May 19, 1942. P. B. ELLIS 2,283,428

NOZZLE FOR VACUUM CLEANERS

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Fig. 1

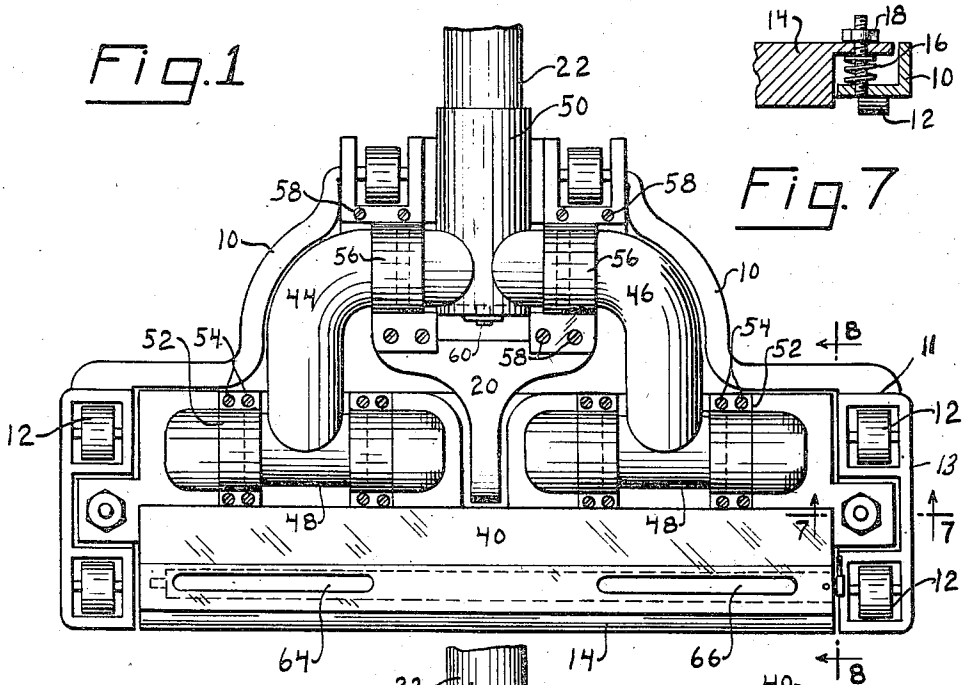

Fig. 7

Fig. 2

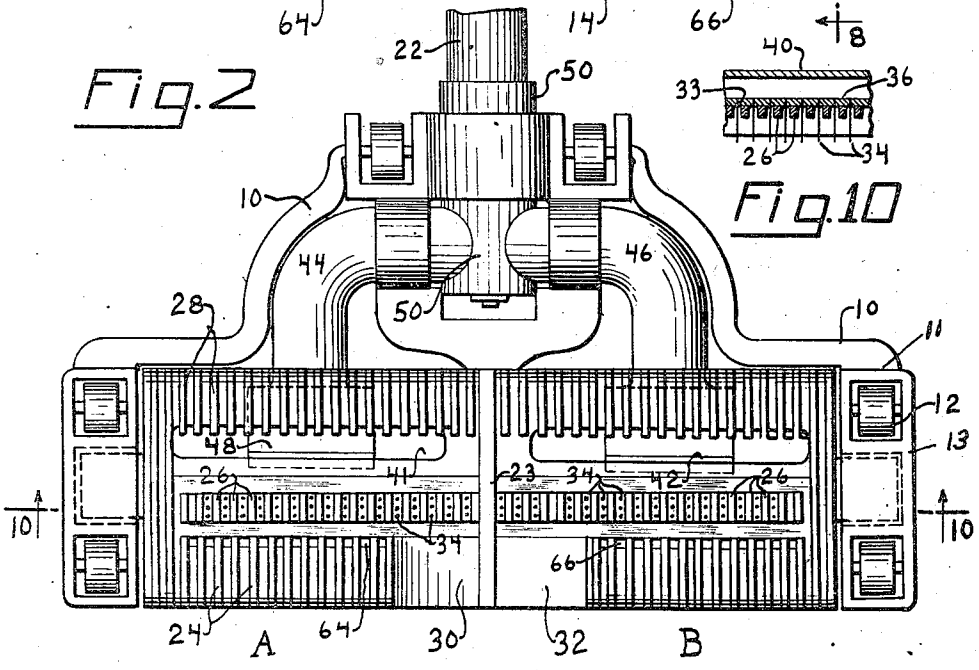

Fig. 10

Fig. 8

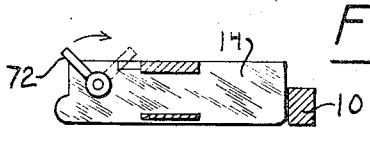

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Fig. 5

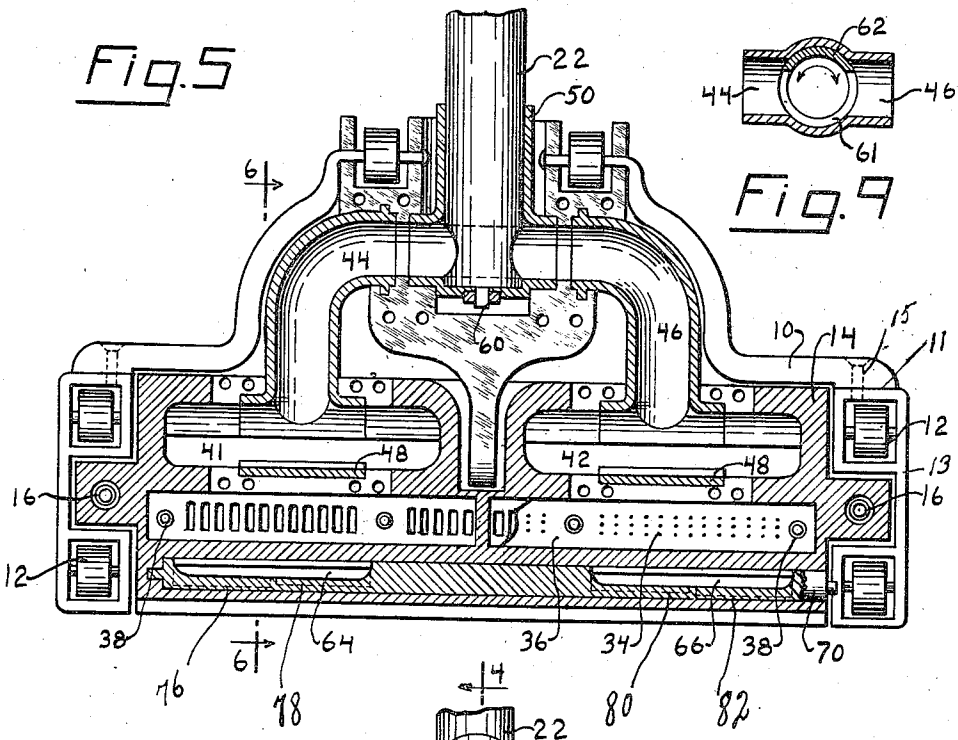


Fig. 9

Fig. 3

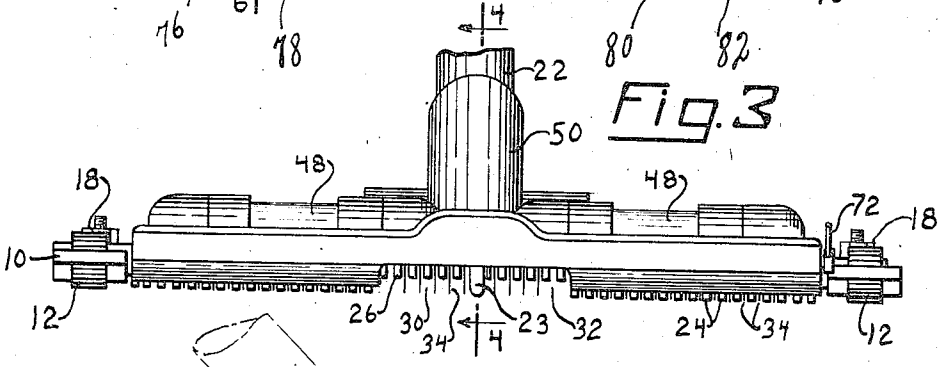


Fig. 4

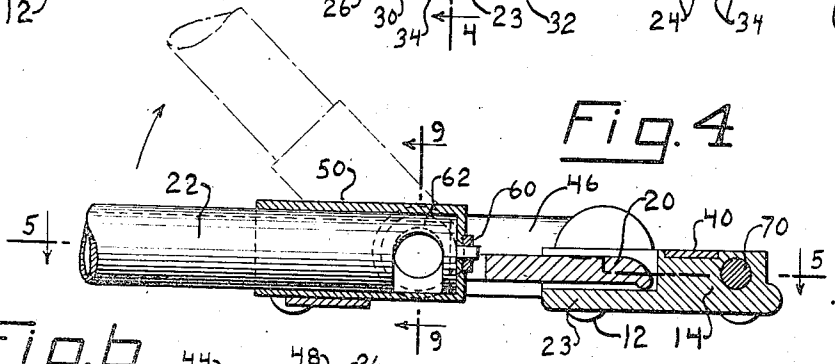
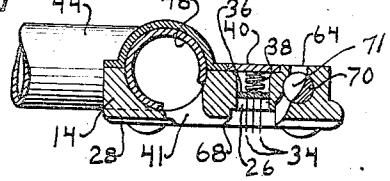


Fig. 6



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NOZZLE FOR VACUUM CLEANERS

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Application October 10, 1940, Serial No. 360,565

11 Claims. (Cl. 15—155)

My invention relates to a new and useful nozzle for vacuum cleaners and it relates more particularly to a nozzle including a frame and a resiliently mounted element adapted for vertical self-adjustment with respect to the surface to be cleaned, whereby maximum suction and cleaning is produced without the creation of undue vacuum that frequently causes the nozzle to stick to or lift the surface being cleaned.

My invention further relates to a nozzle of this character which is in the nature of a duplex nozzle, that is, one in which two independent and separably operable nozzles are integrated in a unitary structure and adapted to be operated simultaneously or independently or with varying degrees of suction, but in which both of said nozzles are connected to a single suction or vacuum creating device.

My invention still further relates to a nozzle of this character provided with a hollow handle for manipulating the nozzle on the surface to be cleaned, said handle having a vertical, swivel connection with the nozzle for convenience of operation and at the same time constituting a valve for controlling the suction or regulating it. The valve forming part of the handle, unlike other constructions heretofore known and used, is operable by merely turning the handle about its longitudinal axis, the vertical movement of the handle with respect to the nozzle not having any effect upon the regulation of the suction.

My invention still further relates to a nozzle including a connection between the operating handle and the nozzle itself whereby varying degrees of pressure may be exerted upon the nozzle depending upon the requirements of the surface being cleaned.

My invention still further relates to a nozzle of this character, the underside of which is provided with grooves forming ribs therebetween which are adapted to act upon the nap of the surface being cleaned with the movement of the cleaner to and fro, together with resiliently mounted combs adapted to cooperate with and to project between said ribs to dislodge subsurface dirt from the surface being cleaned as well as to pick up lint, threads and similar objects which may resist ordinary suction.

My invention still further relates to nozzle of this character which is provided with a plurality of inlet openings leading from a point exterior of the nozzle to the surface being cleaned, together with an independently operable valve for controlling the flow of air through said inlets.

My invention still further relates to a nozzle of this character the bottom edge of which, except for the inlet above mentioned, forms a substantial seal with the surface being cleaned along the major portion of its periphery, a portion of the underside of the central body of the nozzle being recessed and spaced from the surface being cleaned thus providing in conjunction with said surface a compartment to which air is admitted in a limited and controlled manner to be sucked through said nozzle by the suction device to which it is connected.

Other novel features of construction and advantage will be more clearly understood from the following specification and the accompanying drawings in which:

Fig. 1 represents a top plan view of a nozzle embodying my invention.

Fig. 2 represents a bottom plan view of Fig. 1.

Fig. 3 represents a front elevation of Fig. 1.

Fig. 4 represents a section on line 4—4 of Fig. 3.

Fig. 5 represents a section on line 5—5 of Fig. 4.

Fig. 6 represents a section on line 6—6 of Fig. 5.

Fig. 7 represents a section on line 7—7 of Fig. 1.

Fig. 8 represents a section on line 8—8 of Fig. 1.

Fig. 9 represents a section on line 9—9 of Fig. 4.

Fig. 10 represents a fragmentary sectional view showing details of construction.

Referring to the drawings in which like reference characters indicate like parts, and more particularly to Fig. 1, 10 designates a frame mounted on the wheels or rollers 12 which are adapted to travel over the surface to be cleaned. In the interests of efficient suction it is necessary to achieve exactly the desired amount and character of contact between the bottom of the nozzle and the surface to which it is applied, since, if the bottom of the nozzle is in tight engagement with the surface to be cleaned and without provision for proper suction, the nozzle tends to stick to the surface being cleaned and if, on the contrary, the bottom of the nozzle is spaced too far from the surface, the suction is unduly dispersed and is to that extent ineffective. Nor is is possible to adjust any given nozzle permanently since different rugs or other surfaces have different naps and even different portions of the same surface may present similar variations. Also, the nature and amount of the dirt to be removed has a bearing on the proper adjustment of the nozzle. In order to overcome this difficulty I mount the

body 14 of the nozzle in yielding suspension with respect to the rigid frame and I provide means for exerting variable pressure on the body 14 so as to bring the bottom edge thereof into exactly the desired contact relation with respect to the rug or other surface. Thus, as will be best seen from Fig. 7, the body 14 of the nozzle is supported by the springs 16 which are confined between the body 14 and the frame 10 and which are provided with the tension adjustment nut 18. In this way, and without any particular pressure exerted on the nozzle, the weight of the body 14 will cause the latter to drop with reference to the frame 10 and the wheels 12 until it is in contact with the nap of the rug and the body will flex or yield upwardly in accordance with variations in the topography of the surface being cleaned. In order to exert special pressure on the body 14 of the nozzle further to depress it with respect to the frame 12, I provide the finger 20 which in turn is actuated by pressure exerted on the wand or hollow suction handle 22. Downward pressure on the wand 22 forces finger 20 to rotate through a small angle about a fulcrum located at the axis of the rear wheels 12, rotation of the finger 20, inhibited by its contact with body 14, compresses springs 16 forcing the nozzle closer to the surface being cleaned.

As will be seen from Fig. 2, the underside of the nozzle is provided with the transverse partition 23 which divides it into two independent nozzles (for convenience marked A and B). The bottom of each of the nozzles A and B is provided with a front comb 24, a central comb 26, and a rear comb 28. The front comb 24 does not extend across the entire bottom of the nozzles A and B and the front walls of the nozzles A and B are cut away to form central openings 30 and 32, as shown in Fig. 3. Between the teeth of the combs 26 of the nozzles A and B, are formed the through openings 33 through which pass the elements 34 which are bristles, wires or the like and which are carried by the strips 36 as shown in Figs. 6 and 10. The strips 36 are preferably made of rubber or other flexible material. The strips 36 are urged downwardly by the springs 38 which are confined between the strips 36 and the cover plate 40. In Fig. 6 the bristles or wires 34 are shown in their lowermost position but it will be noted that, when necessary, the strips 36 and bristles 34 can yield upwardly against the tension of the springs 38. It will be seen, however, that when the bristles 34 are in their lowermost position they extend below the combs 24, 26 and 28 so as to dig deeper into the nap of the surface being cleaned. The nozzles A and B are provided with the suction openings 41 and 42 which communicate with the suction conduits 44 and 46 through the T-shaped couplings 48. The couplings 48 are mounted to swivel about their longitudinal axes in the body 14 as is best seen in Figs. 5 and 6. The other ends of the conduits 44 and 46 communicate with the juxtaposed ends of another T-shaped coupling 50 which is also mounted to swivel about a horizontal axis with respect to the body of the nozzle. The conduits 44 and 46 are retained in position by the straps 52 and screws 54 or their equivalent, and the junctions of the upper ends of the conduits 44 and 46 with the juxtaposed ends of the T-shaped member 50 are suitably enclosed by the covers 56 fastened by the screws 58. The swiveling of the T-shaped coupling 50 permits the vertical movement of the handle 22 with respect to the horizontal plane of the nozzle through a big arc so that, when it is desired to insert the nozzle under a low piece of furniture, the handle 22 is swung down into almost horizontal position parallel with the floor, and, during normal operation and with the swing of the arm back and forth to move the nozzle over the rug or the like, the swivel 50 permits convenient operation. Similarly, when the finger 20 is pressed down by the handle 22 further to depress the body 14 of the nozzle as above explained, the T-shaped couplings 48 swivel with respect to the body of the nozzle thus maintaining the latter in its horizontal operative position. The hollow handle 22 is fitted within the coupling 50 and is secured to it in a rotatable manner as at 60 so that the handle 22 can be rotated about its longitudinal axis entirely independently of the vertical swiveling of the handle 22 with respect to the body of the nozzle. As will be seen from Fig. 9, the lower end of the hollow handle 22 is cut away as at 61 so as to leave only the wall portion 62. When the handle 22 is in the position shown in Fig. 5, both of the conduits 44 and 46 communicate with the hollow interior of the handle through the opening 61. If the handle 22 is turned upon its longitudinal axis about a one-quarter turn in either direction, the solid portion 62 will obstruct in whole or in part either of the conduits 44 or 46, thus completely or partly shutting off the suction through either of said conduits. The openings 41 and 42, as will be clearly seen in Figs. 2, 5 and 6, lead directly to the bottom of the nozzles A and B and to the surface to be cleaned and, as will be best seen from Figs. 5 and 6, the nozzles A and B are provided with inlet openings 64 and 66 which lead from a point on the outside of the body of the nozzles, also to the surface being cleaned, so that air can be sucked into the openings 41 and 42 either through the openings 64 and 66 (or either of them), or through the central openings 30 and 32 formed by the recessing of the front edge of the body 14 as shown in Fig. 3. In order to establish communication between the openings 30 and 32 or 64 and 66 and the openings 41 and 42, the underside of the body of the nozzle between said openings is recessed upwardly to form the communicating channel 68. In order to be able partly or wholly to close the openings 64 and 66 I provide the valve 70 which is provided with the manipulating handle 72, and which can be adjusted in any desired position as shown in Figs. 4, 6 and 8.

The operation is as follows:

With the device assembled as shown in Fig. 1 and with the handle 22 connected to a source of suction, the nozzle is placed on the surface to be cleaned and, for ordinary cleaning, the handle 22 is retained in the position shown in Fig. 5 and the valve 70 is retained in the position shown in Fig. 6. In this position of the parts suction takes place along the entire surface of the nozzle, the air entering through the openings 64 and 66 as well as through the front recesses 30 and 32. The movement of the nozzle over the surface being cleaned causes the combs 24, 26 and 28 to raise and separate the nap thus exposing the dirt to the suction. The combined action of the combs 24, 26 and 28 and the suction of the motor, not shown, insure thorough cleaning of the surface to which the nozzle is applied. The elements 34 penetrate deeper into the nap raised by the combs 24, 26 and 28 and effects a more complete separation of the nap thus further increasing the efficiency. Furthermore, the bristles 34

being resiliently mounted can not cause any damage to the nap as distinguished from the fixed bristles of the rotary brushes heretofore used which tend to tear the nap. Also, the elements 34 being not rotatable do not develop the heat which is developed by the bristles or wires of rotating brushes, thus further protecting the nap of the surface being cleaned. The passage of the bristles 34 between the ends of the separated nap also serves to catch and pick up threads, hairs, lint and other similar objects which may resist the unassisted action of ordinary suction. Depending on the nature of the surface to be cleaned, as well as its condition, the operator can exert on the resiliently mounted body 14 of the nozzle the desired degree of pressure thus insuring efficiency and ease of operation. When it is desired to concentrate the suction on either the nozzle A or the nozzle B, the handle 22 is turned in the desired direction completely or partly to obstruct the suction through the conduit 44 or 46 and the corresponding openings 41 or 42, and, when it is desired to concentrate the suction through the center openings 30 and 32, the handle 22 is retained in the position shown in Fig. 5 but the valve 70 is turned by the handle 72 partly or completely to close the openings 64 and 66. In some instances it will not be necessary to manipulate the valve 70 since, by merely turning the handle 22 in the desired direction, the suction is concentrated on the nozzle A and the adjacent center opening 30, or on the other nozzle B and its adjacent center opening 32. I have shown the valve 70 as being made of one piece and operated by the single handle 72 but it is obvious that it is within the scope of my invention to make the valve 70 in two parts, one controlling the opening 64 and one controlling the opening 66, each of said parts being operated by a separate handle 72. Also the valve 70 can be in the throat or any other part of the nozzle. For convenience of operation I may attach to the handle 72 a string or other connection so that it may be manipulated by the operator during the cleaning operation and without the necessity of stooping down to adjust the valve 70 manually.

While I have shown and described a construction embodying two longitudinally aligned and independently acting nozzles A and B having the separate conduits 44 and 46 leading to the central source of suction through the valve construction shown in Fig. 9 and the handle 22, it is within the scope of my invention to utilize more than two independently acting nozzles without materially changing the construction or departing from the spirit or scope of the invention as described or as defined in the following claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A vacuum cleaner nozzle comprising a plurality of openings formed therein leading to the underside thereof, a swivel having openings therein corresponding to and at all times communicating with the openings in said nozzle, a valve connected to a source of suction and to said swivel and normally establishing free communication between said openings and said source of suction, said valve and said swivel being rotatable as a unit about an axis parallel to the plane of the surface to be cleaned without interrupting the suction through any of said openings, said valve being also independently rotatable about an axis substantially at right angles to the axis of rotation of said swivel for concentrating the suction in at least one of the openings in said swivel and through the corresponding opening in said nozzle.

2. A vacuum cleaner nozzle comprising a pair of independently acting nozzles, there being openings formed in each of said nozzles leading to the underside thereof, a hollow swivel mounted substantially centrally of said pair of nozzles, there being openings in said swivel corresponding to and at all times communicating with the openings in said nozzles, a valve connected to a source of suction and to said swivel and normally establishing communication between the openings in said nozzles and said source of suction through the openings in said swivel, said valve and said swivel being rotatable about an axis parallel to the plane of the surface to be cleaned without interrupting the suction through any of said openings, said valve being also rotatable independently about an axis substantially at right angles to the axis of rotation of said swivel for selectively shutting off the suction from at least one or the other of the openings in said swivel, whereby said pair of nozzles may be used together, and whereby either of said nozzles may be used independently of the other.

3. A vacuum cleaner tool comprising a pair of longitudinally aligned but independently acting nozzles, there being an opening in each of said nozzles leading to the underside thereof, a hollow swivel having a pair of oppositely disposed openings therein leading to and at all times communicating with the openings in said nozzles respectively and a combined distributing valve and operating handle connected to a source of suction and to said swivel and normally establishing communication between said source of suction and the openings in said nozzles simultaneously, said swivel and combined valve and handle being rotatable as a unit about an axis parallel to the plane of the surface to be cleaned without affecting the passage of air between the openings in said nozzles and said source of suction, said combined valve and handle being also independently rotatable about an axis at substantially a right angle to the axis of rotation of said swivel for partly or wholly interrupting the suction through one or the other of the openings in said swivel and said nozzles.

4. A vacuum cleaner tool comprising a plurality of longitudinally aligned but independently acting nozzles, there being at least one opening in each of said nozzles leading to the underside thereof, a hollow swivel, conduits leading from said nozzles to said hollow swivel and at all times communicating therewith, and a distributing valve engaging said swivel and adapted to be connected to a source of suction normally to establish communication between said source of suction and the undersides of all of said nozzles, said valve and said swivel being rotatable about an axis parallel to the plane of the surface to be cleaned without affecting the suction through any of said nozzles and their respective conduits, said valve being also rotatable about an axis at an angle to the axis of rotation of said swivel for partly or wholly disconnecting at least one of said nozzles from said source of suction.

5. A vacuum cleaner tool comprising a nozzle adapted to act on the surface to be cleaned and having a plurality of suction openings in the underside of said nozzle all of which may be operated simultaneously, a suction member having openings therein corresponding to and at all

times registering with the openings in said nozzle, said suction member being carried by said nozzle and being rotatable about an axis parallel to the plane of the surface to be cleaned, a distributing valve disposed at an angle to and engaging said suction member, and a suction handle connected to said valve, whereby said valve and said handle are movable, as a unit, with said suction member when the latter is rotated, said valve being also rotatable by and about the longitudinal axis of said handle selectively to control the suction through the openings in said nozzle.

6. A vacuum cleaner tool comprising in combination, a handle attached to the tool, a plurality of longitudinally aligned and independently acting nozzles adapted to contact the surface to be cleaned, means for connecting all of said nozzles simultaneously to a single source of suction, and means for disconnecting at least one of said nozzles from said source of suction without interrupting the operation of the remaining nozzles by rotation of the handle about its longitudinal axis.

7. A vacuum cleaner tool comprising a nozzle, the underside of which is adapted to act on the surface to be cleaned, and having a plurality of openings formed therein leading to corresponding areas on the underside of said nozzle, a suction member associated with said nozzle and having a plurality of openings therein corresponding to, and at all times registering with the openings in said nozzle, a nipple engaging said suction member and having an opening normally registering with said openings in said suction member, said nipple being disposed at an angle to the horizontal axis of said suction member, and a suction handle connected to said nipple, said suction member, said handle and said nipple being rotatable as a unit about the horizontal axis of said suction member, said handle and said nipple being also rotatable as a unit about their longitudinal axis independently of their rotation with said suction member, whereby the opening in said nipple is brought out of registration with the corresponding opening in said suction member to stop the suction through the corresponding opening in said nozzle and from the corresponding area of the underside of said nozzle.

8. A vacuum cleaner tool comprising a nozzle, the underside of which is adapted to act on the surface to be cleaned, and having a plurality of longitudinally spaced openings formed therein leading to corresponding areas on the underside of said nozzle, an elongated suction member carried by said nozzle and rotatable about a longitudinal axis parallel to the plane of the surface to be cleaned, there being openings in said suction member corresponding to and at all times registering with the openings in said nozzle, a nipple carried by said suction member and having an opening therein normally registering with said openings in said suction member, and a suction handle connected to said nipple, said nipple and said handle being substantially coaxial and having their longitudinal axis disposed at substantially a right angle to the longitudinal axis of said suction member, whereby said handle and said nipple are movable as a unit with respect to the surface being cleaned, said handle and said nipple being also rotatable about their longitudinal axis independently of the rotation of said suction member whereby the opening in said nipple may selectively be brought out of registration with the corresponding opening in said suction member to stop the suction through the corresponding opening in said nozzle and from the corresponding area of the underside of said nozzle.

9. In a suction nozzle, a hollow body defining an elongated suction opening, a hollow conduit connecting the opening with a source of suction, means dividing said opening into a plurality of longitudinally aligned sections, said nozzle being formed with an outlet opening adapted to be connected to a source of suction through said conduit, and means actuated by rotation of the conduit on its longitudinal axis for connecting all of said sections simultaneously to said outlet opening and selectively for disconnecting at least one of said sections from said outlet opening and connecting the remainder to said outlet opening.

10. In a suction nozzle, a hollow body defining an elongated suction opening, a hollow handle for manually passing the nozzle over the surface to be cleaned, means dividing said opening into two sections, all of said sections being disposed in longitudinal alignment, said nozzle being formed with an outlet opening adapted to be connected to a source of suction through said hollow handle, and means actuated by rotation of the handle on its longitudinal axis for connecting both of said sections to said outlet opening and selectively for connecting only one section to said outlet opening.

11. In a suction nozzle, a hollow body defining a suction opening, a hollow conduit connecting the opening with a source of suction, means dividing said opening into a plurality of sections, said nozzle being formed with an outlet opening adapted to be connected to a source of suction through said conduit, and means actuated by rotation of the conduit on its longitudinal axis for connecting all of said sections simultaneously to said outlet opening and selectively for disconnecting at least one of said sections from said outlet opening and connecting the remainder to said outlet opening.

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