Aug. 8, 1933. W. H. KITTO 1,921,033

SUCTION CLEANER

Filed Feb. 5, 1931 3 Sheets-Sheet 1

Fig. 1.

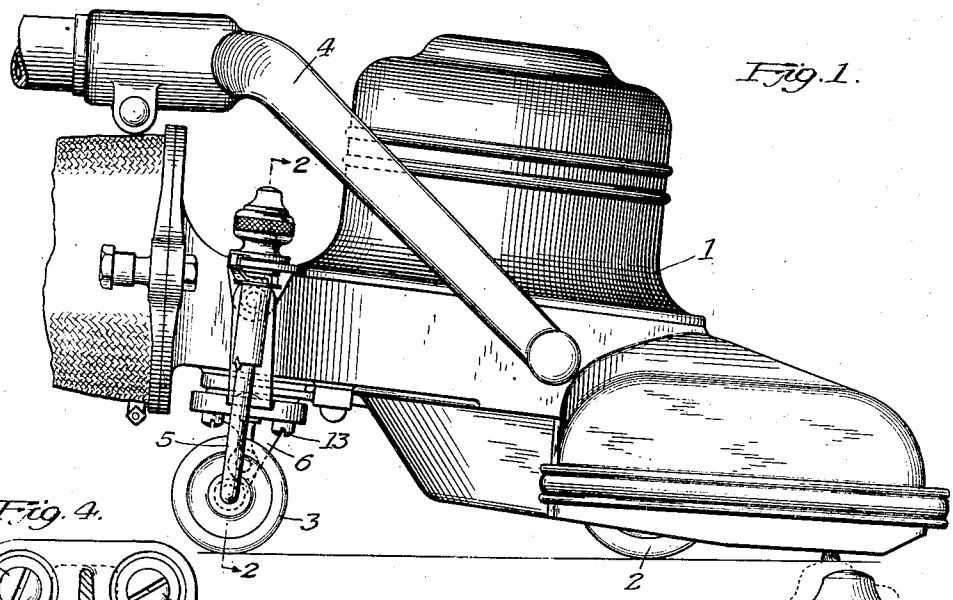


Fig. 4.

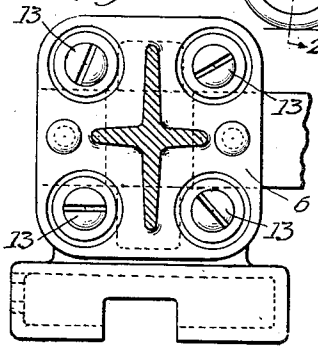


Fig. 2.

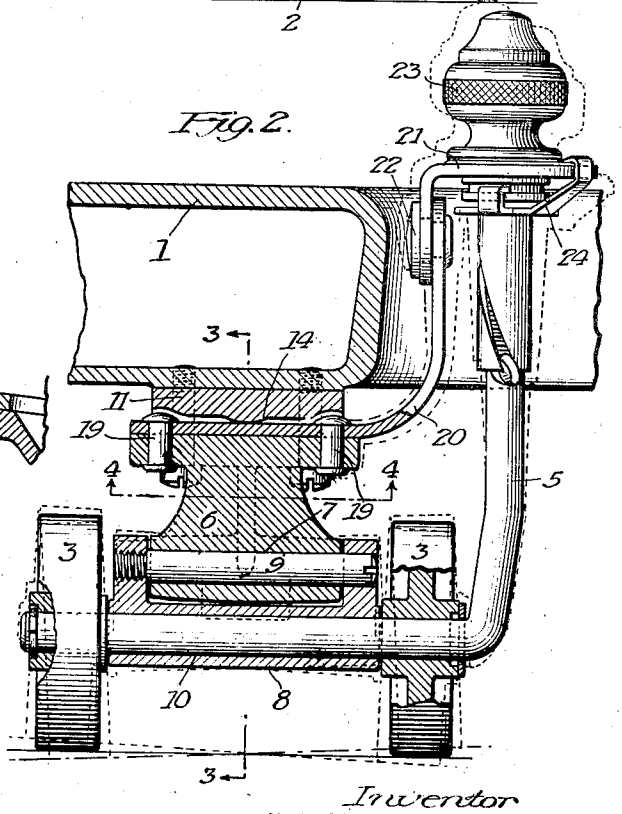


Fig. 3.

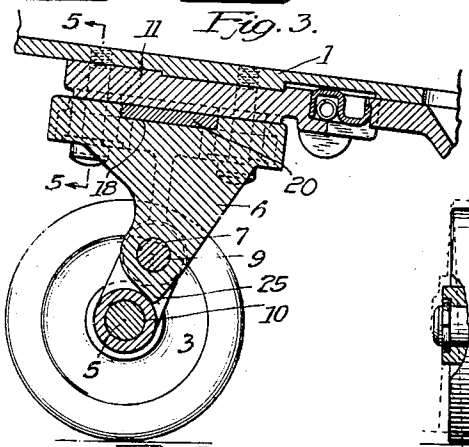
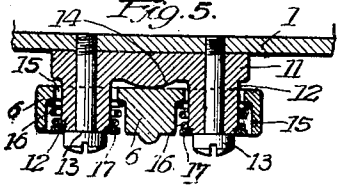


Fig. 5.



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SUCTION CLEANER

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Fig. 6.

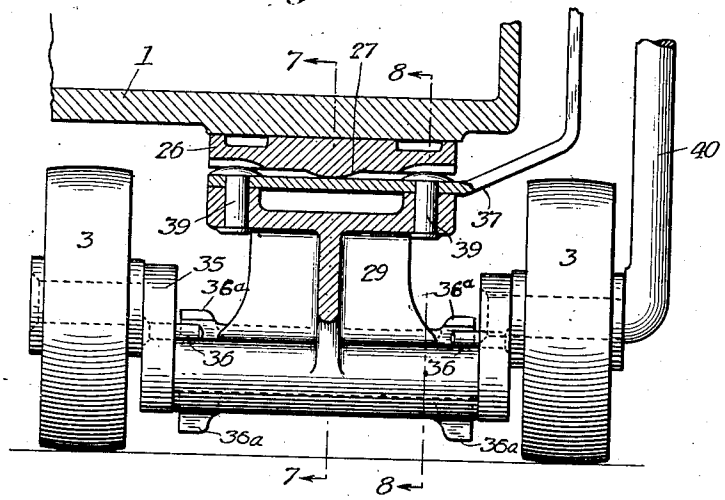


Fig. 8.

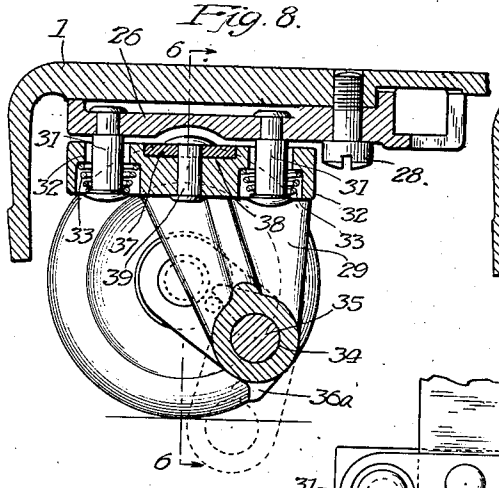


Fig. 7.

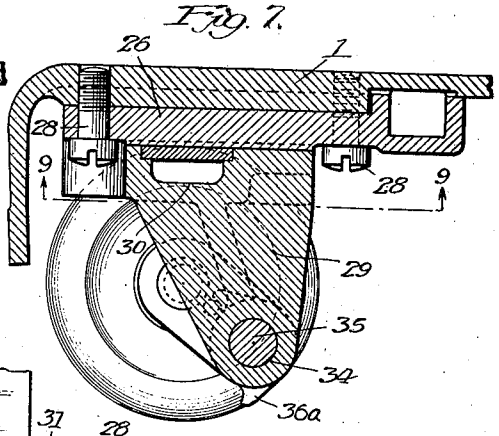
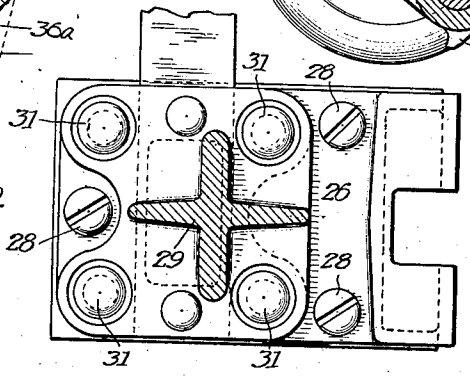


Fig. 9.



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SUCTION CLEANER

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Fig. 10.

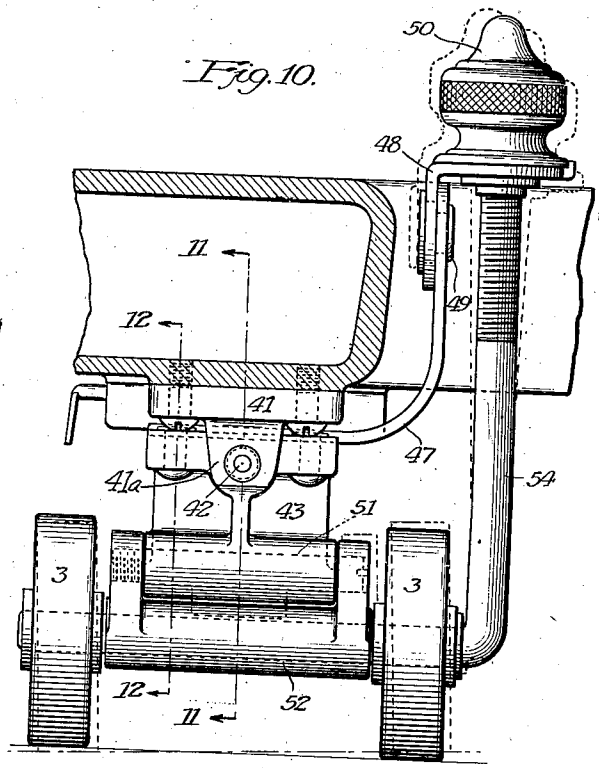
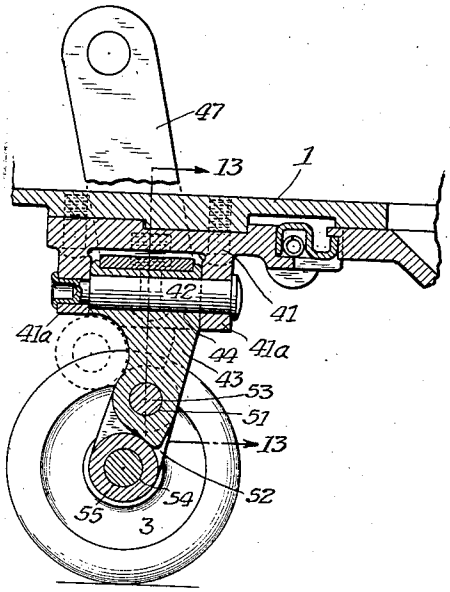


Fig. 11.



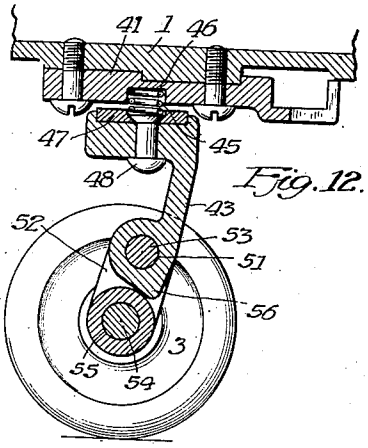


Fig. 12.

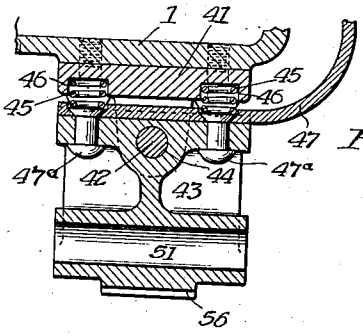


Fig. 13.

Fig. 14.

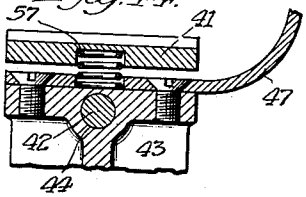
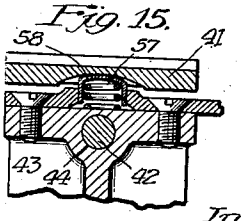


Fig. 15.



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UNITED STATES PATENT OFFICE

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SUCTION CLEANER

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Application February 5, 1931. Serial No. 513,471

9 Claims. (Cl. 15—16)

The present invention relates to suction cleaners in general and in particular to a new and improved rear castor therefore. More specifically the invention comprises the provision of a new and novel supporting wheel construction for a suction cleaner, or similar movable tool, which is characterized in that it is compensating, in the sense that it is able to follow the contour of the supporting surface without tilting the tool which it supports; and further in that it is adjustable relative to the supported tool in order to vary the height of the tool relative to the surface.

It is an object of the present invention to provide a new and improved supporting construction for a movable tool such as a suction cleaner. Another object is the provision of a supporting wheel construction for a movable tool in which the wheels are mounted tiltably relative to the tool which they support and in which means are provided to adjust the height of the supported tool relative to the supporting surface. It is a still further object to provide, in a suction cleaner, supporting wheels which are freely tiltable about an axis perpendicular to their supporting axis and which are further pivoted to permit height adjustment relative to the cleaner. A still further object is the provision of a supporting wheel construction in which the supporting wheels are freely tiltable about one axis and are also tiltable about a second axis, there being adjusting means to control the pivoting of the wheels about said second axis. Another object is the provision of spaced supporting wheels which are freely tiltable about one axis relative to the tool, which they support and which are adjustable relative to said tool thru being pivoted about a second axis, there being adjusting means provided which is tiltable with said wheels about said first mentioned axis to accomplish the adjustment of said wheels about said second axis. These and other more specific objects will appear upon reading the following specification and claims and considering in connection therewith the attached drawings in which a plurality of modifications of the present invention are disclosed.

Referring now to the drawings in which preferred embodiments of the present invention are disclosed and in which the same reference characters refer to like parts in the various views;

Fig. 1 is a side view of a modern suction cleaner with the present invention embodied therein;

Fig. 2 is a partial section upon the line 2—2 of Fig. 1;

Fig. 3 is a section upon the line 3—3 of Fig. 2;

Fig. 4 is a section upon the line 4—4 of Fig. 2;

Fig. 5 is a section upon the line 5—5 of Fig. 3;

Fig. 6 is a partial section, similar to Fig. 2, of a modified embodiment of the present invention, taken upon the line 6—6 of Fig. 8;

Fig. 7 is a cross section upon the line 7—7 of Fig. 6;

Fig. 8 is a cross section upon the line 8—8 of Fig. 6;

Fig. 9 is a cross section looking in the direction of the arrows on the line 9—9 of Fig. 7;

Fig. 10 is a view similar to Fig. 2 of a third modified embodiment of the present invention;

Fig. 11 is a section upon the line 11—11 of Fig. 10;

Fig. 12 is a section looking in the direction of the arrows upon the line 12—12 of Fig. 10;

Fig. 13 is a section upon the line 13—13 of Fig. 11;

Fig. 14 is a section similar to that shown in Fig. 13 showing a modified spring arrangement;

Fig. 15 is a view similar to Fig. 14 showing a still further modified spring arrangement.

Referring to Figures 1 to 5 inclusive, one embodiment of the present invention is disclosed, its application relative to a modern suction cleaner being clearly shown in Figure 1. The suction cleaner casing, indicated generally by the reference character 1, is movably supported by means of front supporting wheels, of which only one is shown, being indicated by the reference character 2, and by means of rear supporting wheels 3, 3, which are positioned under and attached to the underside of the exhaust outlet of the casing in a manner which comprises the present invention. The suction cleaner is also provided with a pivoted handle 4 by which the operator can manipulate the machine. In this first embodiment the rear supporting wheels 3, 3 are rotatably mounted upon the horizontal extension of an L-shaped member 5, said horizontal portion serving as the wheel axle. A body or base 6 is positioned between the wheels 3, 3 and the casing 1 of the cleaner and comprises a lower portion, which is provided with a transversely extending bore 7, and an upper flat face or surface which faces and extends adjacent the underside of the casing of the cleaner. A U-shaped bracket 8 is pivotally supported from the lower portion of body 6 by means of a transversely extending pin 9 which seats within the bore 7 of the body. The horizontally extending portion of the L-shaped member 5 extends thru a bore 10 in the bracket 8, the wheels 3, 3 being positioned upon

the opposite sides thereof at the ends of said bracket.

Carried by the underside of casing 1 of the cleaner directly above the body 6 is a contact plate 11 which is provided with four downwardly projecting portions of circular cross section which are indicated by the reference character 12, 12 etc. Securing screws 13, 13 etc. extend upwardly thru the contact plate 11 at the projecting portions and secure said plate to the underside of the casing thru being threaded thereinto. The underside of the contact plate 11 is provided with a downwardly extending convex ridge, indicated by the reference character 14, which is positioned midway between the two pairs of projecting portions 12, 12 and extends longitudinally of the machine, that is, parallel to its direction of motion. The upper flat surface of body 6 contacts the plate 11 at the convex portion or ridge 14 thereof and is prevented from contacting the remainder of the surface, which is otherwise flat save for the projections 12, 12 etc., by that ridge, there being substantially line contact between the two parts. The plate 6 is necessarily provided with counterbored openings 15, 15 thru which the projecting portions 12, 12 etc. on the contact plate may extend and to prevent the disengagement of the two parts spiral coil springs 16, 16 etc. are positioned within each of the counterbores 15, 15 etc. being seated between the shoulder in said counterbores and suitable washers 17, 17 etc. which are carried at the ends of the projecting portions on the contact member 11 for that purpose, and which are secured thereto as by peened ends on the projecting portions. The convex ridge 14 on the contact plate 11 extends substantially the length of the upper surface of the body 6 and permits that body to be rocked relative to the plate 11 and so to the casing 1, said rocking taking place against the resisting force exerted by the resilient springs 16, 16 etc. which, thru exerting equal forces in compression tend to center the body 6 and so the wheels 3, 3 which are carried thereby thru the bracket 8, and maintain them in a central position, or that in which the wheel axle would be horizontal. As is clearly shown in Figure 5 the openings 15, 15 are larger in diameter than the projecting portions 12, 12, which extend therethru, and the body 6 is permitted to have this tilting action within definite limits being only resisted by the resilient action of the springs.

Extending transversely across the upper surface of the body 6 in a suitable recess 18, and secured thereto by means of rivets 19, 19 is a second L-shaped member or strap 20 which is tiltable with the body 6 relative to the casing thru being rigidly connected thereto. The upper end of the L-shaped strap 20 extends upwardly at the side of the casing 1 and parallel to the upwardly projecting L-shaped member 5, the lower end of which forms the axle for the supporting wheels 3, 3. At the upper end of strap 20 a plate 21 is pivotally mounted, by means of a pin 22, and on the upper surface of this plate 21 is mounted a rotatable member 23 into which the upper end of the member 5 projects in screw threaded relationship. Manual rotation of the adjusting member 23 functions to raise or lower the L-shaped arm 5 relative to the plate 21, and so to the body 6, thereby pivoting the bracket 8 about the pin 9 carried by the body and resulting in the adjustment of the height of the casing 1 of the cleaner relative to the surface thru increasing or decreasing its height above the supporting wheels 3, 3. The extent or degree of this adjustment is indicated by suitable height-indicating means, indicated generally by the reference character 24, which are constructed in a manner which forms no part of the present invention.

The height to which the casing 1 can be raised is limited thru the body 6 being provided with a downwardly projecting lug 25 which is adapted to be contacted by the bracket 8 upon its being pivoted to a certain lower limit by the adjusting means 23.

In the operation of a suction cleaner provided with rear supporting means constructed in accordance with the present invention as the cleaner is operated over the surface covering and passes over an uneven portion thereof the rear supporting wheels are able to follow the contour of that surface, both wheels remaining in contact therewith. Relative movement between the wheels and the cleaner body is permitted by body 6 rocking or tilting relative to the contact surface of the casing formed by the plate 11 and specifically about the downwardly projecting convex ridge 14 formed thereon. The springs 16, 16 etc. positioned between the body 6 and the contact plate 11 serve to maintain the two parts in contact and prevent unnecessary looseness and further to maintain the supporting wheels and their connected parts in relatively fixed relation relative to the cleaner when off the supporting surface.

The second embodiment of the present invention is shown in Figures 6 to 9, inclusive. According to this construction a contact plate 26 is secured to the underside of the exhaust outlet of the casing 1 and is provided with a downwardly extending longitudinally directed ridge 27. The contact plate is secured to the underside of the casing by means of triangularly spaced securing screws 28, 28 etc. which pass thru the plate 26 and are screw threaded into the underside of the casing. The forward extremity of the contact plate is transversely recessed as it was in the previous embodiment, to form a guideway for the securing means for the underside of the casing 1 in a manner which forms no part of the present invention. The pivoted body is represented by the reference character 29 in the present embodiment and is provided with a flat upper surface which is contacted by the contact plate at the ridge 27 and is shown as recessed at 30 for the purpose of reducing the weight. The rivets 31, 31 etc. are secured to the contact plate 26 and extend downwardly therefrom, being arranged at the corners of a rectangle as in the previous embodiment, and extend thru the counterbored holes 32, 32 etc. in the upper face of body 29. As in the previous embodiment coiled spiral springs 33, 33 are seated in the counterbored openings 32, 32 etc. and contact the enlarged ends of the rivets 31, 31 etc. thereby functioning to maintain the upper surface of the body 29 in contact with the ridge 27.

At its lower extremity the body 29 is provided with the transversely extending bore 34 within which is rotatably mounted the central or axle portion of the crank shaft 35 on the side arms of which the supporting wheels 3, 3 are mounted. The range of pivotal movement of the crank shaft 35 relative to the body 29 is limited by the presence of inwardly-extending pins 36, 36 which are adapted to contact, in the limiting positions, the lugs 36a, 36a etc. carried by the body 29.

As in the previous embodiment an L-shaped

member or strap 37 is carried in a suitable recess which extends transversely across the surface of the body 29 and which is indicated by the reference character 38. Spaced rivets 39, 39 rigidly secure the strap to the body. The adjustment of the crank shaft relative to the body for the purpose of raising or lowering the supporting wheels, and so the casing of the cleaner, is accomplished by adjustment means exactly similar to those incorporated in the first described embodiment, there being provided rotatable means at the upper end of the L-shaped strap 37 which function to raise and lower the L-shaped member 40, which, in the present instance, forms the axle for only one of the supporting wheels, said wheels being rigidly connected thru the crank shaft 35.

The functional operation of the embodiment of the invention disclosed in Figures 6 to 9 is the same as the first embodiment.

The third embodiment of the present invention is shown in Figures 10 to 13 inclusive. According to this embodiment the contact plate of the previous embodiments has been replaced by a plate 41 which is provided with downwardly extending longitudinally spaced arms 41*a*, 41*a*. A pivot pin 42 extends between these spaced arms on which is pivotally mounted the body 43, there being a bore 44 provided therethru for that purpose. Spaced compression springs 45, 45 are positioned between the upper surface of body 43 and the plates 41, being positioned in suitable recesses 46, 46 in the plates 41 to prevent dislocation. As in the previous embodiments the horizontal extension of the L-shaped strap, which is in the present embodiment indicated by the reference character 47, is carried by the upper surface of the body 43 being secured by rivets 47*a*, 47*a*. At its upper end a plate 48 is pivotally mounted upon the strap 47 by means of a pin 49 and a rotatable adjusting member 50 is carried by the plate.

At the lower extremity of the body 43 of the present embodiment the usual transversely extending bore is present and is indicated by the reference character 51. The wheels 3, 3 are pivotally mounted relative to the body 43 by means of the U-frame 52, of the same type incorporated in the first embodiment, which is pivoted relative to the body by means of a pin 53 which extends thru the bore 51 of the body. The usual L-shaped wheel-supporting member 54 is present and forms the axle for the wheels 3, 3, connecting them to the U-frame 52 by extending thru the bore 55 therein. The upwardly extending end of the L-shaped member 54 is threaded and extends within the rotatable member 50 carried by the plate 48 for the purpose of being raised or lowered relative thereto. The usual downwardly projecting lug 56 is provided on the body 43 which prevents the pivoting of the U-frame, upon being lowered by the L-shaped member 54, below a definite lower point.

The mounting of the body 43 and its accompanying parts relative to the casing 1 by means of the pivotal connection described presents a construction in which a minimum of friction opposes any tilting of the supporting wheels relative to the cleaner casing in following the contour of the surface covering. The presence of the coil springs between the wheels and the cleaner prevents any looseness of parts and maintains, as in the previous embodiments, the parts in substantially central position when not in place upon the surface covering.

In Figures 14 and 15 partial cross sections, similar to Figure 13, are shown in which the plurality of springs between the upper surface of the body 43 and the plate 40 are dispensed with in favor of a single spring, which is indicated by the reference character 57. As shown in Figure 15 spring 57 is provided with an enclosing cover 58 which is slidably positioned within a suitable recess formed in the strap 47.

I claim:

1. A support for a manually movable tool including spaced surface-contacting units, means supporting said tool on said surface-contacting units tiltably about a horizontal axis at an angle to a line between the points of surface-contact of said surface-contacting units, means resiliently opposing any tilting of said surface-contacting units relative to said tool, said axis being between said units, and adjusting means secured to said surface-contacting units and movable therewith relative to said tool to simultaneously vary the distance between said units and said tool.

2. In a suction cleaner, a casing, spaced rear supporting wheels for said casing, an L-shaped member forming a common axle for said rear supporting wheels, a base between said wheels and said casing presenting a surface adjacent said casing, a convex surface carried by said casing contacting said surface of said base, springs positioned between said base and said casing resiliently opposing any tilting of said base relative to said casing, a bracket pivotally connecting said axle to said base, a second L-shaped member carried by said base and movable therewith, a pivoted plate on said second L-shaped member thru which said first L-shaped member extends, and rotatable means carried by said plate to adjust said first L-shaped member relative thereto to raise or lower said wheels relative to said casing.

3. A support for a movable tool including spaced surface-contacting units, a body tiltably connected to said tool, means pivotally connecting said units to said body for movement about a horizontal axis, and means connected between said body and said units and tiltable therewith to pivot said units relative to said body.

4. A support for a movable tool including spaced surface-contacting units, means supporting said tool on said units about a horizontal axis for tilting about a horizontal axis means pivotally mounting said units transverse of said first-mentioned axis, and manually operable means to pivot said units about said last-mentioned axis.

5. In a support for a movable tool having a casing, a body positioned adjacent said casing, a part spacing said casing and said body and making line contact with one of them to permit tilting, spaced supporting wheels, means pivotally mounting said wheels to said body, for movement about a horizontal axis, and manually operable means to adjust said wheels relative to said body.

6. In a support for a movable tool having a casing, a body positioned adjacent said casing, a part spacing said casing and said body and making line contact with one of them to permit tilting, resilient means acting on opposite sides of said contact line securing said body and casing in operative position and opposing relative tilting therebetween, supporting wheels for said body and casing, means pivotally mounting said wheels on said body for movement about a horizontal axis, and wheel-pivoting means carried by said body.

7. In a support for a movable tool, spaced sup-

porting wheels, a body, means pivotally mounting said wheels on said body, a contact element between said body and said tool making contact with said body on a line extending perpendicularly to a vertical plane through the axis of said supporting wheels, spring means forcing said body into contact with said contact element, a rigid element carried by and extended to the side of said body, a second rigid element extended from said pivotal mounting means for said wheels adjacent said first mentioned rigid element, and means connected between said elements to raise and lower said second rigid element for the purpose of pivoting said pivotal mounting means for said wheels.

8. In a support for a movable tool, a body, means tiltably securing said body to said tool, an L-shaped member having a horizontal and a vertical section, supporting wheels rotatably mounted on the horizontal section of said L-shaped member as an axle, means pivotally mounting said axle relative to said body, a second L-shaped member secured to said body and having a section extending vertically, a horizontal plate pivotally mounted on the vertical section of said second L-shaped member, and a rotatable member carried by said plate in screw-threaded relation with the vertical section of said first L-shaped member for the purpose of raising and lowering said member and said wheels relative to said body and said casing.

9. In a support for a movable tool, a body, pivot means pivotally supporting said body relative to said tool, a pair of spaced supporting wheels, means pivotally supporting said wheels relative to said body upon a horizontal axis at right angles to the axis of said first mentioned means, and adjusting means carried by said body to pivot said wheels on said second pivot means.

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