upwardly offset portion **61** pivotally mounted on the cleaner body by unshown brackets, while the extreme ends **62** of the shaft are offset rearwardly from the spaced shaft portions **61** and support the front wheels **30**.

Between the central shaft portion **60** and the sector **45** is a lever **65** pivotally supported at its upper end on a pin **66** carried by a bracket **67** secured by a screw **68** to the rear wall **69** of the nozzle **10**. The lever **65** is substantially U-shaped in cross section and supports at its lower end in the side walls **70—70** a pin **71** on which is rotatably mounted a roller **72** engaging the sector **45**. The upper end **73** of the side walls **70** abuts the bracket **67** to limit clockwise movement of the lever **65**. The central shaft portion **60** is urged clockwise by an unshown spring to at all times rest against the wall **74** of the lever **65**. A spring **75** has one end riveted to the lever wall **74** and the opposite end **76** slidably engages the nozzle rear wall **69** to urge the lever **65** in clockwise direction and maintain the roller **72** in engagement with the sector **45**.

In operating this embodiment of the invention, movement of the handle through the range indicated by the sector portion **47** does not alter the position of the nozzle lip **28** with respect to the rug **77** since the central shaft portion **60** abuts the walls **74** of the lever **65** and the latter is urged clockwise by the spring **75** so that the roller **72** rides against the uniform sector portion **47**, and such clockwise movement of the lever **65** is limited by the upper end **73** thereof abutting the bracket **67** as shown in full lines in Figure 4.

If the cleaner is moved rearwardly toward the body of the operator so that the handle **26** is pivoted upwardly at an acute angle with respect to the vertical, then the bulge **49** engages the roller **72** and pivots the lever **65** counterclockwise, and the latter rotates the central portion **60** of the wheel shaft counterclockwise to lower the front wheels **30** raising the nozzle lip **28** to break the suction seal with the carpet **77** indicated in dotted lines in Figure 4. Upon breaking the nozzle seal with the carpet the force of suction and the frictional resistance of the carpet is reduced so that the operator can more easily initiate forward movement of the cleaner. After the cleaner has traveled forwardly a short distance the handle **26** will be lowered into its operating range to bring the arcuate portion **47** into engagement with the roller **72** whereupon the spring **75** and the unshown spring for the wheel shaft move the lever **65** clockwise to lower the nozzle lip **28** and again adjust the nozzle to proper cleaning position.

When the handle is moved to the storage position shown in dotted lines in Figure 4 the roller **72** is disposed in the recess **50** to raise the nozzle for off-the-floor cleaning, by movement of the lever **65**, central portion **60** of the wheel shaft and the front wheels **30**, and thereafter the cover **23** is removed and the hose can be connected to the fan chamber for cleaning surfaces by suction alone.

The third embodiment of the invention is shown in Figure 5 and is similar to that disclosed in Figures 1 to 3 with the exception of the means for controlling the nozzle and handle positions. In the third embodiment the front wheel shaft has a central portion **80** at the opposite ends of which is an offset portion **81** pivotally mounted on the cleaner body **10** by suitable bracket means. Extending from each offset portion **81** is another eccentric shaft portion **82** on which the front wheels **30** are rotatably supported.

A lever **84** of U-shaped cross section is provided in its side walls **85** with a marginal slot **86** which seats on the shaft central portion **80**. Mounted on the lever side walls **85** is a pin **83** rotatably supporting a roller **87** which at all times engages the sector **45**. The upper end of the lever has a fulcrum point **88** bearing against a wall **89** of the body.

A spring **90** is attached to the nozzle rear wall **91** by rivets **92** and is provided with an upper spring arm **93** and a lower spring arm **94**, and the latter bears against the shaft central portion **80** to seat the latter in the slot **86** and urge the roller **87** in constant engagement with the sector **45** to limit movement of the lever and wheel shaft toward the cleaner body. The upper spring arm **93** bears against the end **96** of the lever **84** above the fulcrum point **88** to retain the latter against the wall **89**.

In the operation of this embodiment, movement of the handle **26** through the range indicated by the uniform sector surface **47** maintains the nozzle lip **28** in proper adjustment with respect to the carpet **97** shown in full lines, due to the lower spring arm **94** exerting a force on the roller **87** through the shaft central portion **80**. When the handle is raised so that the sector portion **49** engages the roller **87** the lever **84** is pivoted counterclockwise about the fulcrum **88** causing the shaft central portion **80** and the wheels **30** to be lowered and thereby raise the nozzle lip **28** to the position indicated with respect to the carpet **97** shown in dotted lines and thus break the carpet suction seal and reduce the effort required to initiate forward movement of the cleaner. The spring lower arm **94** exerts its force through the shaft portion **80** and lever **84** to maintain the roller **87** against all portions of the sector **45** and resistingly hold the handle **26** in adjusted position.

I claim:

1. A suction cleaner comprising a body, a nozzle on said body for engaging the carpet to be cleaned, a crank shaft movably mounted on said body adjacent said nozzle, a pair of body supporting front wheels on said shaft, a pair of body supporting wheels at the rear of said body and about which said nozzle pivots upon adjustment of said front wheels, a handle pivotally mounted on said body for rotation through a normal operating range during reciprocation of said cleaner over the carpet, sector

means movable with said handle and including means representing the major portion of said handle normal operating range operatively engaging said shaft for maintaining the latter and front wheels at one adjustment to arrange said nozzle in suction sealing position with the carpet during reciprocation of said handle through said major portion of said operating range, and means on said sector operative upon moving said handle into the upper limit of said handle normal operating range for shifting said crank shaft to lower said front wheels and pivot said body about said rear wheels to raise said nozzle from the carpet and break said suction seal.

2. A suction cleaner as described in claim 1, and means operatively connecting said sector means and crank shaft and including lever means movably mounted on said body and having means engaging said sector means and means engaging said crank shaft to effect said nozzle adjustments upon said movements of said handle.

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