May 31, 1960 G. F. CARABET 2,938,225

SURFACE CLEANING TOOL

Filed June 9, 1958 2 Sheets-Sheet 1

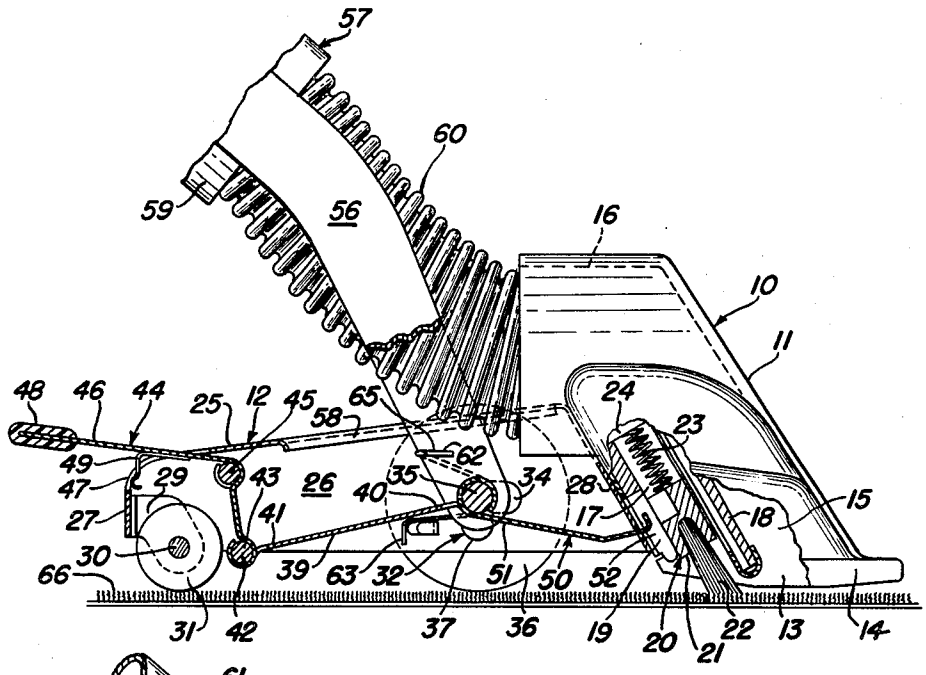


Fig. 1

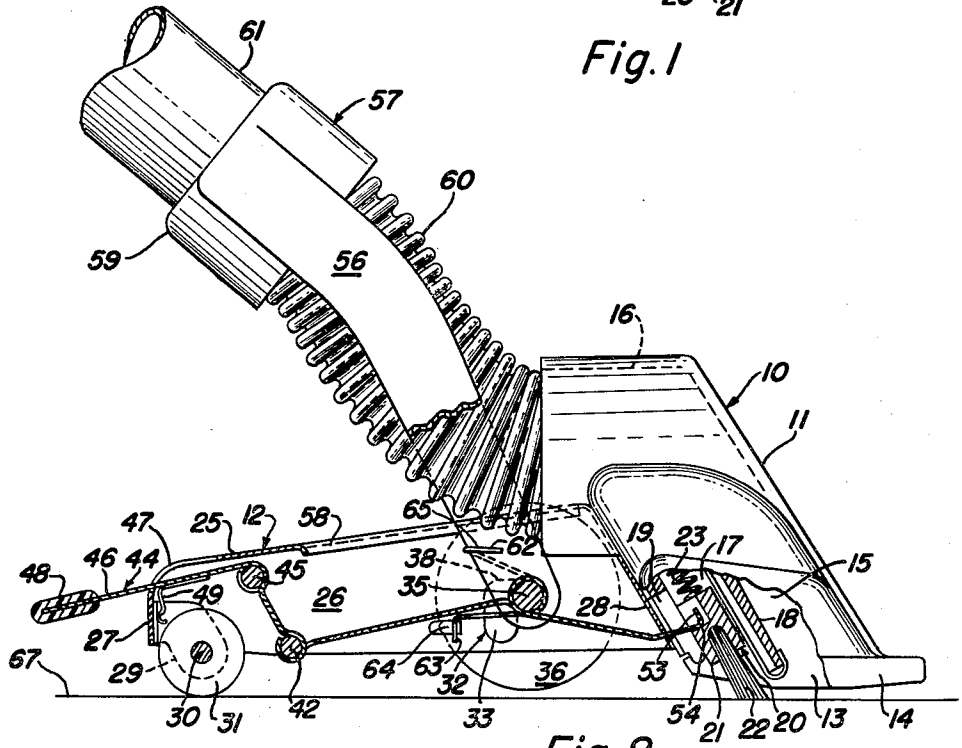


Fig. 2

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SURFACE CLEANING TOOL

Filed June 9, 1958 2 Sheets-Sheet 2

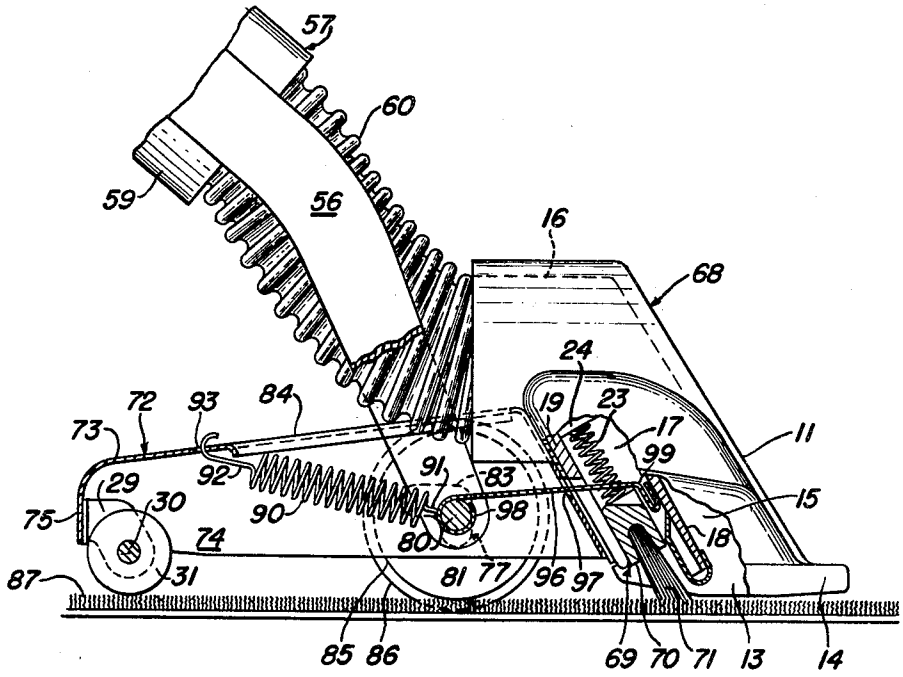


Fig. 3

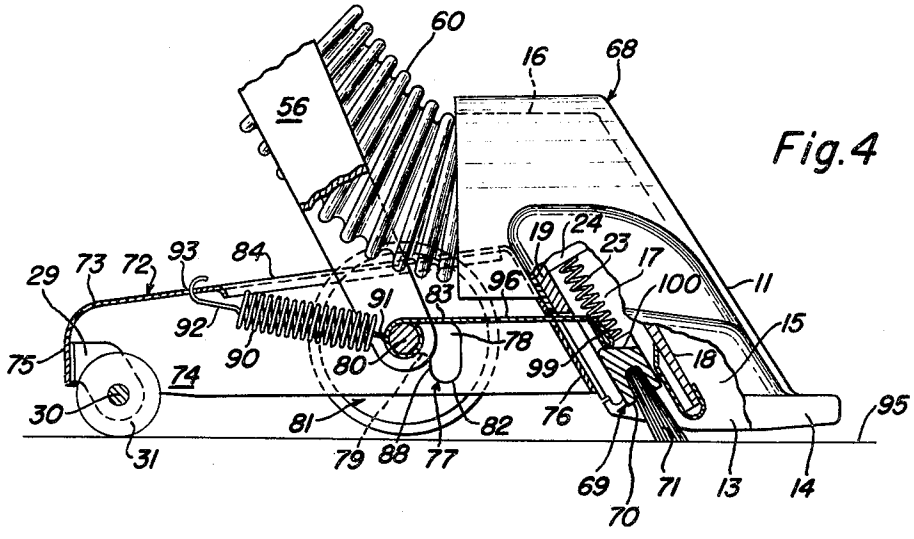


Fig. 4

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SURFACE CLEANING TOOL

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10 Claims. (Cl. 15—356)

The present invention relates to suction cleaning tools and more particularly to a tool having a nozzle which can be adjusted to float or remain fixed with respect to the surface being cleaned.

An object of the invention is to provide a cleaning tool having a surface cleaning nozzle and supporting means wherein the latter is movably and fixedly mounted with respect to the nozzle to transfer propelling forces either to the nozzle or the supporting means. Another object is to provide the aforesaid cleaning tool with a resiliently mounted brush which is maintained in projected surface cleaning position when the supporting means are fixedly mounted on the nozzle body to thereby transmit the propelling forces to the brush and thus the surface being cleaned. A further object is to adjust the brush in the cleaning tool to its projected position by displacement of the supporting means from its movable to fixed positions relative to the nozzle body. Other objects and advantages of the invention will become apparent from the following description and drawings wherein:

Figure 1 is a side view partly in section of one embodiment of the invention showing the supporting wheels loosely mounted with respect to the nozzle body and the brush in unlocked position,

Figure 2 is a view similar to Figure 1 and showing the supporting wheels fixed with respect to the nozzle body and the brush locked in projected position,

Figure 3 is a view partly in section of another embodiment of the invention showing the supporting wheels arranged to permit the nozzle to float with respect to the surface being cleaned and the brush in unlocked position, and

Figure 4 is a view similar to Figure 3 but showing the supporting wheels fixed with respect to the nozzle body and the brush locked in projected position.

The embodiment of the invention disclosed in Figures 1 and 2 comprises a body **10** having an elongated nozzle **11** at its forward end and a rearwardly extending bracket **12**. The nozzle **11** is provided with a mouth **13** defined by a perimeter lip **14** and communicates with an air passageway **15** having an outlet **16**. Rearwardly of the nozzle inlet **13** is a brush housing **17** formed by the nozzle wall **18** and the rear wall **19**. Slidably disposed in the brush housing **17** is a brush **20** having a brush back **21** and bristles **22**. A pair of springs **23**, only one of which is shown, is seated between a land **24** on the nozzle body and the brush back **21** to resiliently urge the bristles **22** outwardly of the nozzle lip **14** into engagement with the surface to be cleaned.

The body bracket **12** has a top wall **25**, depending side walls **26**, an end wall **27** and front wall **28**, the latter being suitably secured to the brush housing rear wall **19**. Attached to the rear wall **27** is a wheel bracket **29** supporting a shaft **30** on which is rotatably mounted a roller **31**. The roller **31** engages the surface to be cleaned to form a rear support for the body **10** and the shaft **30** provides a pivotal axis for the body. Formed

in each side wall **26** of the body bracket **12** is an opening **32** having a vertical portion **33** and a forwardly disposed offset portion **34**. Extending through the openings **32** is a thrust receiving wheel shaft **35** provided at its opposite ends with a thrust wheel **36** which engage the supporting surface. The vertical portion **33** of the openings **32** provide mounting means for the shaft **35** to permit vertical displacement of the shaft and wheels **36** relative to the nozzle **11** and such movement is limited by the shaft **35** engaging either the bottom **37** or top **38** of the walls defining the vertical portions **33** of the openings. The offset portion **34** of the openings **32** provide additional mounting means for the shaft **35** to maintain the latter fixed with respect to the body **10**.

A locking device is provided to maintain the shaft **35** in the offset portions **34** of the openings **32** as shown in Figure 2 and comprises a link **39** having one end **40** rotatably secured to the shaft **35** by partly encircling the latter, and the opposite end **41** is journaled on a pin **42** rotatably mounted at one end **43** of a lever **44**. The lever **44** is pivotally supported on a pin **45** mounted in the opposed side walls **26** and has a lever arm **46** projecting rearwardly of the body through an opening **47** and terminates in a pad **48** to receive the operator's foot for manipulating the lever **44**. A spring latch **49** is secured to the lever arm **46** and engages the rear wall **27** of the body **10** to maintain the lever **44** in its locked position as shown in Figure 2.

The brush **20** is also locked in its projected position shown in Figure 2 by a link **50** having one end **51** rotatably connected to the wheel shaft **35** and the link extends forwardly through an opening **52** in the bracket wall **28** of the body **10** into the brush housing **17** and terminates in an offset end **53**. The end **53** of the link **50** is adapted to engage a shoulder **54** on the brush back **21** to lock the brush **20** in its projected position relative to the nozzle lip **14**.

Rotatably mounted on the wheel shaft **35** are spaced arms **56** of a bail **57** which projects through an opening **58** in the top wall **25** of the body bracket **12**. The bight **59** of the bail **57** is tubular and is connected at one end to a resilient conduit **60** which is secured to the outlet **16** of the nozzle **11** for communication with the nozzle mouth **13**. A wand **61**, which also acts as a propelling handle, is attached to the bail **57** and communicates with the resilient conduit **60**. Attached to the opposite end of the wand **61** is an unshown hose which is connected to a suction cleaner in a well known manner for conveying dirt laden air from the nozzle mouth **13** to the cleaner which removes the dirt from the air stream prior to discharging the latter to atmosphere. A pair of torsion springs **62** are arranged about the wheel shaft **35** at its opposite ends and one end **63** of each spring is attached to a lug **64** on the side walls **26** of the body bracket **12**, and the opposite ends **65** are secured to each leg **56** of the bail **57**. The springs **62** are of such strength as to prevent the nozzle **11** from pivoting downwardly when the body **10** is lifted off the supporting surface but do not interfere with displacement of the wheel shaft **35** in the openings **32**.

When the tool is employed to clean a soft surface as represented by the rug **66** in Figure 1 the operator exerts a lifting force on the lever pad **48** to rotate the lever **44** to its unlocked position shown in Figure 1. Movement of the lever to its unlocked position arranges the wheel shaft **35** in the elongated vertical openings **33** and also shifts the brush link **50** out of engagement with the shoulder **54** on the brush **20**, whereby the wheel shaft **35** is free to move in the elongated openings **33** and the brush **20** is unlocked for movement in the housing **17**. The tool is propelled over the surface **66** on the wheels **36** and the roller **31** by applying forces to the wand **61**, and such

forces are transmitted through the bail arms 56 to the wheel shaft 35 and then to the wheels 36 onto the surface 66. The elongated portions 33 of the openings 32 in the body frame 12 permit the wheel shaft 35 to be displaced with respect to the nozzle 11 so that the vertical component of the forces applied to the handle 61 are not transferred to the nozzle 11, with a result the nozzle lip 14 rests lightly on the surface. In addition the vertical elongated openings 33 allow the body to pivot about the roller axis 30 when the nozzle lip 14 engages different types of rugs to automatically adjust itself to the surface so that the nozzle 11 in effect floats with respect to the surface 66. The opening 47 through which the lever arm 46 projects is of sufficient area so as not to interfere with upward movement of the nozzle 11 relative to the wheel shaft 35. The brush 20 is unlocked and thus is resiliently urged outwardly of the brush housing 17 to an extent necessary to engage the surface 66 being cleaned.

If the tool is employed to clean a hard surface such as linoleum or a bare floor as indicated at 67 in Figure 2, it is desirable to lock the brush 20 in projected position and also lock the wheel shaft 35 with respect to the body 10 so that the propelling forces applied to the handle 61 may be transmitted directly to the brush 20 to scrub and remove dirt from the floor. To adapt the tool for cleaning hard surfaces the operator places his foot on the lever pad 48 to depress the lever arm 46 causing the link 39 to move forwardly to displace the wheel shaft 35 into the offset openings 34. The wheel shaft 35 is locked in the offset openings 34 by the spring latch 49 engaging the body rear wall 27 and thus the wheel shaft 35 is rigid with respect to the body 10. Depressing the lever arm 46 also causes the end 53 of the brush link 50 to engage the shoulder 54 on the brush back 21 to lock the latter in its fully projected position relative to the nozzle lip 14. The bristles 22 are projected to such an extent that the supporting wheels 36 are raised from the surface 67, as shown in Figure 2, whereby the tool is supported on the rear roller 31 and the bristles 22. Since the wheel shaft 35 is locked in the offset openings 34 which are adjacent the upper end of the elongated openings 33 the nozzle lip 14 is also maintained in its lowest nozzle position with respect to the surface 67.

When the wheel shaft 35 and brush 20 are locked with respect to the body 10 the propelling forces applied to the handle 61 are transmitted directly to the body 10 and since the wheels are raised from the surface 67 a positive pressure is applied to the bristles 22 for scrubbing action on the surface 67.

The embodiment of the invention disclosed in Figures 3 and 4 includes a body 68 having the nozzle 11 provided with the inlet 13 communicating with the flexible conduit 60 connected to the wand 61 supported on the bail 57 as previously described. Slidably disposed in the brush housing 17 is a brush 69 having a brush back 70 and bristles 71, and the springs 23 resiliently urge the bristles 71 to project outwardly of the nozzle lip 14 into resilient engagement with the surface to be cleaned. Extending rearwardly of the nozzle 11 is a body bracket 72 having a top wall 73, side wall 74, end wall 75 and front wall 76, the latter being attached to the rear wall 19 of the brush housing 17. Secured to the rear wall 75 is the wheel bracket 29 on which is mounted the shaft 30 provided with the roller 31.

Formed in each side wall 74 of the body bracket 72 is an opening 77 having a vertical portion 78 and at the upper end thereof a rearwardly extending offset portion 79. A thrust receiving wheel shaft 80 is arranged in the openings 77 and rotatably mounted on the opposite ends of the shaft is a thrust wheel 81. The vertical portions 78 of the openings 77 provide mounting means for the shaft 80 to permit vertical displacement of the latter and the wheels 81 relative to the nozzle 11, and such movement is limited by the shaft 80 engaging either the bottom 82 or the top 83 of the walls defining the vertical openings 78. The offset rear openings 79 provide additional mounting means for the shaft 80 to maintain the latter fixed with respect to the nozzle 11. The arms 56 of the bail 57 are rotatably mounted on the shaft 80 and project upwardly therefrom through an opening 34 in the top wall 73 of the body bracket 72.

The peripheral thread surface of the wheels 81 is of irregular contour and includes a recessed annular area 85 from which centrally projects an annular rib 86, whereby the tool is supported on the projecting ribs 86 when propelled along hard surfaces, and when moved along soft surfaces such as a rug 87 in Figure 3, the ribs 86 enter the pile so that the recessed tread areas 85 and the nozzle lip 14 rest upon the top surface of the rug 87. When the wheel ribs 86 penetrate the rug 87 the nozzle 11 is pivoted upwardly about the roller shaft 30 to position a portion of the wheel shaft 80 slightly below the lower edge of the offset openings 79 whereby the shaft 80 abuts the lower rear walls 88 of the vertical openings to prevent movement of the shaft 60 into the offset openings 79.

A locking device is provided to yieldably maintain the wheel shaft 80 in the offset openings 79 and includes a pair of tension springs 90, only one of which is shown, and each spring 90 is arranged adjacent the body bracket side walls 74 and has one end 91 secured to the shaft 80 and the opposite end 92 is attached to the body 68 as indicated at 93. The pulling force exerted by the springs 90 on the wheel shaft 80 is such that when the tool is resting on a hard surface, as the floor 95 in Figure 4, the shaft 80 is moved by the springs 90 into the offset openings 79 to prevent relative movement between the nozzle 11 and the shaft 80.

The brush 69 is locked in its projected position as shown in Figure 4 by a link 96 extending through an opening 97 in bracket wall 76 of the nozzle body and the link has one end 98 attached to the wheel shaft 80 and the opposite end is provided with a depending lug 99 which is engageable with a cam surface 100 on the brush back 70 to maintain the bristles 71 in fixed position with respect to the nozzle lip 14.

When the tool is employed to clean a soft surface as represented by the rug 87 in Figure 3 the annular ribs 86 on the wheels 81 penetrate the surface of the rug so that the recessed tread areas 85 support the wheels 81 on the rug. Since the wheel ribs 86 penetrate the surface of the rug 87 the nozzle lip 14 is raised with respect to the shaft 80 and elevates the openings 77 with respect to the wheel shaft 80 whereby the latter is arranged in front of the rear walls 88 of the vertical openings 78 so that the force exerted by the springs 90 do not displace the wheel shaft 80 into the offset openings 79. The propelling force applied to the wand 61 is transmitted through the bail arms 56 to the wheel shaft 80 and then to the wheels 81 onto the surface 87. The lower portion of the vertical openings 78 permit the wheel shaft 80 to be vertically displaced with respect to the nozzle lip 14 so that the vertical component of the forces applied to the handle 61 are not transferred to the nozzle 11, with the result the nozzle lip 14 rests lightly on the surface of the rug 87. The brush 69 is unlocked and is resiliently urged into engagement with the rug 87 by the springs 23.

If the wheel shaft 80 is arranged in the offset openings 79 for cleaning a hard surface, as shown in Figure 4, and it is desired to clean the rug 87, the tool is automatically converted for cleaning such soft surfaces by placing the tool on the rug 87 and upon the initial forward stroke of the tool over the rug 87 the rearward force exerted by the springs 90 is overcome due to the forward propelling force applied to the wand 61 plus the surface resistance of the rug 87 to passage of the bristles 71 thereover, whereby the body 68 will be displaced rearwardly relative to the shaft 80 to arrange the latter in the vertical

openings 78, and thereafter the force applied to the wand 61 is transmitted directly to the wheels 81 so that they enter the rug 87 and the shaft 80 is arranged in the lower portion of the vertical openings 78.

If the tool is to be converted from the rug cleaning position shown in Figure 3 to bare floor cleaning position shown in Figure 4 the operator merely moves the tool for rug 87 onto the floor 95. The ribs 86 on the wheels 81 then rest on the floor 95 allowing the nozzle lip 14 to drop to thereby arrange the offset openings 79 opposite the wheel shaft 80. The springs 90 then pull the shaft 80 rearwardly into the offset openings 79 as shown in Figure 4. Displacement of the shaft 80 rearwardly from the vertical openings 78 into the offset openings 79 moves the brush link 96 to the rear and causes the depending lug 99 to slide along the cam surface 100 to rigidly lock the brush 69 in its projected position relative to the nozzle lip 14. The bristles 71 are projected to such an extent that the supporting wheels 81 are raised from the floor 95 whereby the tool is supported on the rear roller 31 and the brush 69, and since the shaft 80 is locked in the offset openings 79 the nozzle lip 14 is rigidly maintained in its lowest possible position with respect to the surface. With the wheel shaft 80 and brush 69 locked with respect to the body 68 the propelling forces applied to the handle 61 are transmitted directly to the body 68 and since the wheels are elevated with respect to the surface 95 a positive pressure is applied to the bristles 71 for scrubbing the surface 95.

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

I claim:

1. A cleaning tool comprising: a body having a surface cleaning nozzle at its forward end, means on said body for connecting said nozzle to a source of suction, rear wheel means rotatively connected to said body rearwardly of its center of gravity whereby said nozzle tends to drop and rest upon the surface to be cleaned for vertical adjustment in accordance with the type of surface being cleaned, thrust receiving shaft means having front wheel means, a handle attached to said shaft means for transferring a propelling force thereto, first mounting means in said body for supporting said thrust receiving shaft means rigidly with respect to said body in a high position relative to said nozzle and to transfer a propelling handle force to said body and thus said nozzle, second mounting means communicating with said first mounting means for displacement of said shaft means from said high position in said first mounting means into said second mounting means, said second mounting means providing a loose connection between said body and shaft means for vertical adjustment of said shaft means relative to said body upon application of a propelling force to said handle when cleaning a surface having a yieldable pile.

2. A cleaning tool as described in claim 1, and means connected to said shaft means and body for latching said shaft means in said first mounting means.

3. A cleaning tool as described in claim 1, and spring means connected to said shaft means and body for retaining said shaft means in said first mounting means.

4. A cleaning tool as described in claim 1, and said first mounting means arranged rearwardly of said second mounting means, and spring means connected to said shaft means and body to latch said shaft means in said first mounting means rearwardly of said second mounting means, the force exerted by said spring means being sufficient to maintain said shaft means in said first mounting means against the propelling force applied to said handle when cleaning a relatively hard surface, and said spring means yielding when a greater propelling force is required to move said nozzle against the resistance of a yieldable pile surface to thereby allow displacement of said shaft means into said second mounting means.

5. A cleaning tool as described in claim 1, and manually operated lever means connected to said shaft means and body for latching said shaft means in said first mounting means.

6. A cleaning tool as described in claim 5, and said lever means operable to shift said shaft means into said second mounting means whereby said shaft means is movable with respect to said body upon application of propelling forces to said handle.

7. A cleaning tool as described in claim 1, and a surface cleaning brush, means movably mounting said brush on said body, means resiliently projecting a portion of said brush exteriorly of said body into engagement with the surface to be cleaned, and means for locking said brush in projected position relative to said body.

8. A cleaning tool comprising: a body having a surface cleaning nozzle at its forward end, means on said body for connecting said nozzle to a source of suction, rear wheel means rotatively connected to said body rearwardly of its center of gravity whereby said nozzle tends to drop and rest upon the surface to be cleaned for vertical adjustment in accordance with the type of surface being cleaned, thrust receiving shaft means having front wheel means, a handle attached to said shaft means for transferring a propelling force thereto, first mounting means in said body for supporting said thrust receiving shaft means rigidly with respect to said body to transfer a propelling handle force to said body and thus said nozzle, second mounting means communicating with said first mounting means for displacement of said shaft means from said first into said second mounting means, said second mounting means providing a loose connection between said body and shaft means for vertical adjustment of said shaft means relative to said body upon application of a propelling force to said handle when cleaning a surface having a yieldable pile, a surface cleaning brush, means movably mounting said brush on said body, means resiliently projecting a portion of said brush into engagement with the surface to be cleaned, and means connected with said shaft means and movable therewith to lock said brush in projected position relatively to said body upon displacement of said shaft means into said first mounting means to thereby transfer the propelling handle force to said brush.

9. A cleaning tool comprising: a body having a surface cleaning nozzle at its forward end, means on said body for connecting said nozzle to a source of suction, rear wheel means rotatively connected to said body rearwardly of its center of gravity whereby said nozzle tends to drop and rest upon the surface to be cleaned for vertical adjustment in accordance with the type of surface being cleaned, thrust receiving shaft means having front wheel means, a handle attached to said shaft means for transferring a propelling force thereto, first mounting means in said body for supporting said thrust receiving shaft means rigidly with respect to said body to transfer a propelling handle force to said body and thus said nozzle, second mounting means communicating with said first mounting means for displacement of said shaft means from said first into said second mounting means, said second mounting means providing a loose connection between said body and shaft means for vertical adjustment of said shaft means relative to said body upon application of a propelling force to said handle when cleaning a surface having a yieldable pile, spring means connected to said shaft means and body for retaining said shaft means in said first mounting means, a surface cleaning brush, means movably mounting said brush on said body, means resiliently projecting said brush into engagement with the surface to be cleaned, and means connected to said spring means for locking said brush in projected position relatively to said body when said shaft means is latched in said first mount-

ing means to thereby transfer the propelling handle force to said brush.

10. A cleaning tool comprising: a body having a surface cleaning nozzle at its forward end, means on said body for connecting said nozzle to a source of suction, rear wheel means rotatively connected to said body rearwardly of its center of gravity whereby said nozzle tends to drop and rest upon the surface to be cleaned for vertical adjustment in accordance with the type of surface being cleaned, thrust receiving shaft means having front wheel means, a handle attached to said shaft means for transferring a propelling force thereto, first mounting means in said body for supporting said thrust receiving shaft means rigidly with respect to said body to transfer a propelling handle force to said body and thus said nozzle, second mounting means communicating with said first mounting means for displacement of said shaft means from said first into said second mounting means, said second mounting means providing a loose connection between said body and shaft means for vertical adjustment of said shaft means relative to said body upon application

of a propelling force to said handle when cleaning a surface having a yieldable pile, manually operated lever means connected to said shaft means and body for latching said shaft means in said first mounting means, a surface cleaning brush, means movably mounting said brush on said body, means resiliently projecting said brush into engagement with the surface to be cleaned, and means connected to said lever means for locking said brush in projected position relatively to said body when said shaft means is latched in said first mounting means to thereby transfer the propelling handle force to said brush.

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