March 14, 1961 A. W. SEYFRIED 2,974,347

SUCTION CLEANER NOZZLE

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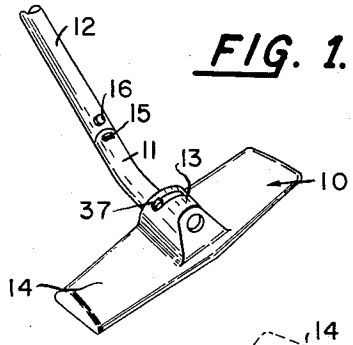
FIG. 1.



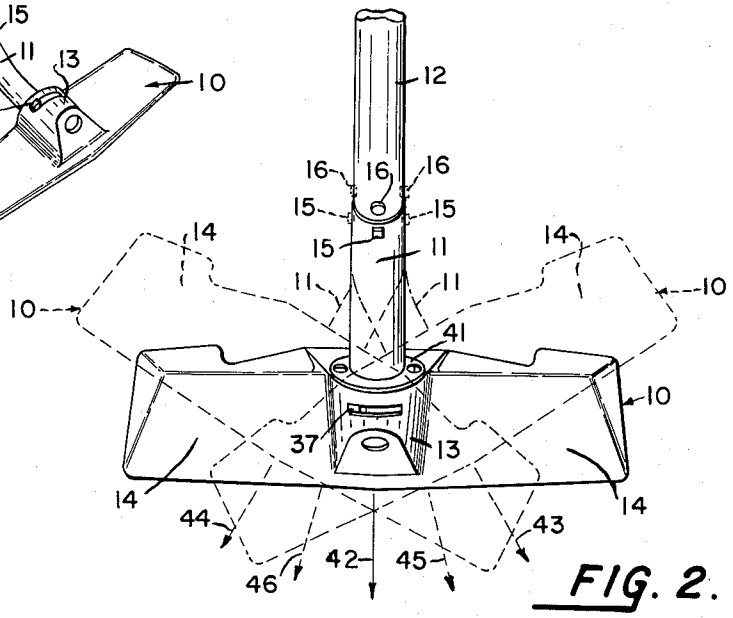


FIG. 2.

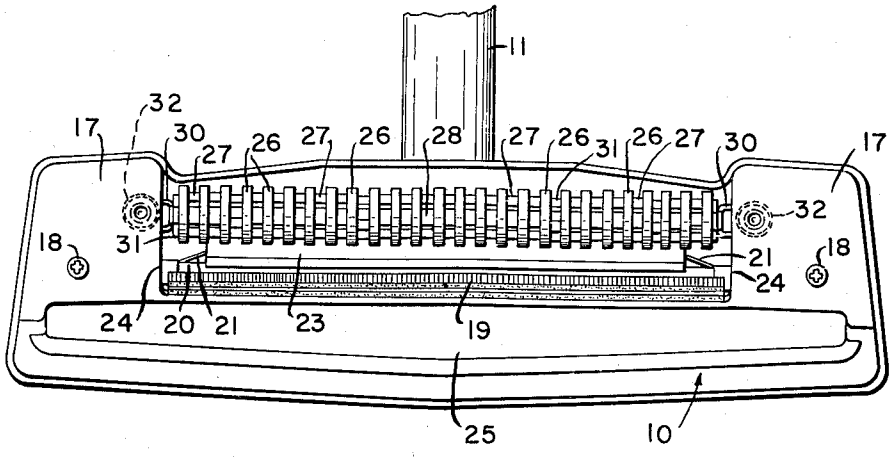


FIG. 3.

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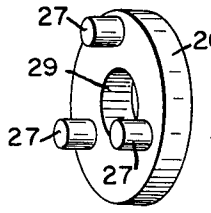

FIG. 4.

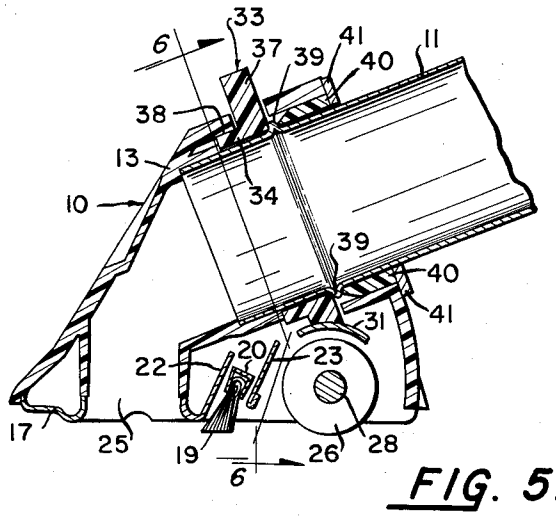

FIG. 5.

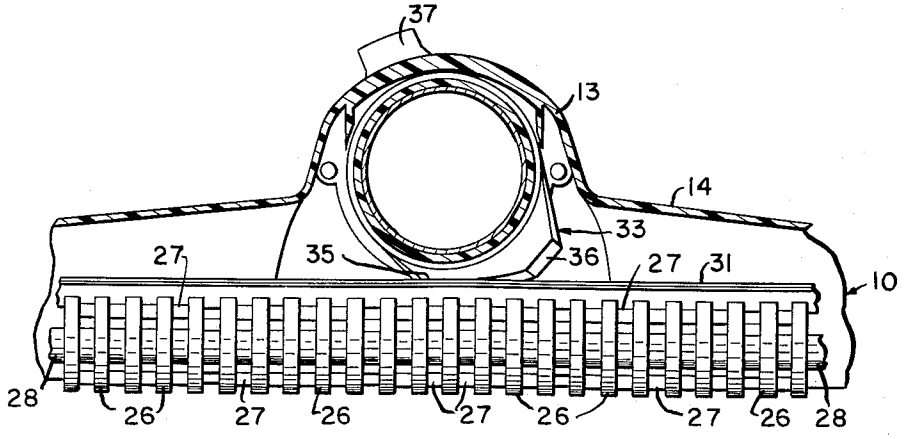

FIG. 6.

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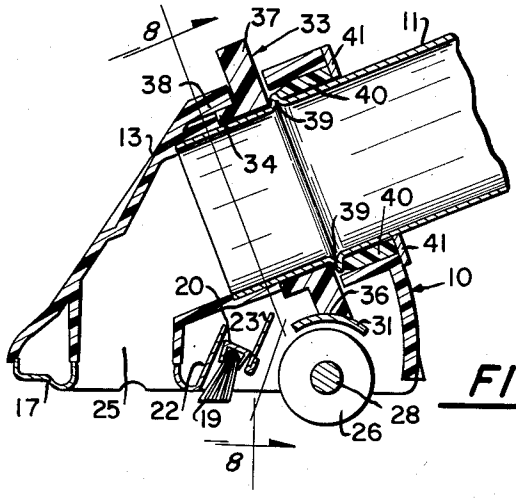

FIG. 7.

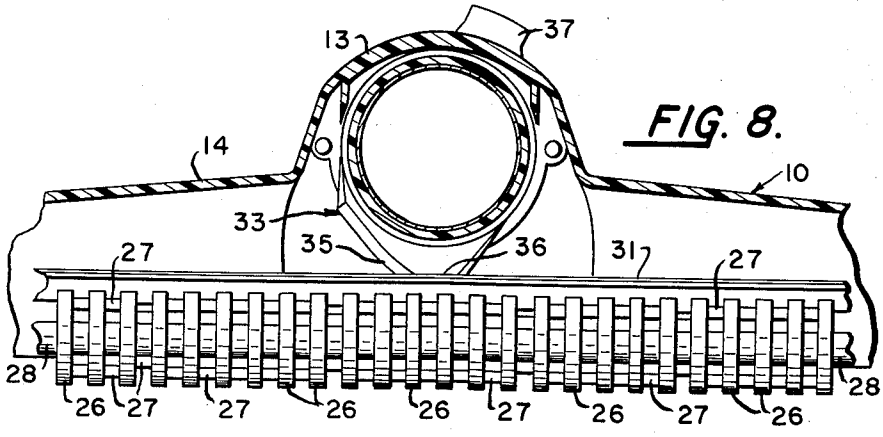

FIG. 8.

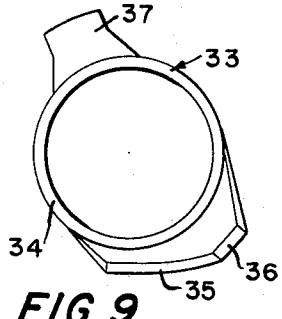

FIG. 9.

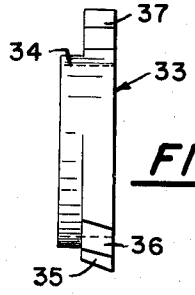

FIG. 10.

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United States Patent Office 2,974,347
Patented Mar. 14, 1961

2,974,347

SUCTION CLEANER NOZZLE

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Filed Sept. 8, 1959, Ser. No. 838,462

5 Claims. (Cl. 15—356)

This invention relates to a suction cleaner nozzle, particularly to a floor nozzle used for cleaning rugs, carpets and other floor surfaces. Such nozzles are attached to tubular handles whereby the operator controls the steering of the nozzle. The tubular handles are connected by flexible hose to the cleaner housings for conveying dust laden air from the nozzle to the cleaner.

An object of the invention is to provide means connecting the handle to a roller supported suction cleaner nozzle whereby rotation of the handle about its own axis results in turning movement of the nozzle. It is customary for the operator to move the handle back and forth to impart movement to the nozzle in a straight path extending forwardly from the operator. In order to change the direction of movement of the nozzle, it has been necessary for the operator to either bodily slide the nozzle sidewise over the surface to be cleaned or to walk around until the operator is facing in line with the desired direction of movement. By the use of my invention, the nozzle can be made to travel straight forwardly, or by rotating the handle about its own axis, the nozzle can be made to travel in a direction extending at an angle to the direction of applied force or movement imparted to the handle without any lateral swinging of the handle or change of position of the operator.

The steering is controlled by the axial relationship of the straight tubular handle and an axially curved adapter tube connected non-rotatably at one end to the handle and connected rotatably at the other end to the nozzle. The nozzle can be moved in a straight forwardly extending path when the handle and adapter are axially in one vertical plane, and the nozzle can be made to travel in a path extending at an angle to said straight forwardly extending path when the handle has been rotated about its own axis and the adapter has thereby been turned so that the axes of the adapter and handle are not in the same vertical plane. When the handle has been rotated about its own axis to turn the adapter as described, the nozzle is caused to turn about a vertical axis, either to the left or right, and force applied to the handle in the forwardly direction nevertheless imparts movement to the nozzle in a direction at an angle to said straight forwardly direction.

Another feature of the invention is the provision of numerous small rollers loosely mounted on a shaft extending longitudinally of the nozzle, which support the nozzle for easy movement over the surfaces to be cleaned and which bias the nozzle to move in a direction at right angles to the shaft on which the rollers are mounted. The nozzle naturally is influenced to move in the direction in which the rollers rotate. However, when the nozzle and adapter have been turned to the right or left by rotation of the handle about its own axis, as hereinbefore mentioned, and the operator applies force to the handle in the direction of its axis, sidewise pressure is exerted by the rollers against the nap of the rug or carpet on which they travel. Such sidewise pressure augments the

nozzle brush in its disturbance of the nap and increases the dust collecting capacity of the nozzle.

The advantages described are attained by mounting the rollers on the shaft with the side surfaces of each roller slightly spaced from an adjacent roller, so that side pressure is exerted by numerous rollers in one direction or the other whenever the nozzle is moved at an angle to the direction of rotation of the rollers. Further, the rollers are located in the nozzle to rotate and travel in the path over which the nozzle opening passes when the nozzle is being moved over a surface by the operator, and thus are in position to augment the action of the brush in disturbing the nap and loosening dust to be collected by the nozzle.

Another object of the invention is to provide a nozzle with easily controlled means for adjusting the height relatively to the surfaces to be cleaned.

Other advantages of the invention will become apparent from the drawings and following specification.

In the drawings:

Fig. 1 is a perspective view of a suction cleaner nozzle embodying my invention.

Fig. 2 is a top plan view of the nozzle showing in broken lines different positions which the nozzle assumes when the tubular handle is rotated about its own axis.

Fig. 3 is a bottom plan view of the nozzle.

Fig. 4 is a perspective view of one of the rollers, detached.

Fig. 5 is a transverse vertical sectional view through the nozzle and part of the tubular adapter, showing the nozzle in "low" position.

Fig. 6 is a longitudinal sectional view in the plane of the line 6—6 of Fig. 5.

Fig. 7 is a transverse vertical sectional view through the nozzle and part of the tubular adapter, showing the nozzle in "high" position.

Fig. 8 is a longitudinal sectional view in the plane of the line 8—8 of Fig. 7.

Fig. 9 is a front elevational view of the nozzle adjusting cam, detached, and Fig. 10 is a side elevational view of the same.

In that embodiment of the invention shown in the drawings, the nozzle is indicated as a whole at **10**, the hollow tubular adapter at **11** and the hollow tubular adapter at **11** and the hollow tubular handle at **12**. The adapter **11** is axially curved midway between its ends and is rotatably mounted in the central raised portion **13** of the nozzle upper housing **14**. The handle **12** is detachably inserted in the adapter **11** and retained therein by a spring mounted button **15** cooperating with a slot in the adapter, the button **15** being actuated by a depressible button **16** on the handle **12**. Thus the handle **12** is non-rotatably connected to the adapter **11**, and rotation of the handle about its own axis transmits rotary motion to the adapter and turns the lower portion to the right or left, resulting in turning of the nozzle **10** as will be explained hereinafter. The opposite end of the handle **12** is connected to the conventional flexible hose (not shown) which conveys the dust laden air to the cleaner housing (not shown).

As shown in Fig. 3, the nozzle upper housing **14** is partially closed by a bottom plate **17** connected to the upper housing by two screws **18**. A brush **19** is mounted in the housing by a brush holder **20**, urged downwardly by a pair of flat springs **21** at opposite ends of the holder **20**, the brush being located between longitudinally extending walls **22**, **23**, which are part of the bottom plate **17**. The ends of the brush holder are retained in the housing by the side portions **24** of the bottom plate. The brush is located adjacent to and rearwardly of the nozzle opening **25** which communicates with the adapter **11** and handle **12**.

Numerous small rollers 26, of polystyrene or other suitable material, provided with laterally projecting spacers 27, are loosely mounted on a shaft 28 by means of the central apertures 29. Opposite ends of the shaft 28 are mounted in a rigid bracket 30 retained between the upper housing 14 and bottom plate 17. The bracket 30 includes a longitudinally extending transversely curved plate 31 which overlies the rollers 26 in spaced relation thereto, as shown in Figs. 5 and 7. The plate 31 is concave on its lower surface and convex on its upper surface as shown. Light coiled springs 32 are located between the plate portions 24 and the said roller bracket 30 to yieldingly urge the bracket and rollers upwardly in the nozzle.

The roller bracket plate 31 cooperates with means for raising and lowering the nozzle relatively to the rollers 26 and the surface to be cleaned on which the rollers travel. Said adjusting means comprises a cam indicated as a whole at 33, shown detached in Figs. 9 and 10. It is mounted in the raised portion 13 of the nozzle to surround and rotate about the adapter 11. The cam comprises a ring 34, elongated cam surface 35, short cam surface 36, and control knob 37. The cam surfaces 35, 36 extend circumferentially as shown in Figs. 6, 8 and 9, and are curved transversely from front to rear so as to bear complementally on the convex surface of the plate 31 as shown in Figs. 5 and 7.

When the control knob is in the "low" position shown in Figs. 5 and 6, the left hand portion of the cam surface 35 bears on the plate 31 and the bottom plate of the nozzle is only slightly above the bottom of the rollers 26 and surface to be cleaned. When the control knob 37 is in the "high" position shown in Figs. 7 and 8, the cam surface 36 bears on the plate 31, the nozzle as a whole is raised, and the bottom plate of the nozzle is on a higher level, close to that of the shaft 28, as shown in Fig. 7. The cam surface 35 is elongated eccentrically to the axis of the ring 34, to provide means for gradually raising or lowering the nozzle between the low and high positions shown in Figs. 6 and 8.

The top of the portion 13 of the nozzle is provided with a slot through which the control knob 37 extends. To assemble the structure, the cam 33 is inserted in the nozzle through an opening in the rear wall, to bear against the annular shoulder 38, the adapter 11 is inserted into the nozzle and cam ring 34, so that the circumferential stop rib 39 abuts the cam ring, a spring ring 40 is inserted between the adapter 11 and nozzle portion 13, and finally a centrally apertured retaining plate 41 is attached to the rear wall of the nozzle.

The operation of the described parts is as follows:

The nozzle is adjusted relatively to the rollers 26 and surface to be cleaned by moving the control knob 37 to right or left in its slot, to cause the cam surface 35 or 36 to bear on the roller bracket plate 31, whereby the nozzle as a whole is raised or lowered as desired for the character of the floor covering to be cleaned. If the operator desires to move the nozzle back and forth in a path directly forwardly of the operator, the hollow handle 12 and adapter 11 are positioned as shown in full lines in Fig. 2, where the axes of the said parts 11 and 12 pass through the same vertical plane extending transversely of the nozzle. If the operator desires to move the nozzle to one side or the other of said directly forwardly extending path, it is necessary only to rotate the handle 12 about its own axis, and thereby the adapter 11 is rotated and the lower end of the adapter and the nozzle are turned toward the right or left, as indicated by the broken lines in Fig. 2. When the handle 12 has been rotated about its own axis and the adapter has been turned as shown, the axes of the two tubular parts 11 and 12 do not pass through the same vertical plane.

The natural tendency of the nozzle is to move in the direction of rotation of the rollers 26, at right angles to the shaft 28. When the nozzle has been turned to

the right or left as shown in broken lines in Fig. 2, by rotation of the handle 12 about its own axis, then the nozzle and the rollers are positioned to travel in a path extending at an angle to the axis of the handle. When the handle has been rotated and the nozzle has been turned as described, if the operator applies pushing force to the handle 12, in the direction of its axis, the result is movement of the nozzle in a direction influenced by two different but combined forces, namely, the force applied to the handle in the straight forwardly extending direction of its axis, and the force transmitted to the turned nozzle which is influenced by the rotative direction of the rollers. Therefore the nozzle does not travel in either of the two paths in which it would move if influenced by only one or the other of the two forces. The resultant movement of the nozzle is in a direction at an angle to the axis of hte handle or handle-applied force, but at a more acute angle than that indicated by the turned position of the nozzle and of the rollers 26 therein. This movement of the nozzle, under the influence of the two forces, causes the spaced apart rollers 26 to exert sidewise pressure against the nap of the carpet or rug being cleaned, and to thereby augment the dust loosening capacity of the brush to increase the dust collecting efficiency of the cleaner.

In Fig. 2, the arrow 42 indicates the straight forward movement of the nozzle when the handle 12 and adapter 11 are axially located in the same vertical plane and the operator applies force to the handle in the direction of its axis. The rigid hand arrow 43 indicates the path in which the turned nozzle would travel assuming the nozzle is influenced only by the rotative direction of the rollers 26. The left hand arrow 44 similarly indicates the path in which the turned nozzle would travel assuming the nozzle is influenced only by the rotative direction of the rollers 26. The right hand arrow 45 indicates the path which the nozzle travels when it has been turned to the right as described by rotation of the handle 12 about its own axis, and straight forwardly directed force is applied to the handle by the operator in the direction of the axis of the handle. Likewise, the left hand arrow 46 indicates the path in which the nozzle travels when it has been turned to the left as described by rotation of the handle 12 about its own axis, and straight forwardly directed force is applied to the handle by the operator in the direction of the axis of the handle. The arrows 45 and 46 illustrate the results of the combined forces, namely, the roller positions and applied force, which influence the nozzle when turned to the right or left and when force is applied to the handle in the direction of its axis.

Changes may be made in details of construction and in the form and arrangement of parts without departing from the scope of the invention defined by the appended claims.

I claim:

1. A suction cleaner nozzle comprising a nozzle housing provided at its bottom with an elongated air intake opening, a roller shaft fixedly mounted in the housing parallel to the intake opening, a plurality of rollers loosely mounted on the shaft in nozzle supporting position across the path over which the intake opening passes when the nozzle is moved over a surface, said rollers being rotated independently of each other by contact with the surface to be cleaned, the side surfaces of each roller being slightly spaced from the sides of adjacent rollers, an axially curved hollow tubular member rotatably mounted at one end in the rear of the nozzle housing in communication with the interior of the nozzle, and an axially straight hollow tubular handle connected to the other end of the curved member, said rollers biasing the nozzle to move in the direction of rotation of the rollers at right angle to the shaft when moving force is applied to the handle, rotating of the handle about its axis causing turning of the nozzle, the combined biasing influence

of the rollers and moving force applied to the handle in the direction of its axis when the nozzle has been turned by rotation of the handle causing the nozzle to travel in a path extending from the nozzle between the direction of said applied force and a direction at right angles to the roller shaft and producing sidewise pressure exerted by the rollers against the nap of the surface on which the nozzle travels.

2. The suction cleaner nozzle defined by claim 1 in which the roller shaft and rollers mounted thereon are located rearwardly of the air intake opening.

3. The suction cleaner nozzle defined by claim 1 in which each roller is provided with annularly spaced lateral projections on a side surface, said projections loosely contacting an adjacent roller and spacing said rollers apart.

4. The suction cleaner nozzle defined by claim 1 in which the roller shaft and rollers mounted thereon are located rearwardly of the air intake opening, and an elongated brush parallel to the air intake opening is located between said roller shaft and said intake opening.

5. The suction cleaner nozzle defined by claim 1 which includes a roller shaft bracket mounted in the housing, parallel to and overlying the roller shaft between the rollers and said tubular member, a cam surfaced ring mounted on the inner end of the tubular member, the cam surfaces bearing on the roller shaft bracket, and means for rotating the cam ring.

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