July 15, 1958 C. C. HURD 2,842,793

SUCTION CLEANING TOOL WITH FLOATING AND PRESSURE NOZZLE

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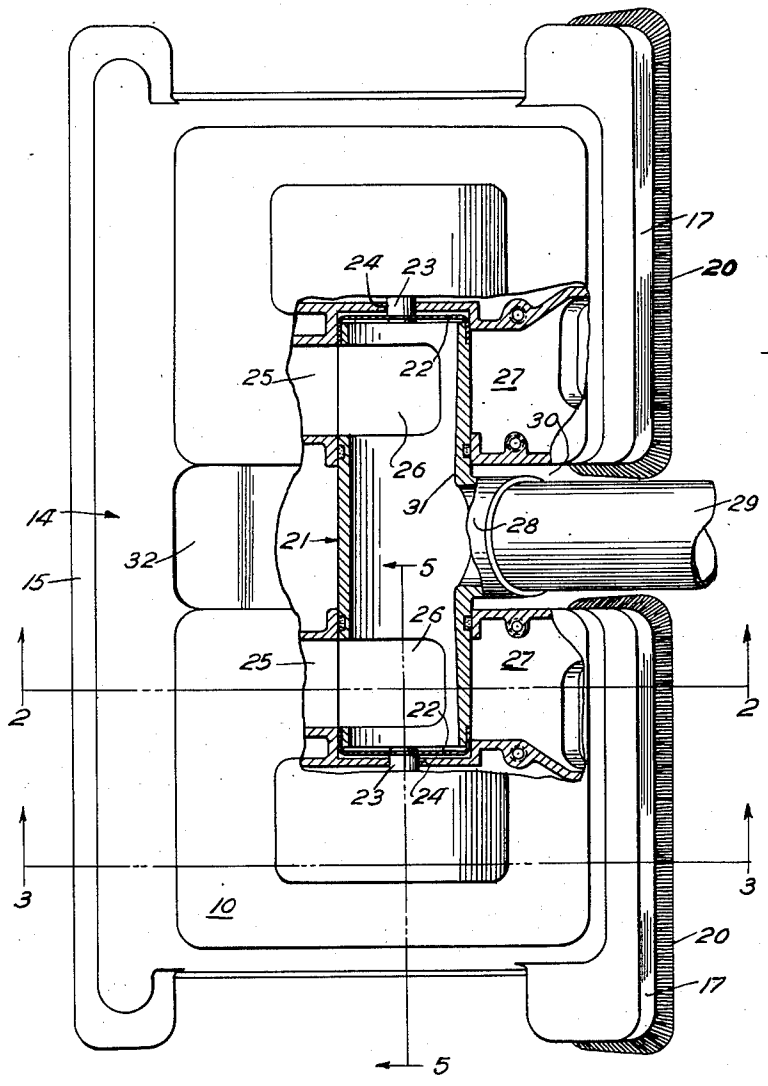


FIG. 1

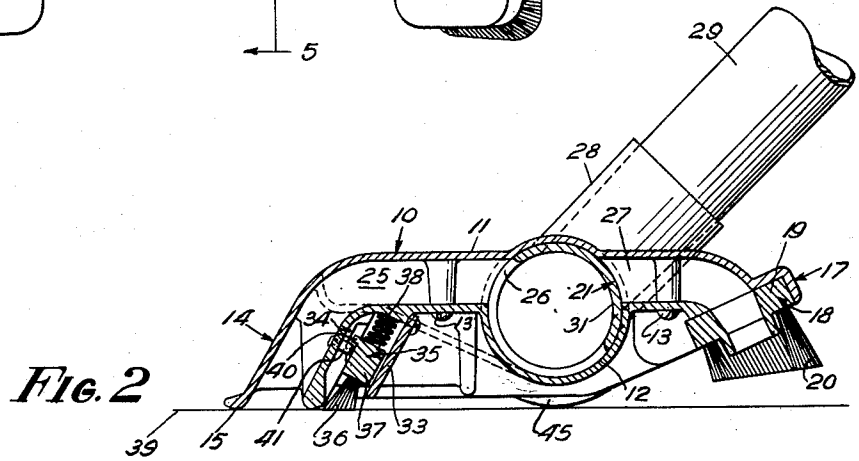


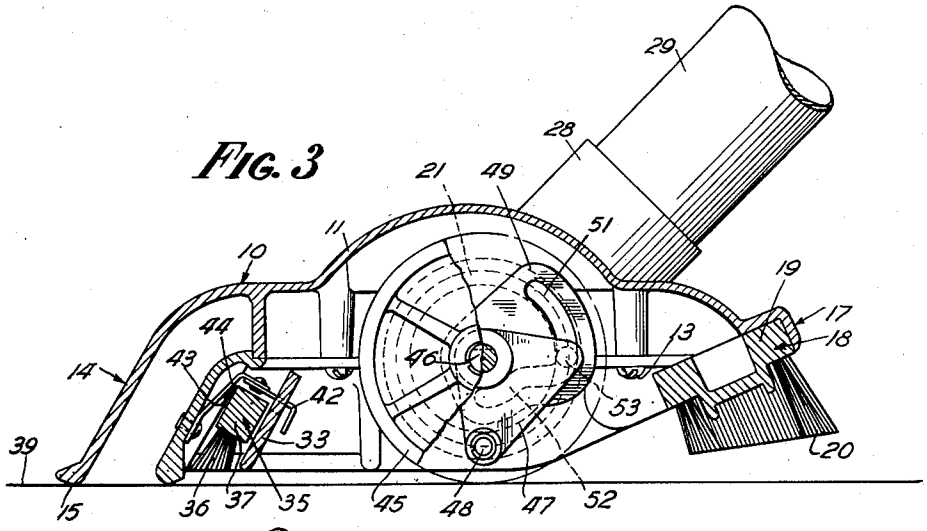
FIG. 2

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FIG. 3



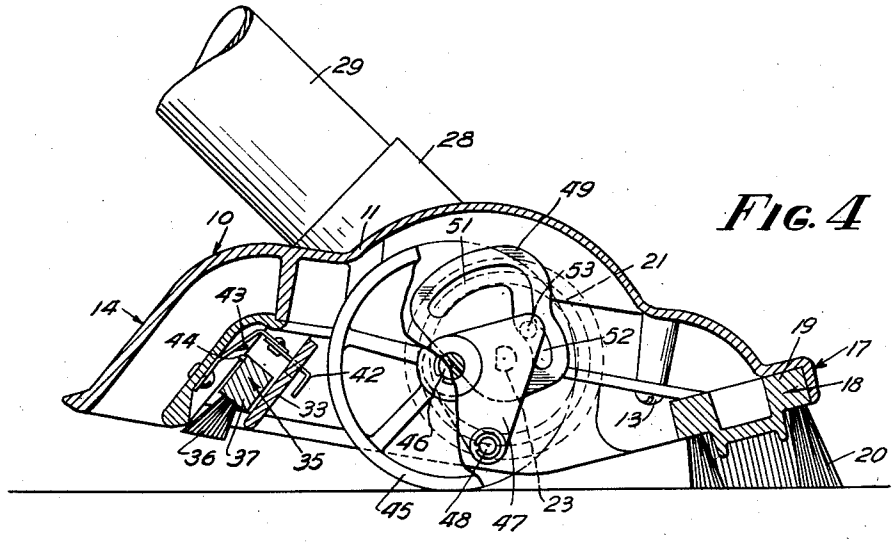


FIG. 4

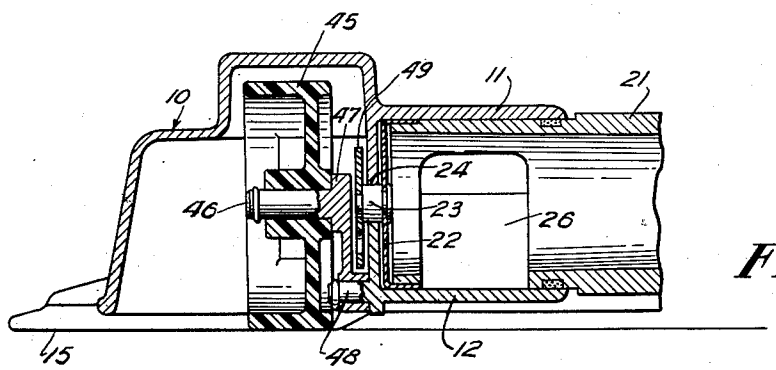


FIG. 5

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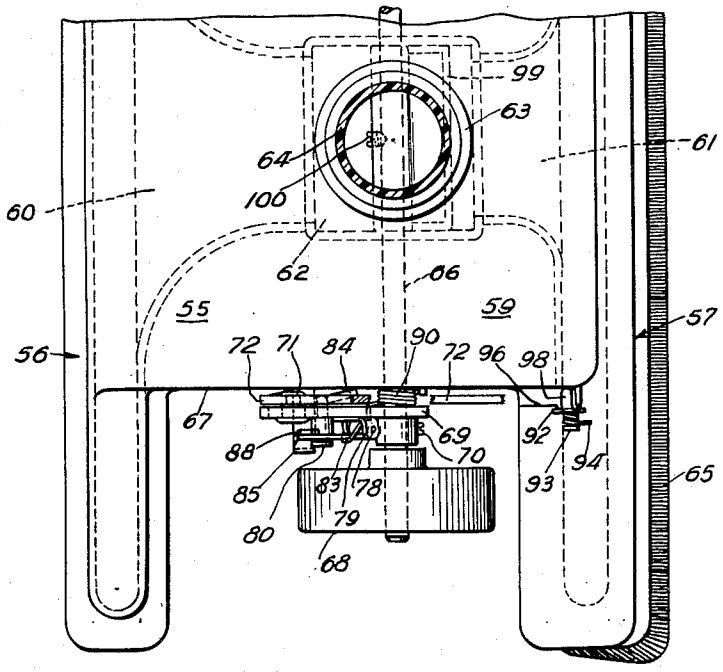


FIG. 6

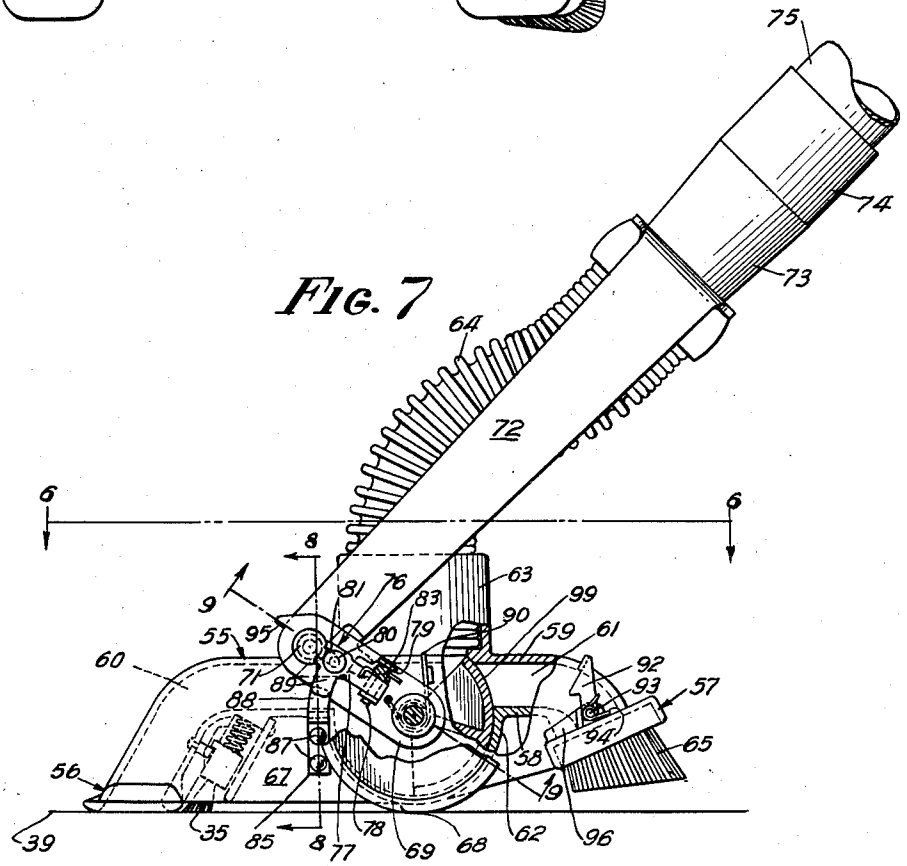


FIG. 7

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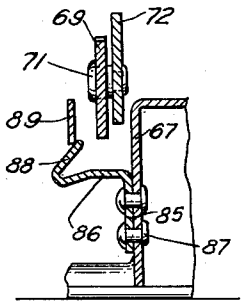


FIG. 8

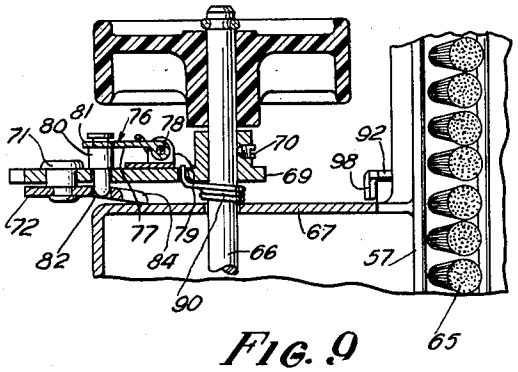


FIG. 9

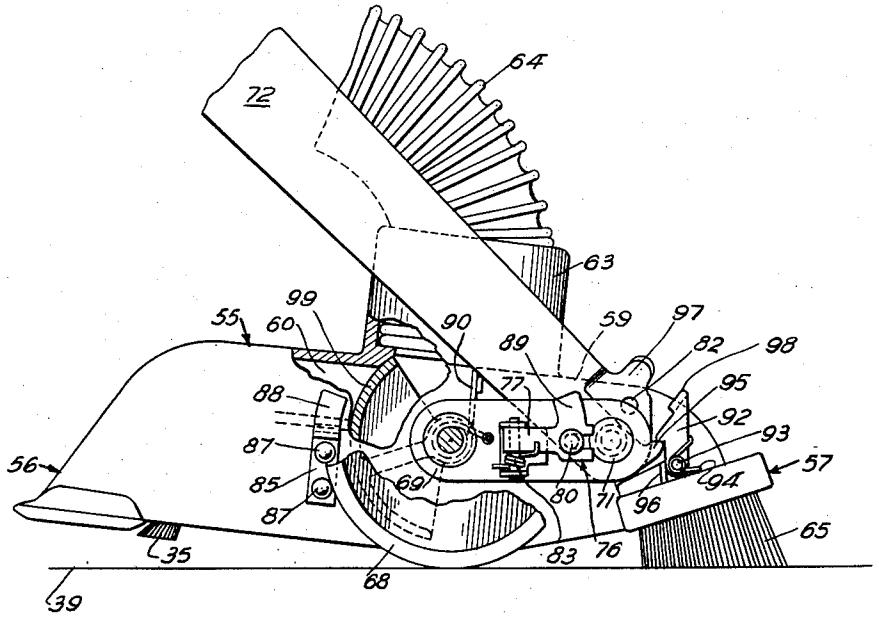


FIG. 10

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SUCTION CLEANING TOOL WITH FLOATING AND PRESSURE NOZZLE

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Application May 3, 1955, Serial No. 505,692

10 Claims. (Cl. 15—359)

The present invention relates to surface cleaning tools adapted to be connected to suction cleaners.

An object of the invention is to provide a cleaning tool having a surface cleaning means, supporting wheels and a propelling handle the latter being movable to different angularly spaced positions for arrangement coaxially of or offset to the rotational axis of the wheels whereby the cleaning means either float with respect to the surface being cleaned or the handle propelling forces are transmitted thereto and the surface to be cleaned. Another object is to provide a cleaning tool having a propelling wand adapted to be connected to a source of suction and movable relative to the supporting wheels to transmit the forces applied to the wand either to the surface cleaning means or the wheels, whereby the cleaning means is pressed against or floats with respect to the surface being cleaned. A further object is to provide a cleaning tool having two spaced nozzles, supporting wheels and a propelling handle, the latter movable to different positions with respect to the wheels and nozzles to transmit the forces applied to the handle to one of the nozzles to press it against the surface to be cleaned, or transmit the forces to the wheels whereby the other nozzle floats with respect to the surface. Other objects and advantages of the invention will become apparent from the following description and drawings wherein:

Figure 1 is a top plan view partly in section of one embodiment of the invention,

Figure 2 is a section along the line 2—2 in Figure 1 showing the handle coaxial with the supporting wheels and the operating nozzle floating with respect to the surface,

Figure 3 is a similar view but taken along the line 3—3 of Figure 1,

Figure 4 is a sectional view showing the handle in another position and offset with respect to the wheel axis to apply pressure to the operating nozzle and thus the surface to be cleaned,

Figure 5 is a section along the line 5—5 in Figure 1,

Figure 6 is a partial top plan view of another embodiment of the invention taken along the line 6—6 of Figure 7,

Figure 7 is a side view partly in section showing the handle pivoted about the axis of the supporting wheels to arrange the operating nozzle for free movement relative to the surface,

Figure 8 is a section along the line 8—8 of Figure 7,

Figure 9 is a section along the line 9—9 of Figure 7, and

Figure 10 is a side view partly in section showing the handle pivot offset from the wheel axis to apply handle propelling forces directly to the operating nozzle to positively press the latter against the surface to be cleaned.

The embodiment of the invention disclosed in Figures 1 to 5 comprises a body 10 formed respectively from upper and lower portions 11 and 12 secured together by screws 13 and cooperating to form a floating nozzle 14

having a perimeter lip 15 extending the length of the body 10. An interrupted pressure nozzle is formed in two spaced sections 17 and attached to each nozzle section is a brush 18 having a brush back 19 and bristles 20. Disposed between the body portions 11—12 is a T-shaped air conducting tubular member 21 closed at its opposite ends by a plate 22 and secured to the latter is a pin 23 pivotally mounted at 24 between the body portions 11—12 to rotatably support the air conducting member 21. Formed between the body sections 11—12 and extending from the floating nozzle 14 are two air passageways 25 adapted to be connected to a pair of inlet openings 26 formed in the wall of the member 21. Extending from each pressure nozzle 17 is an air passageway 27 also adapted to be connected to the inlets 26. The socket 28 in the member 21 provides an air outlet and attached thereto is a rigid wand 29, which acts as a propelling handle, connected with an unshown hose of a suction cleaner to thereby conduct dirt laden air to the latter in a well known manner. The handle 29 is adapted to be moved in the space 30 between the pressure nozzle sections 17 when the wand is being moved through one of its operating ranges as viewed in Figures 1 and 2 to place the inlet openings 26 in register with the floating nozzle 14 for connection to the source of suction, and the solid wall portion of the member 21 opposite the openings 26 forms a valve 31 to close the pressure nozzle air passageways 27 to the source of suction. The upper surface of the body portion 11 is recessed at 32 to accommodate the handle 29 when the latter is moved to the left as shown in Figure 4.

Cooperating with the rear wall of the floating nozzle 14 is a member 33 forming a brush housing 34 in which is disposed a floating brush 35 having bristles 36 set in a back 37. A pair of compression springs 38 urge the bristles outwardly of the housing 34 beyond the nozzle lip 15 for resilient engagement with the surface 39 to be cleaned. A pair of lugs 40 on the brush back 37 engage pins 41 on the nozzle rear wall to limit the outward projection of the bristles 36 as shown in Figure 2. The brush 35 is maintained in retracted inoperative position by a spring latch 42 provided with a detent 43 engageable with a projection 44 on the brush back 37 as shown in Figure 3.

A pair of wheels 45 are each rotatably mounted on a pin 46 at one corner of a triangularly shaped wheel supporting plate 47 the latter being journaled on a pin 48 fixed to the body 10 vertically beneath the handle pivot pins 23 at the opposite ends of the T-shaped member 21. Rigidly mounted on each pivot pin 23 is a cam plate 49 having a cam slot divided into a floating nozzle portion 51 and a pressure nozzle portion 52 for the reception of a pin 53 secured to the wheel supporting plate 47 whereby the wheels 45 may be displaced with respect to the handle pivots 23.

When it is desired to clean a surface having lightly embedded dirt the floating nozzle 14 is used and is placed in operative position by moving the heandle 29 to the right of a vertical plane passing the handle pivot pins 23 as shown in Figures 2 and 3. Such movement of the handle rotates the T-shaped member 21 to align the air inlet openings 26 with the air passageways 25, whereby dirt laden air removed from the carpet is conveyed from the nozzle 14 to the handle 29 and then to the suction cleaner which collects the dirt prior to discharging the air to atmosphere. When the handle is in this position the valves 31 close off the air passageways 27 to prevent passage of air through the pressure nozzles 17 to the source of suction. During oscillating movement of the handle 29 in this operating range, the cam portions 51 receive the pins 53 which maintain the wheels 45 coaxial

with the handle pivots 23 whereby the forces applied to the handle are transmitted directly to the wheels 45 and not to the floating nozzle 14. During movement of the nozzle 14 along the surface 39 the nozzle is free to rise and fall about the pivots 23 to adjust itself to the type of surface being cleaned regardless of the forces applied to the handle 29. The brush 35 is urged by the springs 38 to resileintly engage the surface being cleaned as shown in Figure 2, and if desired the brush may be retracted and locked out of contact with the surface by means of the spring latch 42 as shown in Figure 3.

When it is desired to scrub floors or clean carpets having deeply embedded dirt the pressure nozzles 17 are used and the handle 29 is moved to another operating range at the left of a vertical plane passing through the handle pivot 23. Movement of the handle 29 to its pressure cleaning operating position causes the valve 31 to close off the air passageways 25 and to connect the nozzles 17 and air passageways 27 with the wand 29 and thus the source of suction. During such movement of the handle 29 the cam plates 49 are rotated counterclockwise causing the pins 53 to enter the pressure cam slots 52 to shift the wheels about the pins 48 to thereby displace the wheels 45 offset to the left of the handle pivots 23 as shown in Figure 4. In this position of the wheels 45 all the forces applied to the handle are transmitted to the pins 23 and thus to the pressure nozzles 17 which dig into the surface to thereby dislodge the dirt and the latter is carried by the air stream through the air passageways 27 to the filter in the suction cleaner. The handle 29 can be oscillated throughout its operating range between the recess 32 to the vertical plane.

The embodiment of the invention disclosed in Figures 6 to 10 comprises a body 55 having a floating nozzle 56 and a pressure nozzle 57 formed between two body portions 58 and 59 which also cooperate to provide air passageways 60 and 61 from the nozzles 56 and 57 respectively and terminating in a valve housing 62 provided with an upwardly projecting coupling 63 to which a flexible hose 64 is removably connected. Attached to the rear of the floating nozzle 56 is the resiliently supported brush 35 described in the first embodiment, and the pressure nozzle 57 is provided with a brush 65.

A shaft 66 extends through the central portion of the valve housing 62 and is rotatably supported in spaced depending walls 67 between the nozzles 56—57. A wheel 68 is rotatably mounted on the opposite ends of the shaft 66 to support the cleaning tool on the surface 39 to be cleaned. Interposed between each wheel 68 and the side walls 67 is a handle link 69 rigidly attached by a set screw 70 to the shaft 66. At the opposite end of each link 69 is a rigidly secured pin 71 on which is rotatably mounted the arms 72 of a U-shaped bail 73 terminating in a coupling 74 to which a wand 75, forming a handle, is attached and the hose 64 is also joined to the coupling 74 to connect the valve housing 62 to the handle 75 and thus to the source of suction.

In order to transmit the forces applied to the handle 75, when in the operating position shown in Figure 7, directly to the wheels 68 so that the nozzle 56 will float with respect to the surface 39 a latch 76 is provided to lock the handle 75 to the links 69 whereby the latter form a unitary part of the handle. The latch 76 includes a lever 77 supported on a pin 78 in a bracket 79 mounted on the links 69. A locking pin 80 is supported in a marginal slot 81 of the levers 77 and extends through the links 69 for selective engagement with an opening 82 in the adjacent handle bail arms. A torsion spring 83 about the pins 78 biases the locking pins 80 into engagement with the openings 82. The terminal end 84 of the bail arms adjacent the openings 82 are cammed inwardly toward the side walls 67 to initially engage the end of the locking pins 80 to move the latter outwardly to allow the bail arms to pass thereunder prior to the pins 80 entering the openings 82 to lock the links 69 to the handle 75.

In order to release the links 69 from the handle 75 a latch release 85 is provided and comprises a leaf spring 86 riveted at 87 to the body side walls 67 and has an offset resilient cam 88 engageable with a lateral arm 89 on the latch levers 77 to rotate the latter and remove the locking pins 80 from the openings 82 in the handle bail arms. A torsion spring 90 is arranged about the shaft 66 and is connected to the nozzle body and links 69 to at all times bias the latter counterclockwise to the position shown in Figure 7. When the handle 75 is in position as in Figure 7 and a downward force applied thereto, the links 69 are rotated counterclockwise causing the lever offset arms 89 to engage the release cams 88 which pivot the levers 77 away from the links 69 to remove the locking pins 80 from the openings 82 to thereby permit relative movement between the handle 75 and the links 69.

A device is provided to transmit the handle applied forces directly to the pressure nozzle 57 when the handle is in another operating range shown in Figure 10, and includes a latch lever 92 pivoted on a pin 93 supported on the top wall of the pressure nozzle 57. A torsion spring 94 biases the lever 92 in a counterclockwise direction into engagement with a shoulder 95 on the links 69 to lock the latter against abutments 96 on the pressure nozzle 57. Mounted on the bail arms 72 is a projection 97 which when the handle is moved from the operating range indicated in Figure 10 engages the ends 98 of the levers 92 to rotate the latter clockwise and release the links 69 to allow relative movement of the latter with respect to the body 55.

Disposed in the valve housing 62 is an arcuate shaped valve 99 rigidly attached to the shaft 66 by a screw 100. Movement of the links 69 by the handle 75 to the positions shown in Figures 7 and 10 respectively shift the valve 99 to connect the floating nozzle 56 or pressure nozzle 57 with the hose 64 and handle 73 and thus to the source of suction.

When it is desired to clean surfaces with the floating nozzle 56 the handle is arranged in the position shown in Figure 7 for movement through one operating range. In this position of the handle the locking pins 80 are seated in the bail openings 82 to lock the handle to the links 69 whereby the handle and links rotate about the shaft 66 as a unit. The valve 99 is arranged to close the pressure nozzle air passageway 61 and connect the floating nozzle 56 through its passageway 60 to the hose 64 and handle 75 and thus to the source of suction, whereby the dirt dislodged from the surface 39 is conveyed to a filter in a well known manner.

The forces applied to the handle in propelling the tool over the surface 39 are transmitted to the shaft 66 and wheels 68 and thus to the surface 39, whereby the nozzle 56 rests lightly on the surface 39 and adjusts itself with respect to the different types of pile by pivoting about the shaft 66.

In order to convert the tool for use of the pressure nozzle 57 a relatively great downward force is initially applied to the handle 75 to overcome the force of the torsion springs 90 causing the offset arms 89 on the latch levers 77 to engage the latch release cams 88 which pivot the levers 77 outwardly to remove the locking pins 80 from the openings 82 in the bail arms to thereby unlock the handle 75 from the links 69. The handle 75 is then rotated counterclockwise about its pins 71 to displace the openings 82 from the locking pins 80, and the links 69 are rotated clockwise about the shaft 66 to engage the shoulders 75 with the latch levers 92 as shown in Figure 10.

When the links 69 are locked in this position they rest against the abutments 96 on the body above the nozzle 57 and the handle 75 is free to pivot about the pins 71 through its operating range. The valve 99 is

also arranged as shown in Figure 10 to close the floating nozzle air passageway **60** and expose the pressure nozzle **57** to the hose **64** and handle **75** and thus to the source of suction for passage of dirt laden air to the filter in the suction cleaner.

The forces applied to the handle **75** in propelling the tool over the surface are transmitted directly to the pins **71**, the links **69** and thus to the abutments **96** to cause the nozzle **57** to press against the surface being cleaned with a force substantially equal to that applied to the handle to thereby remove the dirt from the surface.

To thereafter adapt the tool for use of the floating nozzle **56** the handle **75** is rotated clockwise to move the projections **97** into engagement with the latch **92** to disconnect the latter from the shoulders **95** whereby the torsion springs **90** rotate the links **69** counterclockwise to the position shown in Figure 7. The handle **75** is also rotated clockwise about the pins **71** to bring the bail cams **84** into contact with the end of the locking pins **80** and raise the latter for further movement of the handle to place the openings **82** into alignment with the pins **60** for locking engagement with the latter.

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 for use with a suction cleaner comprising a body having a surface cleaning nozzle air inlet, surface engaging nozzle supporting wheels, a propelling handle, means mounting said wheels on said nozzle body in spaced relation to said nozzle air inlet to support the latter, means mounting said handle on said body for pivotal movement between two angularly spaced operating ranges of pivotal movement, and mechanism connecting said handle and a supporting wheel and shifted to different operating positions relative to said supporting wheel by movement of said handle between said operating ranges, said handle when in one range shifting said mechanism to transmit propelling forces applied to said handle to the axis of rotation of said wheels, and said handle when in another range shifting said mechanism to transmit propelling forces applied to said handle to said nozzle body at a point offset from the axis of rotation of said wheels.

2. A cleaning tool for use with suction cleaners and having cleaning nozzle means adapted to float with respect to or be forced against a surface to be cleaned at the will of the operator and comprising a body having cleaning nozzle means, supporting wheels, a propelling handle, mechanism attaching said handle and said wheels to said body for movement relative to each other and including means connecting said handle to the wheel axis actuated by movement of said handle between two angularly separated propelling positions for arranging the handle axis in offset relation to the wheel axis when said handle is in one of its positions, and for positioning said wheel axis and handle axis coaxial in the other of said sandle positions, whereby the propelling forces applied to said handle when in said one position are transmitted to said nozzle body and when in said other position the propelling forces are applied to said wheel axis.

3. A cleaning tool for use with a suction cleaner comprising a body having a surface cleaning nozzle air inlet, surface engaging nozzle supporting wheels, a propelling handle, means mounting said handle and wheels on said body including a mechanism for mounting said handle for pivotal movement into angular propelling positions on opposite sides of the vertical position of said handle, and mechanism connecting said handle and a supporting wheel and shifted to different operating positions relative to said supporting wheel in response to movement of said handle to one of said positions for transmitting propelling forces applied to said handle directly to the axis of the supporting wheels, and said handle when in another angular position shifting said mechanism to transmit propelling forces to said nozzle body, whereby said nozzle floats in said first handle position and is positively applied to the surface being cleaned when said handle is in said other position.

4. A cleaning tool as described in claim 2, and said handle comprising a propelling wand communicating with said nozzle and adapted to be connected to a suction cleaner.

5. A cleaning tool as described in claim 3, and said handle comprising a propelling wand communicating with said nozzle and adapted to be connected to a suction cleaner.

6. A cleaning tool for use with a suction cleaner comprising a body having a surface cleaning nozzle air inlet, surface engaging nozzle supporting wheels, a propelling handle, means mounting said handle and wheels on said body including a mechanism for mounting said handle for pivotal movement into angular propelling positions on opposite sides of the vertical position of said handle, and mechanism connecting said wheels with said handle and including means movably mounted on said body and connected to said wheels and handle and actuated in response to movement of said handle to one of said positions to arrange said wheels for receiving the propelling force applied to said handle, and to displace said wheels when said handle is in the other of said positions to transmit the propelling forces to said body, whereby said nozzle floats in said first handle position and is positively applied to the surface being cleaned when said handle is in said other position.

7. A cleaning tool for use with suction cleaners and having cleaning nozzle means adapted to float with respect to or be forced against a surface to be cleaned at the will of the operator and comprising a body, supporting wheels, a propelling handle, means mounting said wheels on said body, means mounting said handle on said body for movement between two angularly separated propelling positions, linkage means connecting said handle and a supporting wheel and actuated by said handle when in one position to transmit the forces applied to said handle directly to said wheels, and actuated by said handle when in its other position to engage said body to transmit said handle forces to said body, whereby propelling forces applied to said handle when in said other position are transmitted to said nozzle body and when in said one position the propelling forces are applied to said wheel axis.

8. A cleaning tool for use with a suction cleaner comprising a body having spaced surface cleaning nozzles, a propelling handle, body supporting wheels, means mounting said wheels on said body between said nozzles for relative movement therebetween, means mounting said handle on said body for pivotal movement between two angularly spaced propelling ranges of pivotal movement, and mechanism connecting said handle and a supporting wheel and shifted to different operating positions relative to said supporting wheel by movement of said handle between said propelling ranges for transmitting propelling forces applied to said handle when in one poistion to the axis of said wheels whereby one of said nozzles floats with respect to the surface being cleaned, and for transmitting propelling forces applied to said handle when in another position at a point offset from the axis of rotation of said wheels in the direction of the other nozzle to positively force the latter against the surface being cleaned.

9. A cleaning tool for use with a suction cleaner comprising a body having spaced surface cleaning nozzles, body supporting wheels, a propelling handle, mecha-

nism attaching said handle and said wheels to said body for movement relative to each other and including means connecting said handle and a supporting wheel and shifted to different operating positions relative to said supporting wheel by movement of said handle between two angularly separated propelling positions for arranging the handle axis in offset relation to the wheel axis when said handle is in one of its positions to transmit the propelling force then applied to said handle to one of said cleaning nozzles, and for positioning said wheel axis and handle axis coaxial in the other of said handle position to transmit the handle propelling forces to said wheel axis whereby the other of said nozzles floats with respect to the surface being cleaned.

10. A cleaning tool as described in claim 9, and said handle comprising a propelling wand adapted to be connected to a suction cleaner, and valve means operated by said wand when in its different positions to selectively connect each of said nozzles to the suction cleaner.

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