United States Patent [19]

Johnson

[11] **3,750,222**

[45] **Aug. 7, 1973**

[54] **VACUUM CLEANER STRUCTURE**

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[73] Assignee: **Whirlpool Corporation,** Benton Harbor, Mich.

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[52] **U.S. Cl.** **15/416,** 15/411

[51] **Int. Cl.** **A47l 9/06**

[58] **Field of Search** 15/411, 416

[56] **References Cited**

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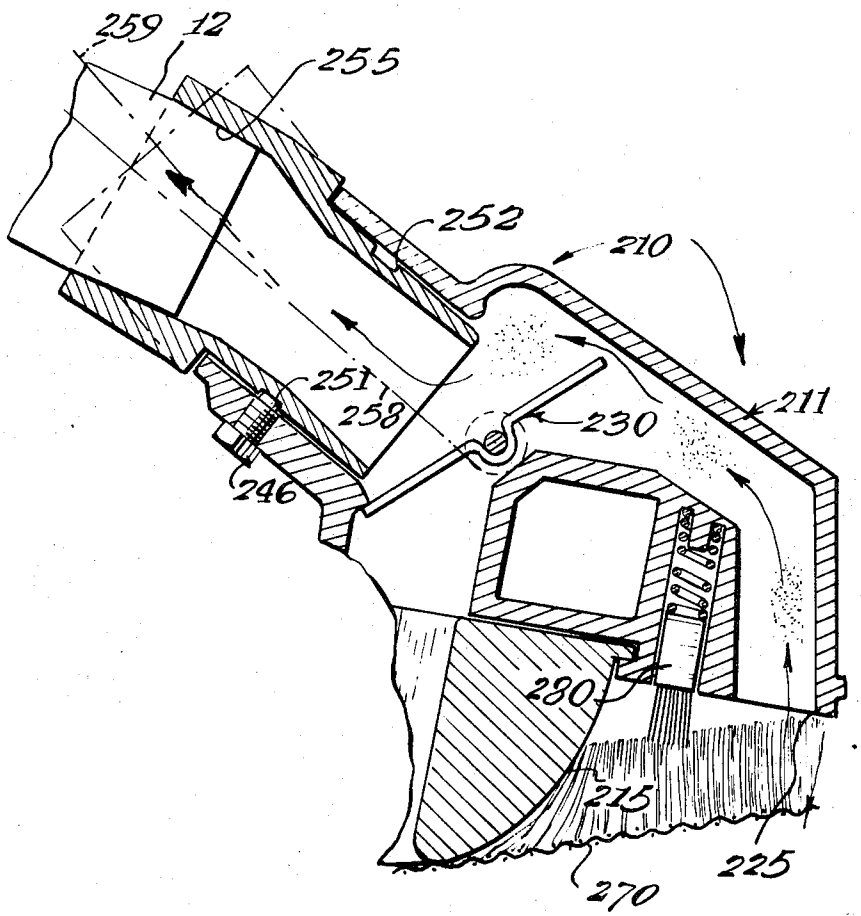
2,293,457 8/1942 Dow 15/411

Primary Examiner—John Petrakes
Assistant Examiner—C. K. Moore
Attorney—Charles L. Rowe et al.

[57] **ABSTRACT**

A vacuum cleaner structure for use with a canister-type vacuum cleaner having a tubular wand provided at one end with a nozzle. The nozzle is provided with a pair of suction inlets including a lowermost inlet and an upper inlet. Means are provided for controlling the air flow through the inlets so that air may be drawn selectively through either of the inlets. In one form, the structure includes a yoke connector adapted to vary the disposition of the upper inlet relative to the lower inlet for adjusting the nozzle for different height rug pile. The nozzle further is arranged to carry a brush adjacent the upper inlet for brushing the upper end of the rug pile during the vacuuming operation.

12 Claims, 8 Drawing Figures



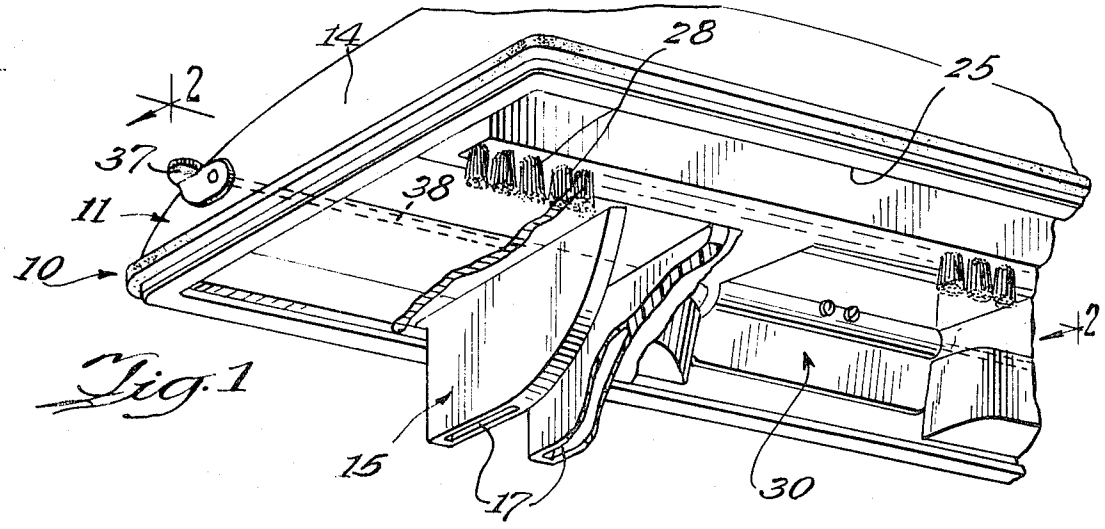


Fig. 1

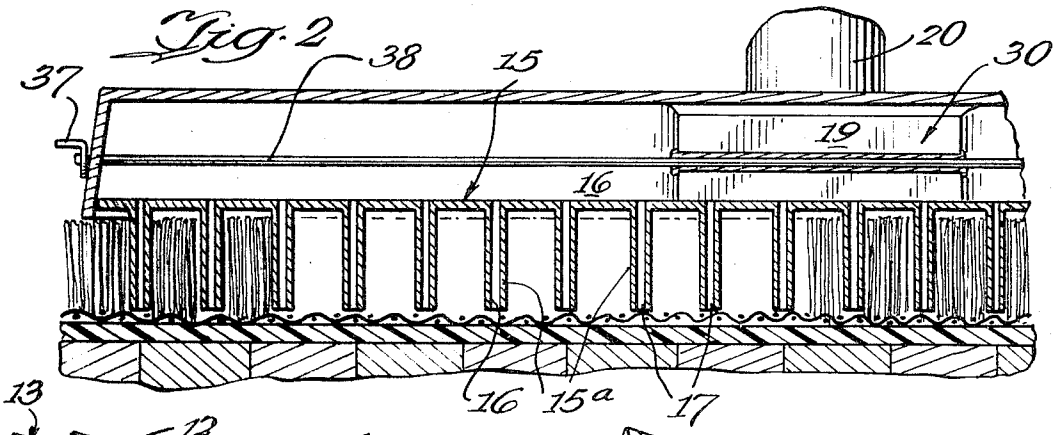


Fig. 2

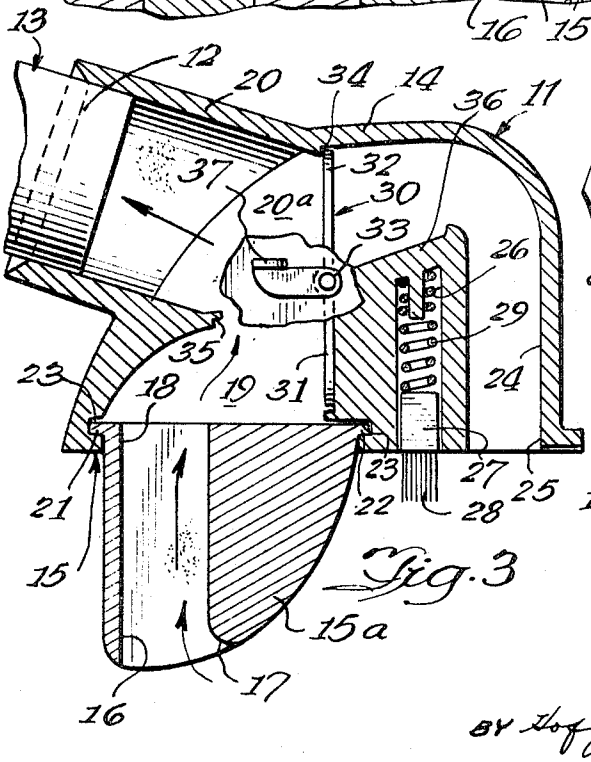


Fig. 3

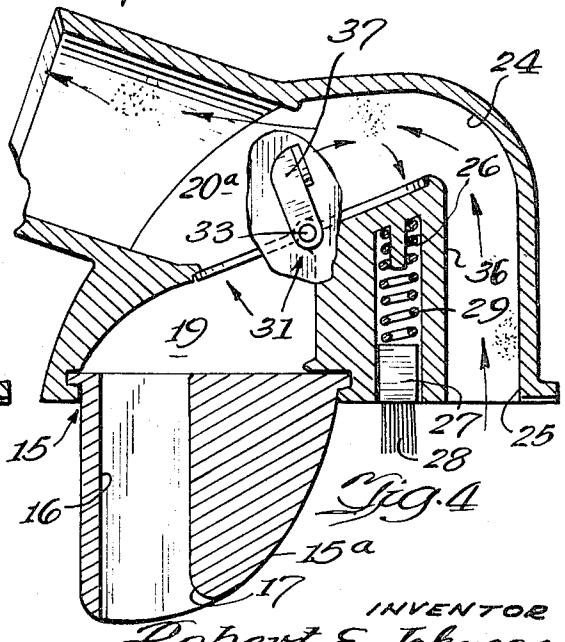


Fig. 4

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Fig. 5

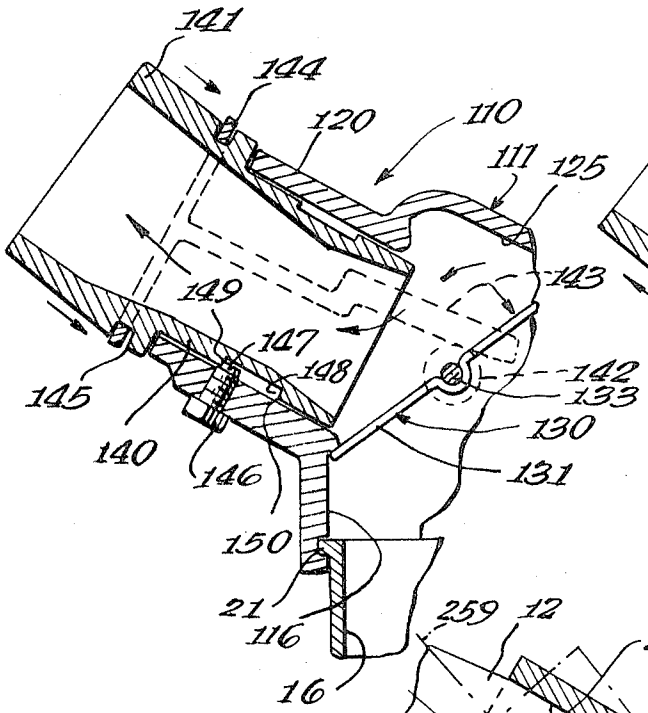


Fig. 6

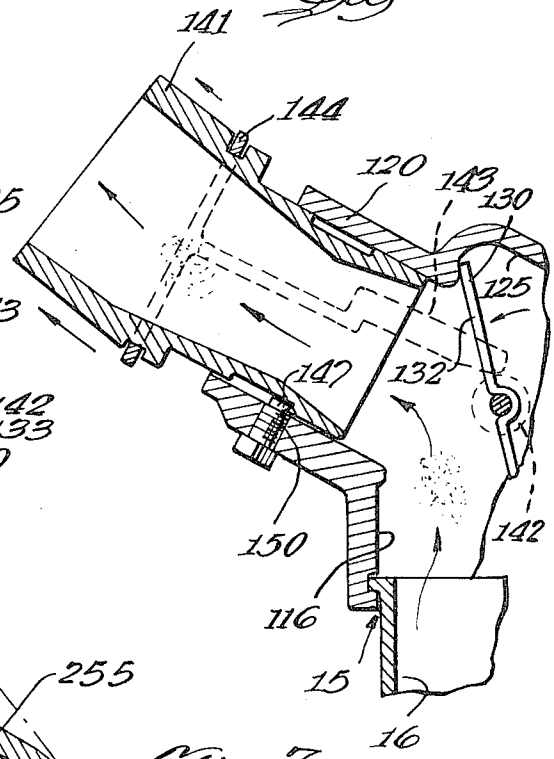


Fig. 8

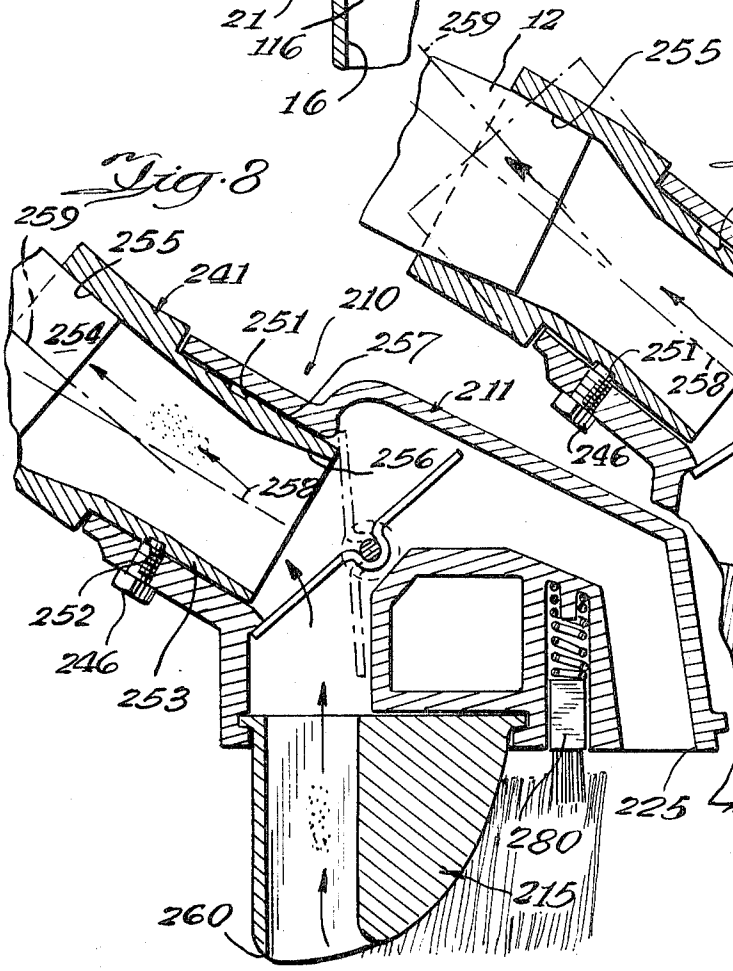
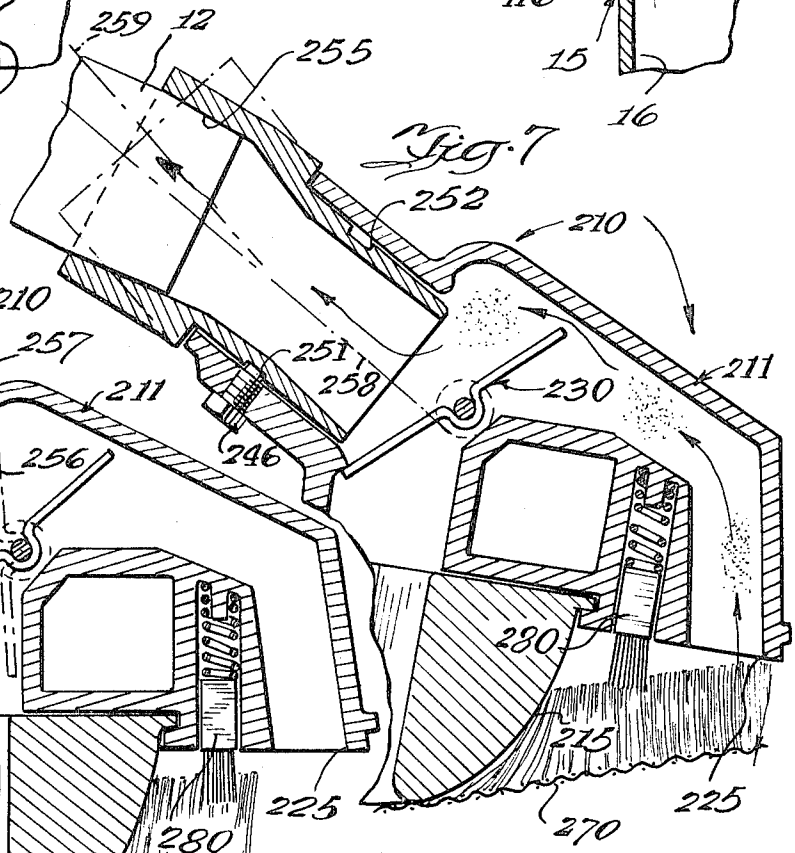


Fig. 7



VACUUM CLEANER STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to vacuum cleaner structures and in particular to nozzle structures and means for mounting such structures on the end of a canister-type vacuum cleaner wand.

2. Description of the Prior Art

In one form of well known vacuum cleaner, a nozzle is provided on the lower end of a tubular wand having its upper end connected through a flexible hose to a canister. A fan is provided in the canister for sucking air through the nozzle end wand for deposition of dirt in the canister.

In one form of such vacuum cleaner structure as shown in Kolenda et al. U.S. Pat. No. 2,860,367, nozzle is provided with a depending wiper about which the nozzle may be provided as it is moved over a hard surface floor.

In another form of such vacuum cleaner structure shown in Dow U.S. Pat. No. 2,293,457, the nozzle is pivotally mounted on the end of a wand so as to adapt the tool for use selectively by different height persons.

In Ott U.S. Pat. No. 2,274,560, a lower portion of the nozzle is shifted relative to the upper portion as a result of the fore and aft movement of the handle so as to provide different diameter suction passages to vary the amount of suction force.

In Atiyeh U.S. Pat. No. 2,556,022, a variation in the suction area of the nozzle is provided as a result of the different forward and rearward strokes of the device.

In Taylor U.S. Pat. No. 2,585,186, a shutter is provided to vary the velocity of the air stream to vary the dirt-lifting capacity of the vacuum cleaner.

In Snyder U.S. Pat. No. 2,624,064, a nozzle is provided having large and small passages with means for selectively moving either one of the nozzles into engagement with the surface by the operator tilting the nozzle forwardly or rearwardly. When the nozzle is tilted reareardly, a valve is automatically moved to change the connection to the wand from the forward to the rearward opening. Other prior art structures are shown in the U.S. Pat. Nos. to Ljungquist 2,048,273; Ott 2,619,315; White 2,632,914; Segesman 2,649,610; Ott 2,659,099; Brock 2,706,826; Draudt 2,717,409; and Skolfield 2,904,816.

SUMMARY OF THE INVENTION

The present invention comprehends an improved vacuum cleaner structure for use with the tubular wand of a canister-type vacuum cleaner apparatus including a nozzle having a lowermost suction inlet, an upper suction inlet, and an outlet, and a tubular connector yoke having an inlet end and an outlet end axially skewed to the inlet end, the nozzle outlet being selectively connected to the yoke inlet and in any one of a plurality of different rotational positions about the axis of the inlet end, and the yoke outlet being connected to one end of the wand in any one of a plurality of different rotational positions about the axis of the wand end whereby the yoke defines means for selectively raising and lowering the upper suction inlet relative to the lower suction inlet with the wand disposed at a preselected angle to the horizontal.

The invention further comprehends the provision of a vacuum cleaner structure including a nozzle having a lowermost suction inlet, an upper suction inlet and an outlet, and means for selectively permitting air flow through only one of the suction inlets at a time while maintaining the upper inlet at a preselected level above the lowermost inlet.

Thus, the invention provides for improved vacuum cleaning of different height carpet pile. The upper nozzle inlet is adapted to clean the upper portion of relatively long pile, such as that of shaf rugs, whereas the lowermost inlet is adapted to vacuum the rug backing between the carpet tufts so as to provide an improved overall cleaning of the carpet. The lower inlet means may be provided in the form of a plurality of spaced depending tine elements functioning in the manner of a comb to penetrate between the tufts down to adjacent the rug backing. By selectively controlling the air flow through the different inlets, high vacuum suction may be provided at either of the inlets for vacuuming each of the upper and lower portions of the carpeting pile. A brush may be provided on the nozzle adjacent the upper inlet for facilitating removal of dirt from the upper portion of the pile. By providing for adjustable height of the upper nozzle inlet relative to the lower nozzle inlet, the nozzle is adapted for use with carpets having different height pile with the upper nozzle inlet being disposed substantially at the upper ends of the pile.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a fragmentary bottom perspective view of a vacuum cleaner structure embodying the invention;

FIG. 2 is a fragmentary vertical section thereof taken substantially along the line 2—2 of FIG. 1 with the vacuum cleaner structure being disposed in cleaning contact with a carpet;

FIG. 3 is an enlarged transverse section thereof with the valve arranged to permit air flow through the lower nozzle inlet;

FIG. 4 is an enlarged transverse section thereof with the valve arranged to permit air flow through the upper nozzle inlet;

FIG. 5 is a fragmentary transverse section of a modified form of vacuum cleaner structure embodying the invention wherein the valve is selectively positioned by movement of the nozzle relative to the connector yoke, the valve being shown as arranged to permit air flow through the upper nozzle inlet;

FIG. 6 is a fragmentary transverse section of the vacuum cleaner structure of FIG. 5 with the valve being positioned for permitting air flow through the lowermost nozzle inlet;

FIG. 7 is a fragmentary transverse section of still another modified form of vacuum cleaner structure embodying the invention wherein the yoke position is changed to control the location of the surface cleaning inlet relative to the floor to accommodate short and long pile rugs with the yoke being positioned for cleaning a relatively short pile rug;

FIG. 8 is a fragmentary transverse section of the vacuum cleaner structure of FIG. 7 with the yoke being positioned for cleaning a relatively long pile rug.

DESCRIPTION OF THE PREFERRED EMBODIEMTNS

In the exemplary embodiment of the invention as disclosed in FIGS. 1–4 of the drawing, a vacuum cleaner structure generally designated **10** is shown to comprise a nozzle **11** adapted to be mounted on one end **12** of a tubular wand **13** such as is conventionally provided in a canister-type vacuum cleaner apparatus. The nozzle is defined by a hollow body **14** having a tine insert **15** including a plurality of depending tines **15***a* each provided with a vertical through passage **16.** The lower end of each passage **16** defines a lowermost suction inlet **17.** The upper end **18** of each passage opens into a chamber **19** within body **14** which is adapted to communicate with the wand **13** through a tubular outlet **20** which, in turn, is connected to the lower end **12** of the wand. As shown in FIG. **3,** the tine insert **15** is mounted in the nozzle body by means of outturned flanges **21** and **22** received in inwardly opening grooves **23** in the nozzle body. Thus, the tine insert **15** can be readily slid out of nozzle body **14** to facilitate periodic cleaning of the tine insert **15** and the through passages **16.**

Nozzle body **14** is further provided with a second through passage **24** defining a second, upper suction inlet **25** disposed substantially above the level of the lowermost suction inlet **17.** Passage **24** opens to body chamber **20***a* for flow of air therefrom to the outlet **20.**

The suction body further defines a downwardly opening recess **26** in which is received a brush holder **27** provided at its lower end with brush tufts **28** disposed adjacent upper suction inlet **25.** The brush is biased downwardly by means of a coil spring **29** within the recess **26.** The brush is thus disposed for facilitated loosening of dirt at the upper end of the carpet pile for facilitated suction of the dirt through nozzle opening **25.** It will be understood that, if desired, the brush could be held in a retracted position by conventional clip means.

Flow of air upwardly through the nozzle selectively through inlets **17** and **25** may be controlled by a valve generally designated **30,** herein illustratively comprising a butterfly valve having a first closure portion **31** and a second closure portion **32** extending outwardly oppositely from a central pivot portion **33.** Nozzle body **14** defines a first valve seat **34** at the upper end of passage **24** and a second valve seat **35** at the upper end of passage **19.** Pivot **33** is carried on a dividing wall **36** between passages **19** and **24.** A manual operating element **37** is connected to pivot **33** by means of a rod **38** andis exposed at one end of the nozzle **14,** as shown in FIG. **2,** for fingertip manipulation by the user in slectively positioning the valve **30** in the alternate positions of FIGS. **3** and **4** wherein passages **19** and **24** are selectively opened to the outlet duct **20.** Thus, with the valve in the vertical arrangement of FIG. **3,** suction is applied through inlet **17** to pick up dirt adjacent the backing of the carpet. When thc valve is rotated to the angled position of FIG. **4,** passages **16** and **19** are closed and passage **24** is opened to pick up dirt at inlet **25** for cleaning the upper portion of the carpet pile.

Referring now to FIGS. **5** and **6** a modified form of vacuum cleaner structure generally designated **110** is shown to comprise a nozzle **111** generally similar to nozzle **11** and having a pivotable butterfly valve **130** therein generally similar to butterfly valve **30.** The tubular outlet **120** of nozzle **111** is telescoped onto the tubular inlet **140** of a connector, or yoke, **141** defining an extension of outlet **120.** A pinion **142** is provided on pivot rod **133** and a rack **143** is connected to connector **141** by a collar **144** received in an outwardly opening circumferential groove **145** on the connector. Axial movement of the connector **141** relative to the tubular outlet **120** is controlled by a screw **146** having an inner end **147** received in a slot **148** in tubular outlet **120.**

The nozzle **111** is provided with a tine insert having tines similar to the tines **15**a. The tines (not shown) provide drag for the nozzlc **111** so that as the yoke **141** is pushed by the wand on the forward stroke the tubular outlet **120** assumes the position shown in FIG. **5.** Thus, as shown in FIG. **5,** when the tubular outlet **120** is at the inward end of its movement, with screw end **147** abutting theinner end **149** of slot **148,** the rack **143,** meshing with pinion **142** cuases the valve **130** to be in the disposition of FIG. **5,** wherein valve closure portion **131** is closing the passage **116** from the lowermost suction inlet allowing air to pass only from the upper suction inlet through passage **125.**

At the end of the forward stroke, the nozzle drag on the carpet holds the nozzle, allowing the first rearward motion of the wand to move the yoke **141** relative to the tubular outlet **120** to a second position as shown in FIG. **5.** This relative movement between the tubular outlet **120** and connector **141** is effected so as to effectively move the connector outwardly from the tubular outlet to an extended position wherein screw end **147** abuts slot shoulder **150** as shown in FIG. **6,** the rack **143** is moved relative to pinion **142** suitably to pivot the valve **130** to the position hwerein the upper valve closure portion **132** closes passage **125** and lower closure portion **131** is disposed to open passage **116.** This in and out movement of the yoke or connector **141** takes place with each foreward and backward stroke of the vacuum cleaner structure **110.** Thus, surface cleaning takes place on the forward stroke, and deep cleaning takes place on the backward stroke.

Thus, vacuum cleaner structure **110** functions similarly to vacuum cleaner structure **10** except for the different means for effecting selective positioning of the valve. In all other respects, the devices are similar and similar elements of structure **110** are identified by similar reference numberals except **100** higher.

Turning now to FIGS. **7** and **8,** a further modified form of vacuum cleaner structure generally designated **210** to provide effective surface cleaning on shag rugs or carpeting having short or long pile is shown to comprise a structure generally similar to structures **10** and **110** but having a modified form of connector generally designated **241** provided with a pair of diametrically opposite recesses **251** and **252** in a first, inner end portion **253** of the connector. The connector defines a through bore generally designated **254** having a cylindrical outer portion **255** and a cylindrical inner portion **256.** The outer surface **257** of the connector inner end portion **253** is cylindrical extending coaxially about an axis **258** skewed to the axis **259** of outer bore portion **255.** The outer endof the wand **13** may be received in bore portion **255,** as shown in FIGS. **7** and **8.** end of

Connector **241** is arranged to provide for selective adjustment of the height of the inlet opening **225** of the nozzle **211** relative to the carpet backing to accommodate short or long pile by varying the angular position of theinlet **225** relative to the lowermost portion **260** of the tines **215.** The tines **215** penetrate the pile and ride on the carpet backing. With a relatively long pile, as

shown in FIG. 8, the distance between the carpet backing and the nozzle at inlet 225 is sufficient to allow easy operation and the inlet opening 225 which forms the surface cleaning air passage is close to the top of the pile, so that brush 280 is effective.

To change the angular position of the nozzle from that of FIG. 8, wherein the nozzle is arranged for cleaning carpeting having a relatively deep pile, to that of FIG. 7, wherein the nozzle is arranged for cleaning carpeting having a relatively short pile, the user merely disconnects the wand from the connector, partially withdraws the screw 246 from recess 252, and rotates the connector 180° to bring the recess 251 in line with the screw whereupon the screw may be advanced to be received in the recess 251 to lock the connector in this diametrically opposite arrangement. A conventional ball detent arrangement could also be used to lock the connector 241 relative to the nozzle. Upon reinsertion of the wand end 12 into the bore end 255, the nozzle will be automatically tilted to the position of FIG. 7 with the wand extending in the same position as in FIG. 8. The specific amount of tilting of the nozzle, and thus the speciific amount of raising and lowerming of the upper inlet 225 relative to the carpet backing 270 of FIG. 7 or 271 of FIG. 8, is controlled by the angularity of axis 259 relative to axis 258 and, thus, may be preselected as desired.

As will be obvious to thos skilled in the art, the adjustable height nozzle 211 may be utilized in connection with valve 230 which may be operated by any suitable control means such as the manual operator 37 or the rack and pinion 143,142. Elements of structure 210 similar to elements of structures 10 and 110 are identified by similar reference numberals except 200 or 100 higher, respectively.

Thus, the invention comprehends an improved vacuum cleaner structure having a lowermost suction inlet and an upper suction inlet with improved means for selectively controlling the flow of air through the different suction inlets. Means may be provided for adjusting the height of the upper inlet to coordinate with different carpet heights. The vacuum cleaner structures of the invention are extremely simple and economical of construction while yet providing the highly desirable features discussed above. The vacuum cleaner structures may be formed primarily of molded plastic to further simplify construction and minimize cost.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. For use with a tubular wand, vacuum cleaner structure comprising:

a nozzle having a lowermost suction inlet, an upper suction inlet, and an outlet; and

a tubular yoke having an inlet end and an outlet end axially skewed to said inlet end, said nozzle outlet being selectively connected to said yoke inlet end in any one of a plurality of different rotational positions about the axis of said inlet end, and said yoke outlet being connected to one end of the wand in any one of a plurality of different rotational positions about the axis of said wand end whereby the axially skewed inlet and outlet ends of said yoke define means for selectively raising and lowering the upper suction inlet relative to said lower suction inlet with the wand disposed at a preselected angle to the horizontal.

2. The vacuum cleaner structure of claim 1 including means for releasably retaining said nozzle on said yoke in preselected different angularly related dispositions.

3. The vacuum cleaner structure of claim 2 wherein said retaining means defines means for releasably retaining said nozzle on said yoke in diametrically opposite angular dispositions.

4. The vacuum cleaner structure of claim 1 wherein said nozzle outlet comprises a tubular means coaxially carried on said tubular yoke inlet.

5. The vacuum cleaner structure of claim 1 further including air flow control means for selectively permitting air flow through only one of said suction inlets at a time.

6. The vacuum cleaner structure of claim 1 further including brush means disposed adjacent said upper suction inlet for brushing the upper end of carpeting tufts during a vacuum cleaning operation.

7. The vacuum cleaner structure of claim 1 further including a butterfly valve in said nozzle for selectively permitting air flow through only one of said suction inlets at a time.

8. The vacuum cleaner structure of claim 1 wherein said nozzle defines means for selectively permitting air flow through only one of said suction inlets at a time while maintaining said upper inlet at a level above said lowermost inlet and said selective flow permitting means comprises a butterfly valve in said nozzle and manually operable means for selectively positioning said valve.

9. The vacuum cleaner structure of claim 8 wherein said manually operable means for selectively positioning said valve is defined by a push member disposed externally of the nozzle and means connecting the push member to said valve.

10. The vacuum cleaner structure of claim 8 wherein said nozzle outlet is movably carried on a yoke member at one end of a tubular wand, and said manually operable means comprises means responsive to manual movement of said nozzle relative to said yoke member for effecting said positioning.

11. The vacuum cleaner structure of claim 8 wherein said nozzle outlet is movably carried on a yoke member at one end of a tubular wand, and said manually operable means comprises means responsive to manual movement of said nozzle relative to said yoke member for effecting said positioning, including a pinion connected to said valve and a rack meshed with said pinion and movable relative thereto as a result of relative movement between said yoke and said nozzle.

12. The vacuum cleaner structure of claim 8 wherein said nozzle outlet is movably carried on a yoke member at one end of a tubular wand, and said manually operable means comprises means responsive to manual movement of said nozzle relative to said yoke member for effecting said positioning, and means for limiting the relative movement between said yoke and said nozzle to positions whereat said valve is at opposite extremes of movement in said nozzle.

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