# United States Patent

**Scott**

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## [54] VACUUM CLEANER


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[73] Assignee: **General Electric Company**



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[52] **U.S. Cl.** ..... **15/333,** 15/354

[51] **Int. Cl.** ..... **A47l 5/34**

[58] **Field of Search** ..... 15/332, 333, 354



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[57] **ABSTRACT**

An electric vacuum cleaner construction wherein a cam and lever arrangement is provided for readily adjusting the nozzle of a vacuum cleaner for cleaning carpets of various pile heights. The vacuum cleaner may also be quickly converted to operate off-the-floor vacuum tools.


**7 Claims, 11 Drawing Figures**

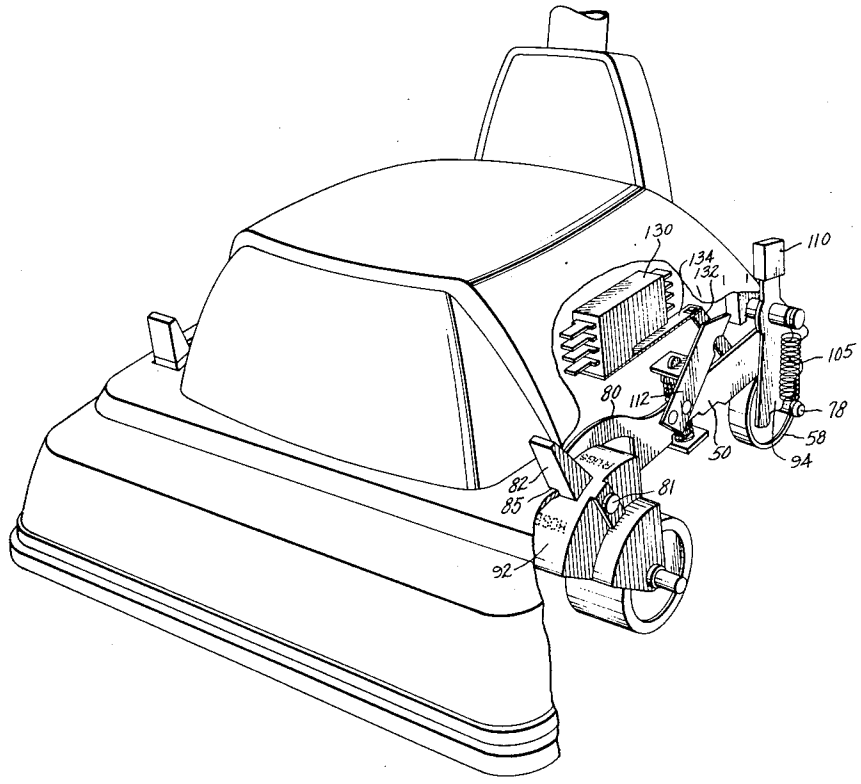


Fig. 1.

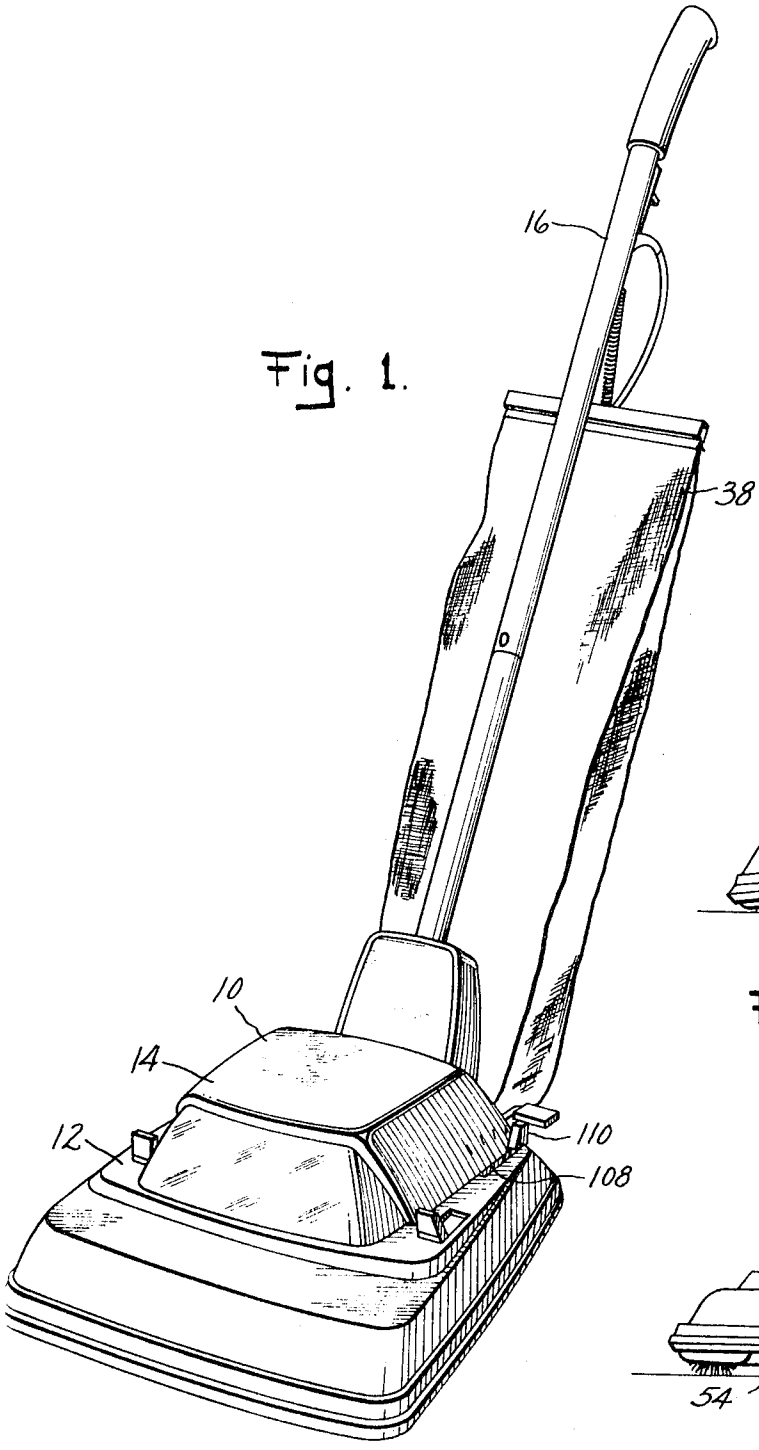



Fig. 2.

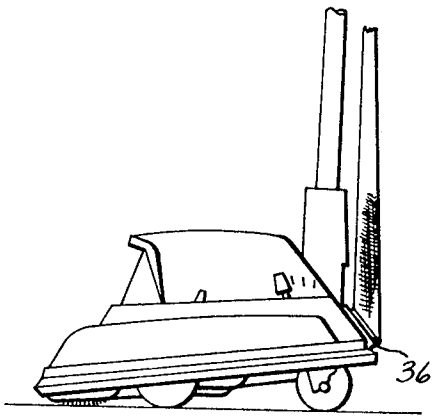
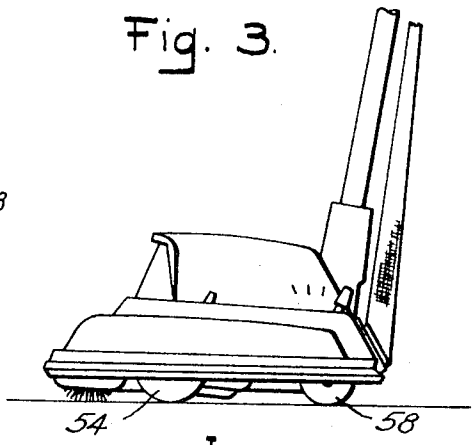



Fig. 3.




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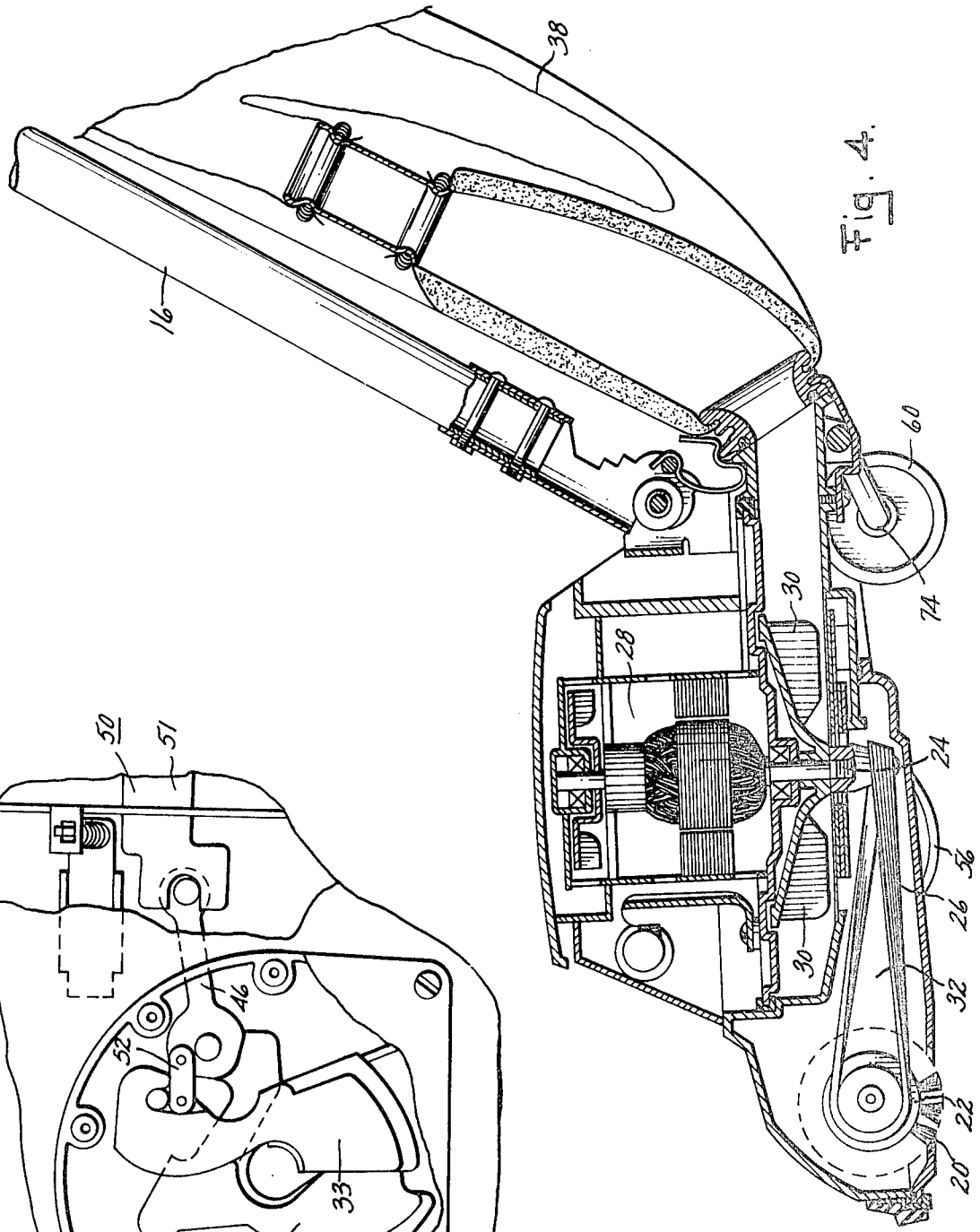



Fig. 4.

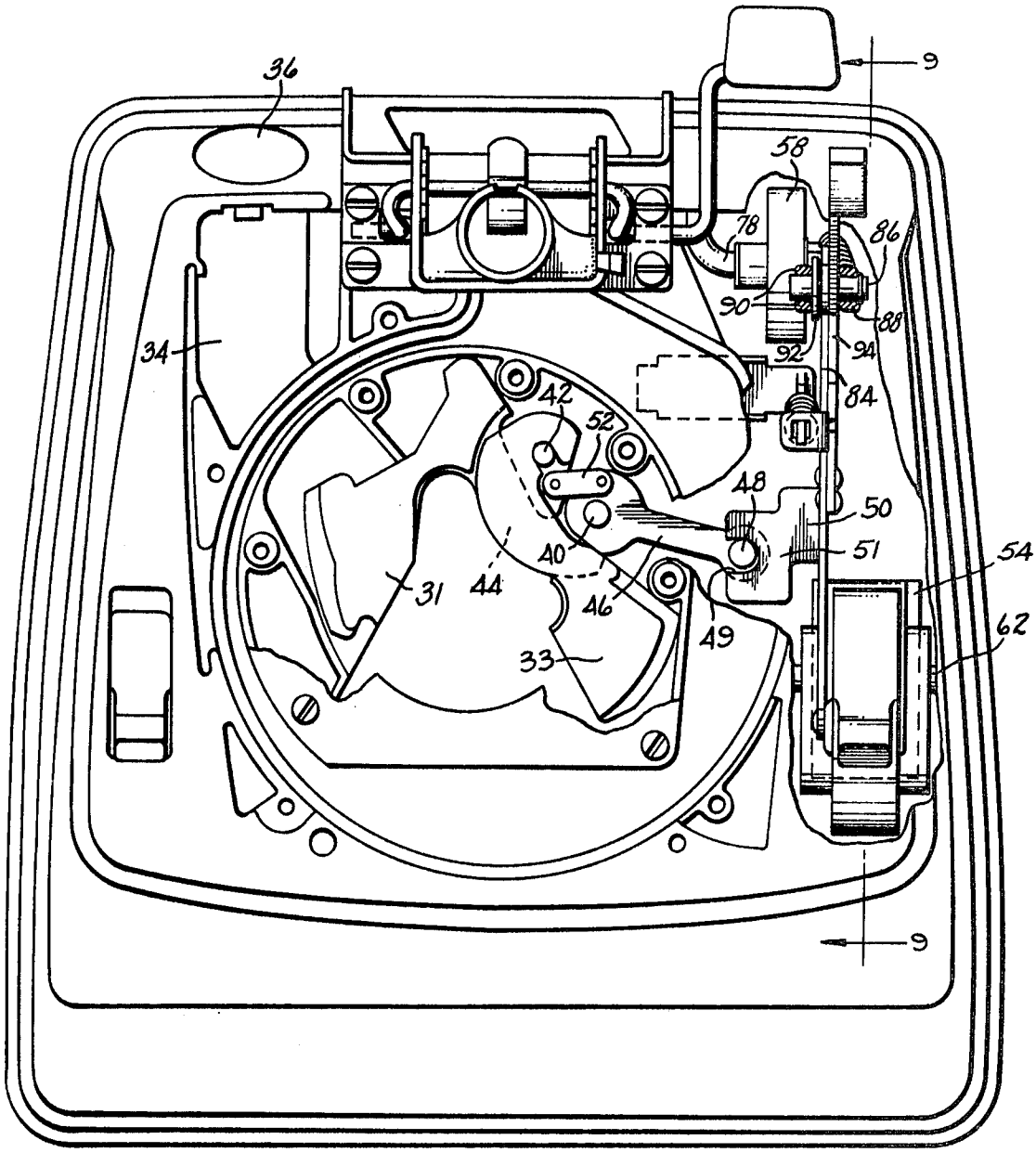



Fig. 6.

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Fig. 5.




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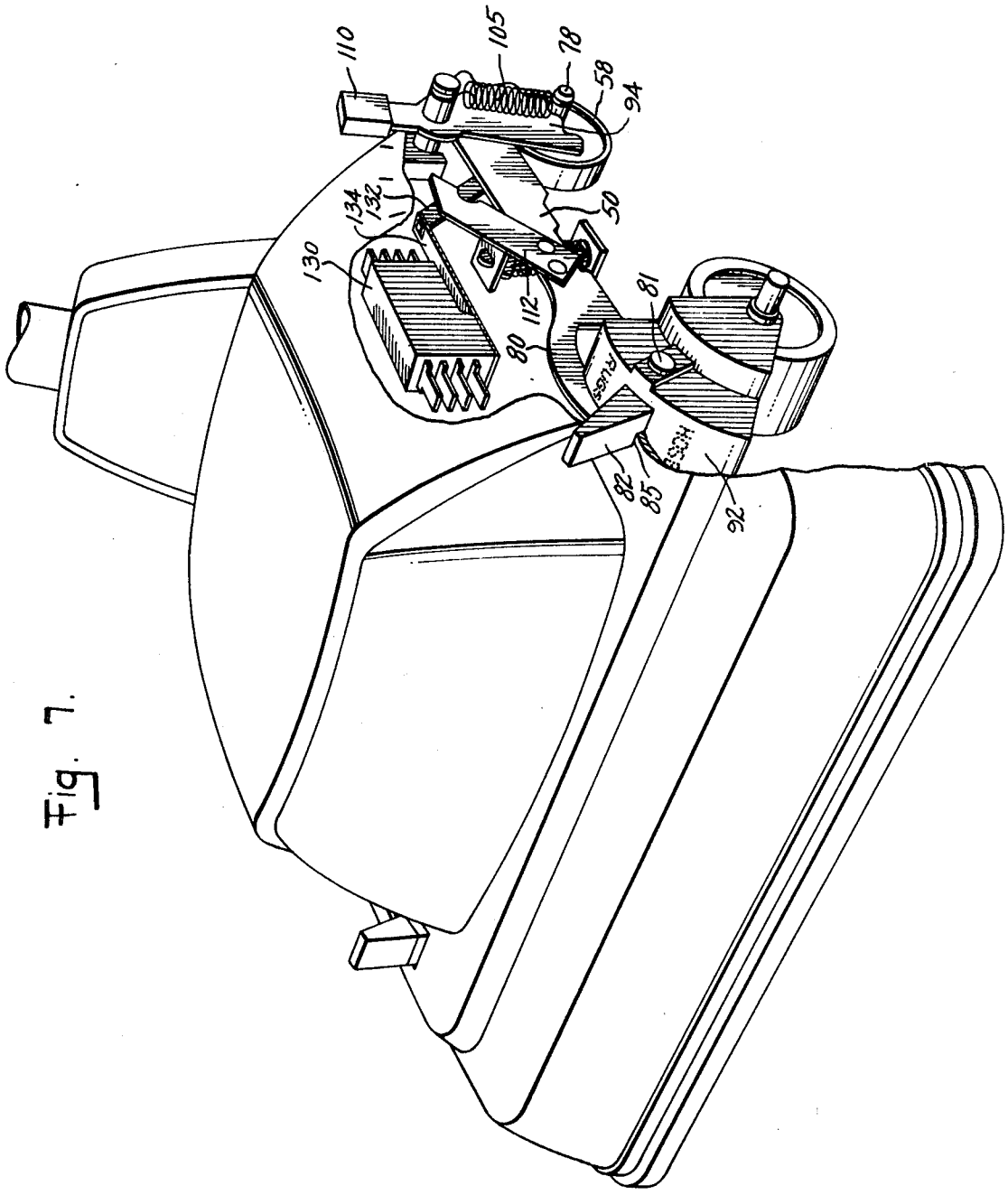



Fig. 7.

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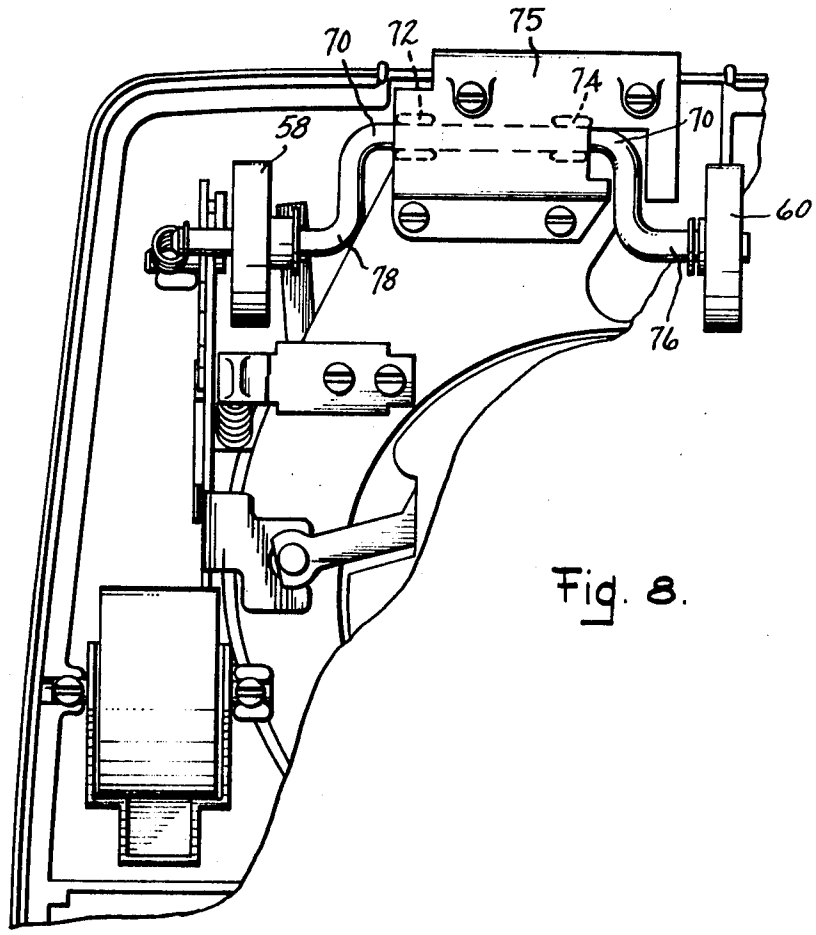



Fig. 8.

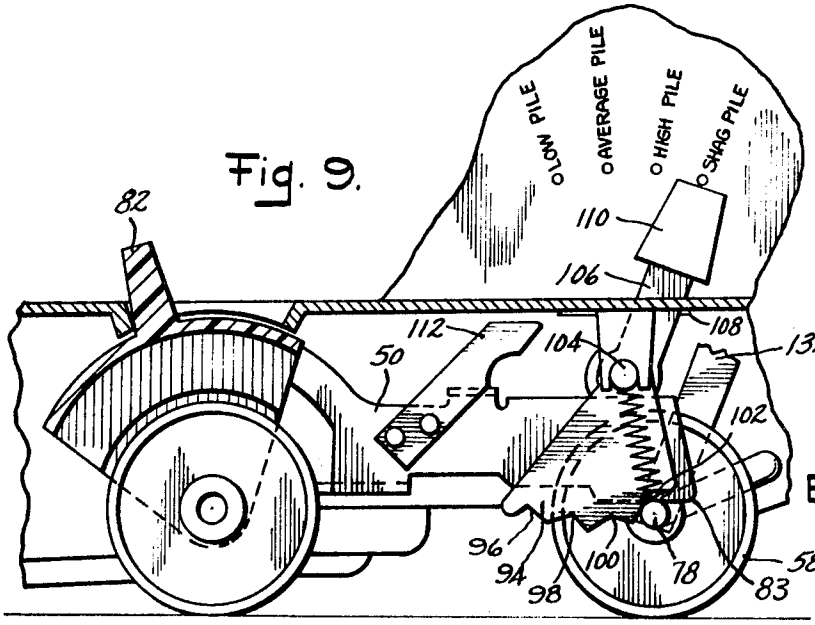



Fig. 9.

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Fig. 10.

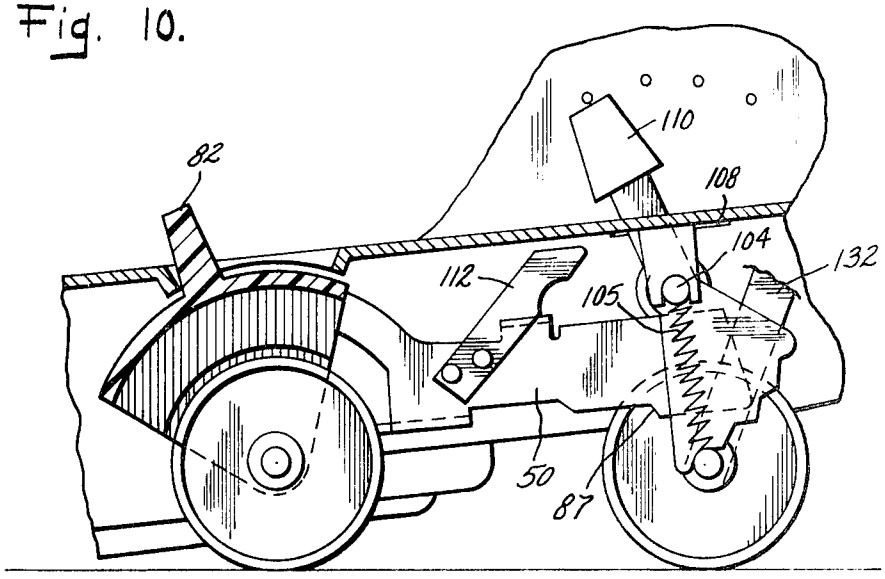
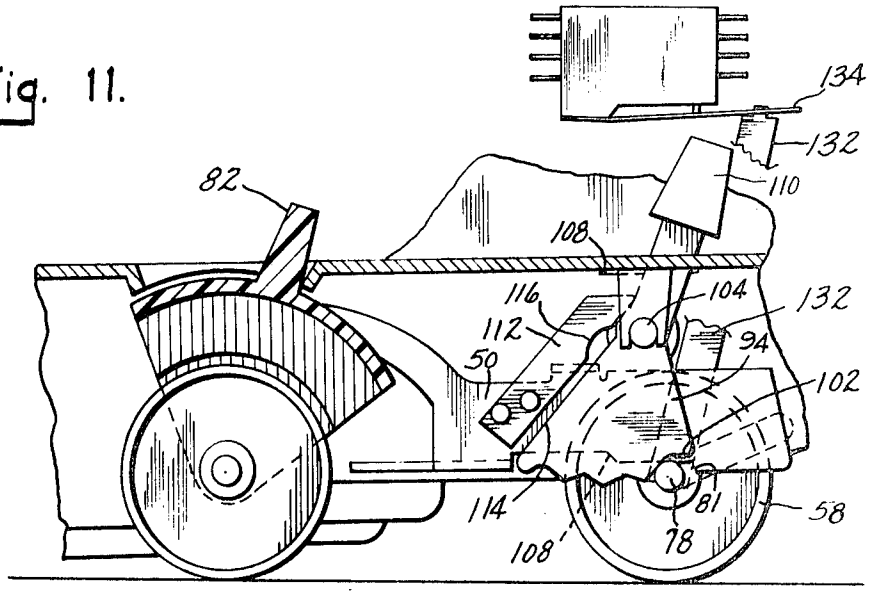



Fig. 11.




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# VACUUM CLEANER

## BACKGROUND OF THE INVENTION

This invention relates to a vacuum cleaner of the upright type which is operable to clean floor surfaces and also off-the-floor objects such as draperies and furniture, and more particularly, to such a vacuum cleaner which may also be readily converted for efficiently cleaning shag rugs and other high pile rugs.

In a prior U.S. Pat. No. 3,217,351 to F. P. Hayba, assigned to the same assignee as the present invention, there is disclosed a mechanism for converting a vacuum cleaner from floor cleaning to off-the-floor cleaning; i.e., the cleaning of household furniture, draperies and the like. A lever mechanism is provided to simultaneously raise a floor nozzle and rotating brush, shut off suction air to the floor nozzle, and provide suction air at an air coupling for attachments for off-the-floor cleaning. The lever may be moved to one of two positions. In one position the floor nozzle is lowered, a two-speed motor switch for a suction fan is moved to its low speed position and the vacuum cleaner is set for cleaning floors. In the other position a cam lever is actuated to pivot the rear wheels to move the floor nozzle and rotating brush to their upper position, the two-speed motor switch is positioned in its high speed position, and the source of suction is shut off from the floor nozzle, but is opened to the attachment coupling. This invention is concerned with such a vacuum cleaner combined with a low cost simple cam mechanism which may be readily added to such a vacuum cleaner for providing not two, but four separate height settings for the rear wheels of a vacuum cleaner in order to achieve four different floor nozzle height adjustments. MOreover, with my invention, the cam mechanism is uniquely related to the motor switch for the suction fan, and a shutter for allowing communication from the suction fan to either the floor nozzle or the attachments coupling, that the floor nozzle height, fan speed and shutter position may be readily set by a housewife.

## SUMMARY OF THE INVENTION

Accordingly, it is a particular object of my invention to provide an upright vacuum cleaner with an improved low cost control mechanism for setting the vacuum cleaner to clean carpets of various pile heights, including shag rugs, and which may also be readily converted for cleaning draperies, furniture and other off-the-floor objects.

It is also an object of my invention to provide an improved vacuum cleaner control which may be uniquely and easily combined with a vacuum cleaner control of the type disclosed in the above mentioned U.S. Pat. No. 3,217,351.

In accordance with one of the aspects of my invention, a vacuum cleaner includes a generally horizontally disposed floor cleaning nozzle positioned at the front of the vacuum cleaner. One suction air passage connects a suction fan with the floor cleaning nozzle and another air passage is provided between the suction fan and an attachment coupling for off-the-floor cleaning. A shutter is positioned in both of the air passages for selectively connecting either the floor nozzle or the attachment air coupling to the suction fan. A manually movable means is provided for moving the shutter to open or close the air passage to the floor nozzle, and a separate manually adjustable means is provided for selectively adjusting the height of the floor nozzle to any one of a plurality of positions whenever the shutter has been moved to open the air passage to the floor nozzle. The adjustment mechanism also includes a uniquely positioned stop for preventing manual adjustment of the height of the floor nozzle whenever the shutter has been moved to open the air passage to the attachments coupling.

With this construction the floor nozzle can be moved to a plurality of positions but cannot be moved into contact with the carpet when the vacuum cleaner is being used for off-the-floor cleaning. Thus, whenever the vacuum cleaner is being used for off-the-floor cleaning, my unique adjustment mechanism insures that the floor nozzle and the rotating brush positioned within the floor nozzle will be located above the carpet to thereby prevent damage to the carpet whenever the vacuum cleaner is being used for above the floor cleaning. This adjustment mechanism is accomplished with the use of a minimum number of parts which are readily combined with each other. Thus, an exceedingly simple unique vacuum cleaner control has been achieved.



## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and attendant advantages of this invention will be apparent from the following description taken in connection with the accompanying drawing in which:

FIG. **1** is a perspective view of a vacuum cleaner incorporating the present invention;

FIG. **2** is a fragmentary side elevation view of the cleaner shown in FIG. **1**, showing the floor nozzle in floor cleaning position with the rear wheels lowered;

FIG. **3** is similar to FIG. **2** but shows the rear wheels retracted so as to allow the vacuum cleaner to pivot about its front wheels to raise the floor cleaning nozzle away from the floor surface;

FIG. **4** is a side view partially in section of the vacuum cleaner shown in FIG. **1**;

FIG. **5** is a fragmentary top plan view of the vacuum cleaner shown in FIG. **1**, showing the shutters in their floor cleaning position;

FIG. **6** is a fragmentary top plan view of the vacuum cleaner shown in FIG. **1**, showing the shutters in their off-the-floor cleaning position;

FIG. **7** is a perspective view of the vacuum cleaner shown in FIG. **1**, some of the parts being broken away or removed to show details of construction;

FIG. **8** is a fragmentary bottom plan view of the vacuum cleaner shown in FIG. **1**;

FIG. **9** is a fragmentary sectional view taken along the line **9—9** of FIG. **5**, showing the vacuum cleaner in the position for cleaning shag pile rugs;

FIG. **10** is a fragmentary sectional view taken along the line **9—9** of FIG. **5** showing the vacuum cleaner in the position for cleaning indoor/outdoor carpets having low pile; and

FIG. **11** is a fragmentary sectional view taken along the line **9—9** of FIG. **5**, showing the vacuum cleaner in the "HOSE" position for off-the-floor cleaning.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and especially to FIGS. **1**, **2** and **3**, there is shown a vacuum cleaner generally designated by the reference numeral **10** embodying my improved cam and lever arrangement for readily adjusting the vacuum cleaner for cleaning carpets of various pile heights. The vacuum cleaner includes a base portion **12** having a hood **14**. Conventionally, an upwardly extending handle **16** is mounted at the rear of the base portion for moving the vacuum cleaner over a floor to be cleaned.

As shown in FIG. **4**, a suction air inlet nozzle **20** is located within the forward portion of the base, and a rotary brush **22** is mounted in the suction nozzle **20** so as to be in contact with a floor surface when the cleaner base is in the position illustrated in FIG. **2**. The rotary brush **22** is connected in driven relationship to a motor shaft **24** by means of an endless belt **26**. The vacuum cleaner also includes a motor fan unit **28** mounted within the base of the cleaner for providing a source of suction which may be utilized by vacuum tools for cleaning draperies, furniture and other off-the-floor objects. A plurality of fan blades **30** are positioned below the electric motor portion of the motor fan unit **28**, and thus, a source of suction is produced immediately below the fan blades **30**. An air passage **32** is located between the fan blades and the floor cleaning nozzle **20** which is generally horizontally disposed along the front of the vacuum cleaner, and as shown more particularly in FIG. **5** a secondary air passage **34** is provided within the

base of the vacuum cleaner between the suction fan **30** and an attachments coupling member **36**.

As shown more particularly in FIGS. **5** and **6**, shutter members **31** and **33** are positioned immediately below the fan blades **30** for selectively opening or closing the air path **32** to the floor nozzle **20** or the air path **34** to the attachments coupling opening **36**. When the shutters are in their spread apart or opened position illustrated in FIG. **5**, the air path **32** to the floor nozzle is opened and the air path **34** to the attachments coupling opening is closed. With the shutters in this position, suction air flows inwardly through nozzle **20**, past brush **22**, through air passage **32**, past shutters **31** and **33**, through the fan **30** to a filter bag **38** which may be connected to the operating handle **16** and the base of the vacuum cleaner in a conventional manner. When the shutters **31** and **33** are moved toward each other to the position illustrated in FIG. **6**, the shutters cooperate with each other to close the air path **32** to the nozzle **20** of the vacuum cleaner and open the air path **34** to the attachments coupling **36**. As illustrated more particularly in FIGS. **4** and **6**, when the shutters are moved to this position, the shutter **31** exposes a portion of the fan **30** to the air passage **34**, thus opening the attachments air passage **34** to the source of suction immediately below the fan blades **30**.

Referring now to FIG. **5**, it can be observed that shutter **31** is mounted for pivotal movement about a pivot pin **40**, and shutter **33** is mounted for pivotal movement about pivot pin **42**. A connecting portion **44** is an integral part of shutter **31**, and likewise, lever arm **46** is integral with or otherwise fixed to connecting portion **44**. The free end of lever arm **46** is provided with a projecting stud **48** arranged to ride in a slot **49** formed in a shutter operating lever **50**.

As shown more particularly in FIG. **5**, shutter **33** is mounted for simultaneous movement with the shutter **31**. As illustrated, shutter **33** is pivotally mounted on pivot pin **42** and a link **52** is pivotally connected at one end to lever arm **46** and at its other end to the shutter **31**. With this construction, when the shutter operating lever **50** is in its forward position as illustrated in FIG. **5**, the shutters are in their spread apart or opened position to open the air path **32** to the floor nozzle **20** and close the path to the adjustments coupling opening **36**, and when the shutter operating lever **50** is moved rearwardly from the position shown in FIG. **5** to the position illustrated in FIG. **6**, operating lever **46** and link **52** are actuated to close the shutters. It can be appreciated that in the position illustrated in FIG. **6**, the suction air passage to the floor nozzle is closed and the path to the adjustments coupling **36** is opened.

The structure so far described is illustrated and described in greater detail in the above mentioned U.S. Pat. to Hayba No. 3,217,351, assigned to the same assignee as the present invention.

As shown in FIGS. **4** and **5**, the base of the vacuum cleaner is supported for movement on a floor surface by two wheels **54** and **56** located at the front of the vacuum cleaner and wheels **58** and **60** located at the rear of the vacuum cleaner. Axles **62** and **64** on which the front wheels **54** and **56** are respectively mounted are fixedly secured to the base of the vacuum cleaner, while the rear wheels **58** and **60** are respectively mounted on offset axle portions **76** and **78** of an axle **70**. As shown in FIG. **5**, axle **70** is mounted for pivotal movement on the casing in a pair of bosses **72** and **74** which are integrally formed with the casing. The central portion of axle **70** rests in bosses **72** and **74** and is held in place by a plate **75** as shown in FIG. **8**. Thus, rear wheels **58** and **60** are pivotally mounted for limited vertical movement with respect to the base of the vacuum cleaner so that they may be retracted to the uppermost position illustrated in FIG. **3** or lowered to a position as illustrated in FIG. **2** in which brush **22** contacts the floor surface. It can be appreciated that the floor nozzle is placed in its raised position when the cleaner is used for off-the-floor cleaning purposes, and that in this manner agitation of a single portion of the floor surface by rotary brush **22** during such cleaning is prevented.

## SHUTTER OPERATING MECHANISM

The shutter operating mechanism of the instant invention is somewhat the same as the shutter mechanism disclosed in U.S. Pat. No. 3,217,351; however, it has been modified so that it cooperates with the rear wheels, and particularly, the offset portion **78** of the rear wheel axle **70** in a manner completely different form the arrangement illustrated in U.S. Pat. NO. 3,217,351. As shown more particularly in FIGS. **5** and **7**, the basic part of the shutter operating mechanism is an elongated slidable shutter operating mechanism is an elongated slidable shutter actuating lever **50**. The lever **50** includes a generally horizontal inwardly extending portion **51** for cooperating with shutter lever **46** to operate the shutters, a generally upwardly extending vertical portion **80** which is pivotally connected at **81** to a manual operating lever **82**, and a rearwardly extending generally vertical slide guide portion **84**. As shown more particularly in FIG. **5**, the slide guide portion **85** is arranged for sliding and guided movement on a roller member **86** which is pivotally mounted on depending bosses **88** and **90** which are integrally formed with and extend downwardly from the base of the vacuum cleaner. In order to prevent transverse movement of the shutter operating lever, an annular flange **92** may be integrally formed with the roller member **86** for preventing lateral movement of the lever **50** inwardly toward wheel **58**.

Referring now to FIG. **7**, it can be seen that the manual operating lever **82** extends upwardly thru an opening **84** formed in the base of the vacuum cleaner, and includes a lower curved portion **92** which is positioned immediately below the opening **85** for effectively closing the opening when the manual operating lever is moved to either one of the shutter positions. Suitable idicia, such as "HOSES" and "RUGS" may be printed or otherwise inscribed on the curved surface **92** for indicating the position of the shutters. It can be appreciated that hoses and similar coupling devices can be connected to the attachments coupling **36**, and thus, the idicia "HOSES" is inscribed on the curved surface **92** to indicate this position. When the manual operating lever **82** is in the "RUGS" position illustrated in FIG. **7**, the shutters **31** and **33** are in their open position illustrated in FIG. **5** to thereby open the air passage from the fan to the floor nozzle **20**. Conversely, when the operating lever **82** is moved rearwardly to its "HOSE" position, the shutter operating lever **50** including its inwardly extending generally horizontal portion **51** is moved to the position illustrated in FIG. **6** to close the shutters thereby closing the air passage to the floor nozzle **20**, and opening the air passage to the adjustments coupling.

In accordance with my invention, a cam member **94** is uniquely formed and positioned with respect to the shutter operating lever **50** and the axle **78** of wheel **58** for raising or lowering the rear wheels to any one of five different operating positions for selectively adjusting the floor nozzle to clean carpets having low pile, medium pile, or high pile, and for also moving the wheels to an upper position for cleaning shag rugs, and an uppermost position when the vacuum cleaner is converted for off-the-floor cleaning. Thus, the nozzle will be raised high enough so that the rotating brush **22** will not damage the pile of the carpeting during off-the-floor cleaning.

As shown more particularly in FIG. **10**, the cam member **94** may be formed of a piece of sheet metal and is generally fan shaped to provide four separate depressions **96**, **98**, **100** and **102** for selectively adjusting the axle **78** of the rear wheels to any one of its desired positions. As illustrated, the fan shaped lever **94** is provided with a pivot aperture **104** for receiving an axle portion of guide roller **86**. A tension spring **105** is connected at one end to the axle **78** for wheel **58** and at the other end to the axle **85** of guide roller **86** for spring urging the axle **78** into contact with the depressions **96**, **98**, **100** and **102** which are formed along the lower surface of cam **94**.

With reference to FIG. **5**, it can be seen that the cam lever **94** is sandwiched between the rearwardly extending portion **84** of the shutter adjusting lever **50** and a downwardly extend-

ing boss 90 for holding the guide roller 86. With this arrangement, not only is the cam lever 94 guided and prevented from substantial lateral movement by its cooperation with rearwardly extending slide 84, but the slide 84 is guided and prevented from substantial lateral movement since it is sandwiched between the cam lever 94 and an outwardly extending annular flange 92 which is formed on the guide roller 86. With reference to FIG. 9, it can be seen that the cam lever 94 includes a generally vertical portion 106 which extends upwardly thru a slot 108 formed in the base of the vacuum cleaner for receiving a manually operable knob 110. With this construction, the manually operable knob 110 may be selectively moved to any one of four positions for raising or lowering the rear wheels of the vacuum cleaner. When the manually adjustable knob 110 is rotated to the left to the position illustrated in FIG. 10, wherein offset axle portion 78 is positioned within notch 96, the rear wheels are in their fully extended position, and thus, the floor nozzle 20 is in its lowest position for cleaning low pile carpets. When the actuating lever 106 is moved so that the axle portion 78 is positioned within notch 98 the rear wheels are raised somewhat to position the floor nozzle in its "medimum pile" position. When the axle portion 78 is positioned within notch 100, the floor nozzle 20 is raised to its "high pile" position.

When the cam 94 is rotated so that the axle portion 78 is positioned directly below notch 102, the nozzle 20 may be placed in either its uppermost position for off-the-floor cleaning or a position slightly lower than the uppermost position for cleaning shag rugs.

In other words, when the cam 94 is rotated to the position illustrated in FIGS. 9 and 11, the height of the rear wheels is determined by the position of slide 50 which may be moved to its rear most "HOSE" position illustrated in FIG. 11 or its forward "RUGS" position illustrated in FIG. 9. In the "RUGS" position illustrated in FIG. 9, it can be seen that a lower rear surface 83 on the slide 50 provides a stop for preventing upward movement of offset axle portion 78 into depression 102 under the influence of tension spring 105. Thus, with the cam 94 in its shag pile position and the guide slide 50 in its "RUGS" position, the rear wheels of the vacuum cleaner are located in a position slightly lower than their uppermost position for achieving a shag rug position. When the guide slid 50 is moved to rearwardly to the position illustrated in FIG. 11, an enlarged notch 87 formed in the lower surface of the guide slide 84 permits the tension spring 105 to move the offset axle portion 78 upwardly into the uppermost notch 102 of cam 94 to thereby permit the wheels to be retracted to their uppermost position under the influence of tension spring 105. Accordingly, the uppermost off-the-floor cleaning position of the rear wheels is achieved when the cam 94 is positioned in the shag rug position, and the shutter actuating lever 82 is in the "-HOSE" position.

From the description thus far it can be seen that the operating cam lever 94 may be moved to any one of four positions for selectivity adjusting the height of the vacuum cleaner nozzle. With my unique arrangement of the cam lever 94 and the generally horizontal portion 84 of the slide lever, five different adjustments may be made in the height of the wheels 58 with respect to the floor. The first three adjustments, namely the position of the wheels for cleaning carpets having low pile, average pile and high pile are achieved by rotating the cam 94 so that the axle 78 of wheel 58 is positioned within depressions 96, 98 or 100 respectively. The fourth position of the wheel axle for cleaning shag rugs is achieved not by having the axle positioned within depression 102, but by having the axle of the wheel placed into abutment with the lower surface 83 of guide slide 84. As shown more particularly in FIG. 9, when the handle 110 for cam 94 is moved rearwardly so that depression 102 is in the vicinity of the wheel axle 78 and the manual actuating lever 82 is in its forward "RUG" position, the wheel axle cannot enter the depression 102 since it is placed into contact with the lower surface 83 of guide slide 84, and thus, it is spaced from the highest wheel adjustment depression 102. Accordingly, with this arrangement, it is the lower surface 83 of the guide slide 84 that provides the fourth carpet height adjustment for shag rugs, as shown in FIG. 9. The fifth and highest wheel height adjustment for lifting the brush 22 and the nozzle 20 to its highest position above the floor to be cleaned is achieved when the shutter operating guide slide is in the position illustrated in FIG. 11, and the offset axle portion 78 is restricted from further upward movement under the influence of spring 105 by its abutment with the notch 102 formed in cam 94.

In accordance with my invention a unique and yet very simple mechanism is provided for automatically moving the cam 94 to the position illustrated in FIG. 11 to thereby move the floor nozzle 20 to its highest position whenever the shutter actuator lever 50 is moved to the attachments or "HOSE" position. With this unique arrangement, whenever the operator of the vacuum cleaner converts the vacuum cleaner for off-the-floor cleaning by manually moving lever 82, the nozzle 20 and rotating brush 22 of the vacuum cleaner are automatically moved to their uppermost position without requiring the operator to think about separately adjusting any other part of the vacuum cleaner. This unique adjustment mechanism is achieved with the use of a single additional part. As shown more particularly in FIG. 11, an upwardly extending stop lever 112 is riveted or otherwise secured at an angle to a side surface of the shutter adjusting lever 50. Thus, whenever the shutter adjusting lever 50 is moved from its "RUG" position illustrated in FIG. 10 to its "HOSE" position illustrated in FIG. 11, the stop lever 112 abuts the left side surface 114 of cam 94 to automatically move the cam 94 to the position as illustrated in FIG. 11 thereby retracting the rear wheels to their uppermost position to move the floor nozzle 20 to its uppermost position for off-the-floor cleaning. With this construction, it can also be appreciated that the lever 112 also acts as a stop to prevent movement of the cam 94 by its manual actuator knob 110 whenever lever 112 has been moved to the position illustrated in FIG. 11. When any attempt is made to move the cam 94 from the position illustrated in FIG. 11 by pushing knob 110 of the cam lever to the left, such motion is prevented since the cam lever 94 is effectively locked between the axle 78 and lever 112. To further achieve this locking action, the lever 112 is provided with a semi-circular recess 116 at its upper end for receiving a portion of the guide roller shaft 104.

As described above, it can be seen that the vacuum cleaner may be adjusted for cleaning low pile, medimum pile, high pile and shag pile carpets, and may also be adjusted for off-the-floor cleaning. This is accomplished by adjusting the position of the levers 82 and 106. Another respect in which it is desirable to alter the functional characteristics of the vacuum cleaner concerns the speed of motor fan unit 28. In off-the-floor cleaning a relatively long flexible hose 39 is utilized to connect a cleaning tool to air inlet 36. The degree of suction produced at the end of a hose of this nature is not as great as the degree of suction produced at the point where it is attached to the vacuum cleaner casing since the inner surfaces of the hose cannot be made perfectly smooth and they therefore offer some resistance to the flow of air through the hose. Hence, in off-the-floor cleaning it is desirable to increase the speed of motor-fan unit 28 so as to compensate for this loss suction. This additional function is simultaneously accomplished upon movement of lever 82 from its floor cleaning position illustrated in FIG. 10 to its off-the-floor cleaning position illustrated in FIG. 11.

As shown more particularly in FIG. 7, a switch 130 is provided for changing the motor speed setting from high speed operation to low speed operation. It can be seen that the speed changing switch 130 is mounted within the base of the vacuum cleaner in overlying relationship with respect to the rear wheel axle 78, switch actuating link 132 extends from a switch operating blade 134 to the rear wheel axle 78 and the link 132 may be conveniently mounted on the axle by simply providing it with a circular aperture which is received by axle 78. Thus, in assembling wheel 58 to its axle 78, the link 132 is first posi-

tioned over the axle **78** followed by the wheel **58**. With this arrangement, the position of the rear wheel axle **78** determines the position of the switch operating link **132**, and the position of switch blade **134** determines the switch setting for achieving high speed or low speed fan operation. The switch blade **134** is so related to the construction within the switch housing **130** that whenever the wheel axle **78** is placed in the depressions **96**, **98**, or **100** of cam **94** or on the lower surface **83** of slide **84**, the switch is in its low speed position for cleaning rugs of various heights, as shown in FIG. **7**. When the switch operating blade **134** is moved substantially upwardly from the position illustrated in FIG. **7** to the position illustrated in FIG. **11**, the switch is moved to the high fan speed operating position. As shown in FIG. **11**, in this position the wheel axle **78** is positioned upwardly on depression **102** within the notch **108** formed in lever **82**. Thus, the nozzle **20** and the brush **22** are in their highest position to prevent damage to the carpet pile when the vacuum cleaner is being used for cleaning off-the-floor objects, such as draperies.

From the foregoing description, it will be appreciated that my improved mechanism for adjusting the height of the floor nozzle **20** and setting the vacuum cleaner for floor cleaning or off-the-floor cleaning may be uniquely combined with the prior art vacuum cleaner adjustment structure illustrated in U.S. Pat. No. 3,217,351 by the addition of only two easily manufactured and assembled parts. The cam lever **94** and the stop lever **112** may be formed in a simple stamping operation and may be readily assembled to the other parts of the vacuum cleaner adjustment mechanism. The stop lever **112** may be riveted or otherwise secured to the shutter lever **50**, and the cam lever **94** may be readily mounted on and pivoted to an existing guide roller shaft **104**. The parts are assembled and constructed so that they are guided with respect to each other during operation of the adjustment mechanism. Thus, an exceedingly simple, yet positive and reliable vacuum cleaner adjustment mechanism has been achieved with the use of a minimum number of parts.

What I claim is:

**1.** An electric vacuum cleaner comprising:

a. a floor cleaning nozzle generally horizontally disposed along the front of the vacuum cleaner;

b. a suction creating means disposed in said vacuum cleaner;

c. air passage means located between said suction creating means and said floor nozzle;

d. a suction air attachment coupling positioned on said vacuum cleaner for permitting off-the-floor vacuum tools to be connected to the vacuum cleaner;

e. suction air passage means positioned between said suction creating means and said coupling means;

f. shutter means positioned in the suction air passage to said nozzle and the suction air passage to said suction coupling for selectively connecting either the floor nozzle or the attachment coupling to said source of suction;

g. first manually adjustable means for selectively adjusting the height of the floor nozzle to any one of more than three positions for cleaning carpets of various pile heights;

h. second manually movable means for moving the shutter means to open the suction air passage to the attachment coupling and for simultaneously moving the floor nozzle to its highest nozzle position whereby the nozzle is automatically raised above the floor whenever the vacuum cleaner is converted for suction off-the-floor cleaning; and

i. means for preventing manual movement of said adjustable means whenever the shutter has been moved to its off-the-floor cleaning position.

**2.** An electric vacuum cleaner comprising:

a. a floor cleaning nozzle generally horizontally disposed along the front of the vacuum cleaner;

b. a suction creating means disposed in said vacuum cleaner;

c. air passage means located between said suction creating means and said floor nozzle;

d. a suction air attachment coupling positioned on said vacuum cleaner for permitting off-the-floor vacuum tools to be connected to the vacuum cleaner;

e. suction air passage means positioned between said suction creating means and said coupling means;

f. shutter means positioned in the suction air passage to said nozzle and the suction air passage to said suction coupling for selectively connecting either the floor nozzle or the attachment coupling to said source of suction;

g. first manually adjustable means for selectively adjusting the height of the floor nozzle to any one of more than three positions for cleaning carpets of various pile heights;

h. second manually movable means for moving the shutter means to open the suction air passage to the attachment coupling and for simultaneously moving the floor nozzle to its highest nozzle position whereby the nozzle is automatically raised above the floor whenever the vacuum cleaner is converted for suction off-the-floor cleaning;

i. said first manually adjustable means for selectively adjusting the height of the floor nozzle including a cam having three depressions for setting the floor nozzle for cleaning low pile, medium pile and high pile rugs and a depression for setting the floor cleaning nozzle to its highest position for off-the-floor cleaning; and

j. said second manually movable means for moving the shutter including a stop surface for adjusting the height of the floor cleaning nozzle to a high pile shag rug position when the first adjustable cam means has been moved to its highest nozzle position.

**3.** An electric vacuum cleaner comprising:

a. a floor cleaning nozzle generally horizontally disposed along the front of the vacuum cleaner;

b. a suction creating means disposed in said vacuum cleaner;

c. air passage means located between said suction creating means and said floor nozzle;

d. a suction air attachment coupling positioned on said vacuum cleaner for permitting off-the-floor vacuum tools to be connected to the vacuum cleaner;

e. suction air passage means positioned between said suction creating means and said coupling means;

f. shutter means positioned in the suction air passage to said nozzle and the suction air passage to said suction coupling for selectively connecting either the floor nozzle or the attachment coupling to said source of suction;

g. first manually adjustable means for selectively adjusting the height of the floor nozzle to any one of more than three positions for cleaning carpets of various pile heights;

h. second manually movable means for moving the shutter means to open the suction air passage to the attachment coupling and for simultaneously moving the floor nozzle to its highest nozzle position whereby the nozzle is automatically raised above the floor whenever the vacuum cleaner is converted for suction off-the-floor cleaning; and

i. an abutment stop fixed to the second manually movable means for moving the first adjustable cam means to its highest nozzle position when the second manually movable means is moved to its off-the-floor cleaning position.

**4.** An electric vacuum cleaner comprising:

a. a floor cleaning nozzle generally horizontally disposed along the front of the vacuum cleaner;

b. a suction creating means disposed in said vacuum cleaner;

c. air passage means located between said suction creating means and said floor nozzle;

d. a suction air attachment coupling positioned on said vacuum cleaner for permitting off-the-floor vacuum tools to be connected to the vacuum cleaner;

e. suction air passage means positioned between said suction creating means and said coupling means;
f. shutter means positioned in the suction air passage to said nozzle and the suction air passage to said suction coupling for selectively connecting either the floor nozzle or the attachment coupling to said source of suction;
g. first manually adjustable means for selectively adjusting the height of the floor nozzle to any one of more than three positions for cleaning carpets of various pile heights;
h. second manually movable means for moving the shutter means to open the suction air passage to the attachment coupling and for simultaneously moving the floor nozzle to its highest nozzle position whereby the nozzle is automatically raised above the floor whenever the vacuum cleaner is converted for suction off-the-floor cleaning; and
i. a stop abutment fixed to said second manually movable means for preventing manual movement of said adjustable means when said second manually movable means is in its off-the-floor cleaning position.

5. An electric vacuum cleaner as defined in claim 3 wherein said abutment stop includes a lever fixed to and extending upwardly from said second manually movable means.

6. An electric vacuum cleaner comprising:
a. a floor cleaning nozzle generally horizontally disposed along the front of a vacuum cleaner casing;
b. a suction creating means disposed in said vacuum cleaner;
c. air passage means located between said suction creating means and said floor nozzle;
d. a suction air attachment coupling positioned on said vacuum cleaner for permitting off-the-floor vacuum tools to be connected to the vacuum cleaner;
e. air passage means positioned between said suction creating means and said coupling means;
f. shutter means positioned in the air passage to said nozzle and the air passage to said suction coupling for selectively connecting either the floor nozzle or the attachment coupling to said source of suction;
g. wheel means including a rear wheel for supporting the vacuum cleaner for movement across a floor surface;
h. an axle pivotally mounted on said vacuum cleaner, said axle having an offset portion and said wheel being rotatally mounted on the offset portion of the axle so that vertical movement of the offset portion of said axle will raise or lower the floor cleaning nozzle with respect to the floor;
i. a rotatable cam having a plurality of depressions formed therein pivotally mounted on said vacuum cleaner casing in the vicinity of the offset portion of said axle, said cam including manually operable means extending outside of said casing for moving said axle into any one of the plurality of depressions formed in said cam to thereby selectively adjust the height of the floor nozzle to any one of a plurality of positions for cleaning carpets of various pile heights; and
j. a lever slidably mounted within the casing of said vacuum cleaner extending from said shutter means to said rotatable cam, the lower portion of said slidable lever being positioned adjacent to the offset portion of said axle for moving the axle to thereby adjust the relative position of the floor nozzle with respect to the floor.

7. An electric vacuum cleaner comprising:
a. a floor cleaning nozzle generally horizontally disposed along the front of a vacuum cleaner casing;
b. a suction creating means disposed in said vacuum cleaner;
c. air passage means located between said suction creating means and said floor nozzle;
d. a suction air attachment coupling positioned on said vacuum cleaner for permitting off-the-floor vacuum tools to be connected to the vacuum cleaner;
e. air passage means positioned between said suction creating means and said coupling means;
f. shutter means positioned in the air passage to said nozzle and the air passage to said suction coupling for selectively connecting either the floor nozzle or the attachment coupling to said source of suction;
g. wheel means including a rear wheel for supporting the vacuum cleaner for movement across a floor surface;
h. an axle pivotally mounted on said vacuum cleaner, said axle having an offset portion, and said wheel being rotatally mounted on the offset portion of the axle so that vertical movement of the offset portion of said axle will raise or lower the floor cleaning nozzle with respect to the floor; and
i. a rotatable cam having a plurality of depressions formed therein pivotally mounted on said vacuum cleaner casing in the vicinity of the offset portion of said axle, said cam including manually operable means extending outside of said casing for moving the offset portion of said axle into any one of the plurality of depressions formed in said cam to thereby selectively adjust the height of the floor nozzle to any one of a plurality of positions for cleaning carpets of various pile heights;
j. a tension spring extending between the offset portion of said axle and the pivot of said cam for resiliently urging the offset portion of said axle into contact with the depressions formed in said cam;
k. a lever slidably mounted within the casing of said vacuum cleaner extending from said shutter means to said rotatable cam, the lower portion of said slidable lever being positioned adjacent to the offset portion of said axle for moving the axle to thereby adjust the relative position of the floor nozzle with respect to the floor;
l. a stop lever fixed to said slidable lever and positioned adjacent to said rotatable cam;
m. said slidable lever being movable in one direction to move the shutter to open the air passage to the attachment coupling to simultaneously move the stop lever to rotate the cam to move the floor nozzle to its highest position whereby the nozzle is automatically raised above the floor whenever the vacuum cleaner is converted for off-the-floor cleaning.

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