Aug. 30, 1938. J. B. DYER 2,128,525

VACUUM CLEANER

Filed May 4, 1933 3 Sheets-Sheet 1

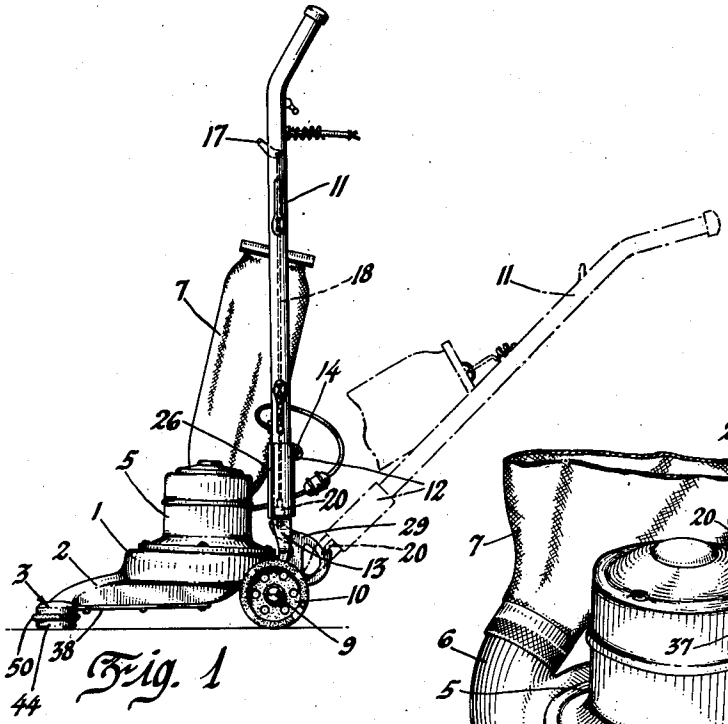


Fig. 1

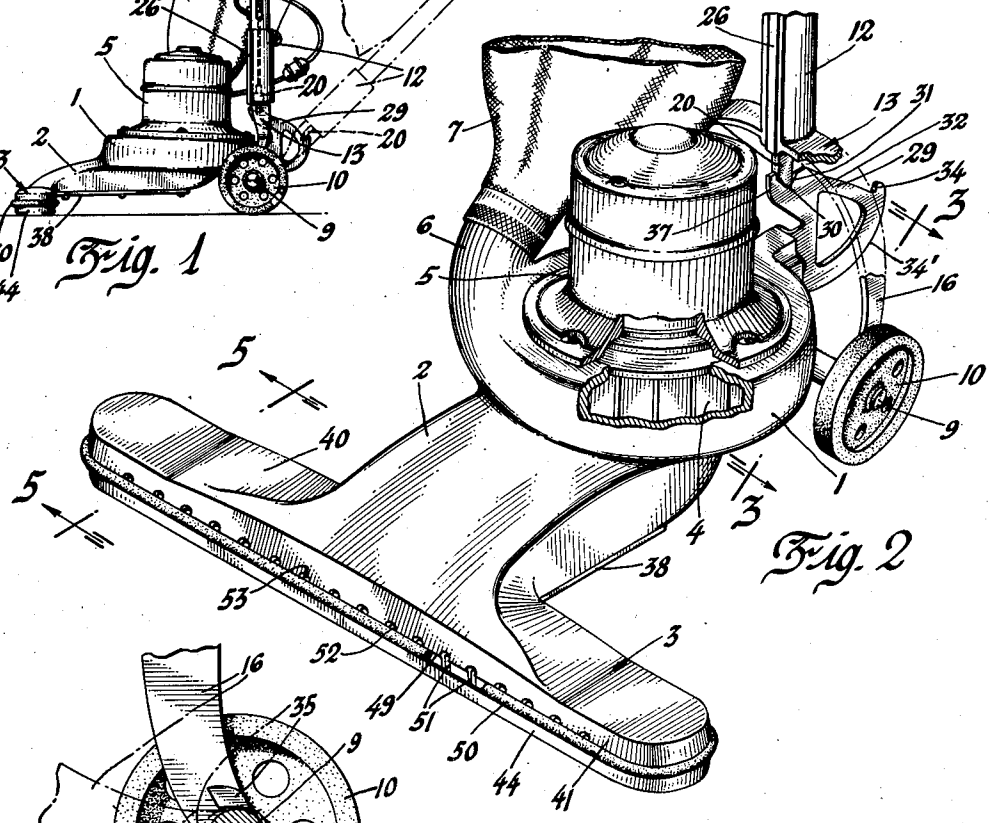


Fig. 2

Fig. 3

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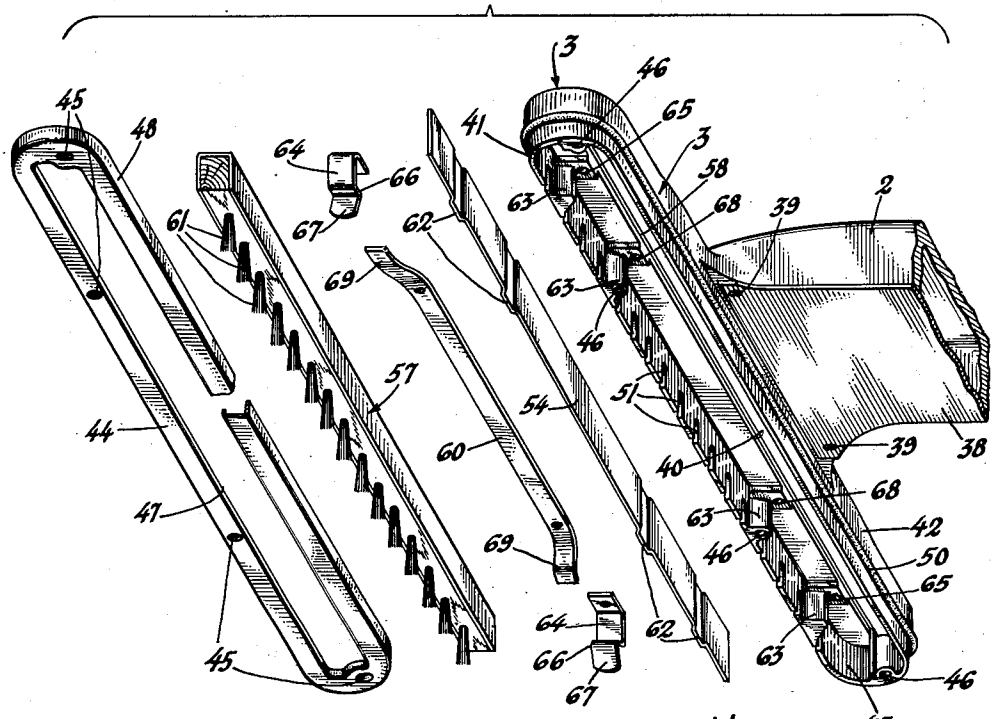


Fig. 4

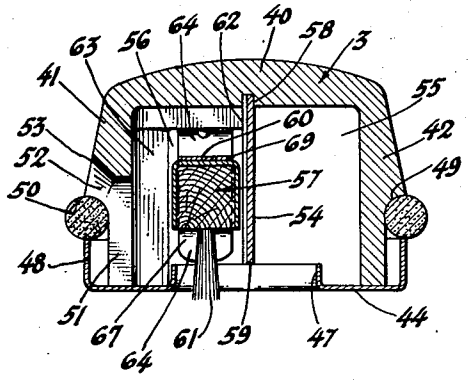


Fig. 5

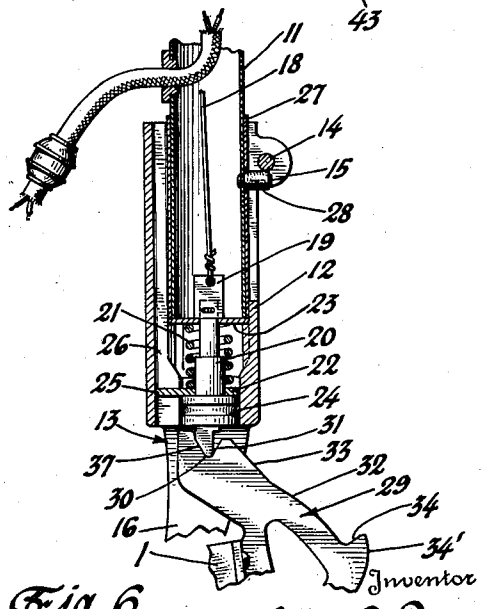


Fig. 6

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VACUUM CLEANER

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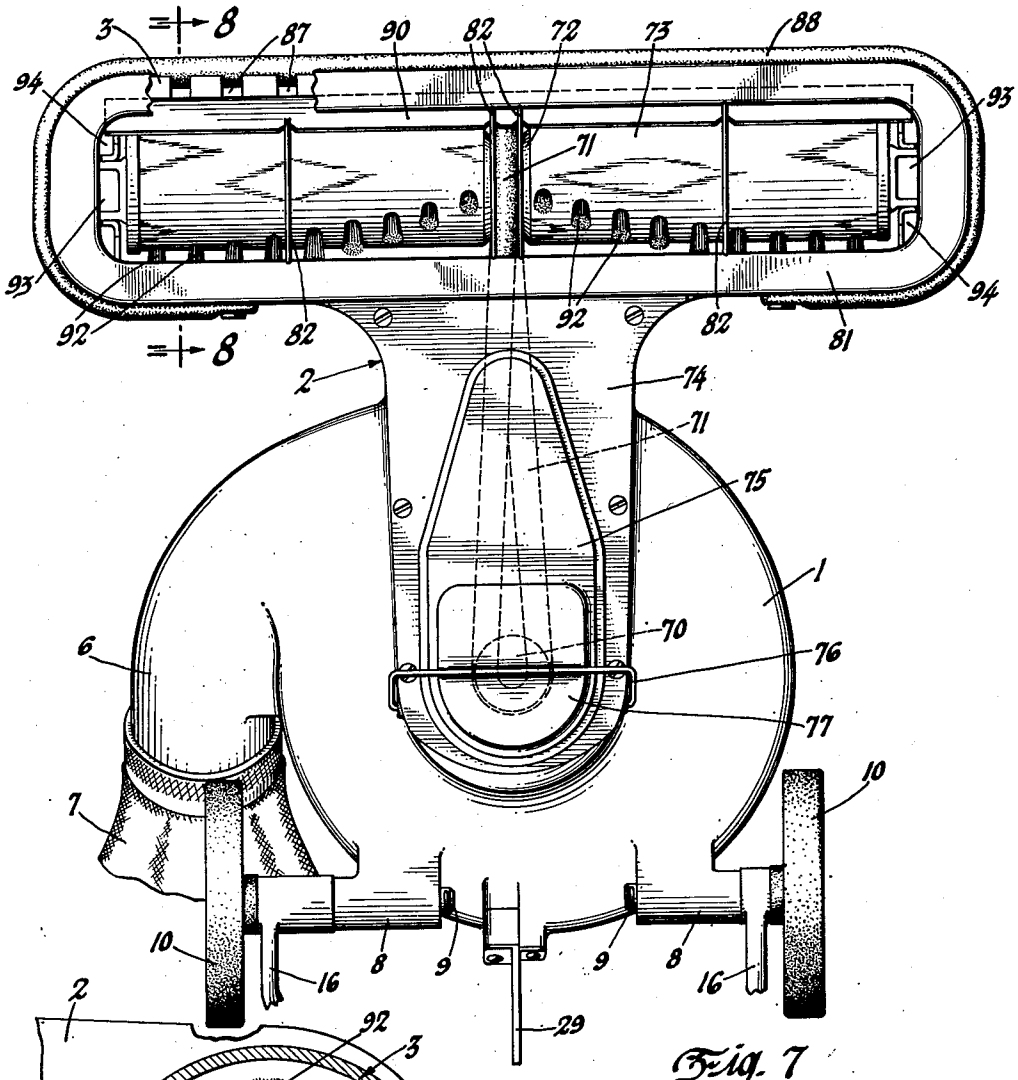


Fig. 7

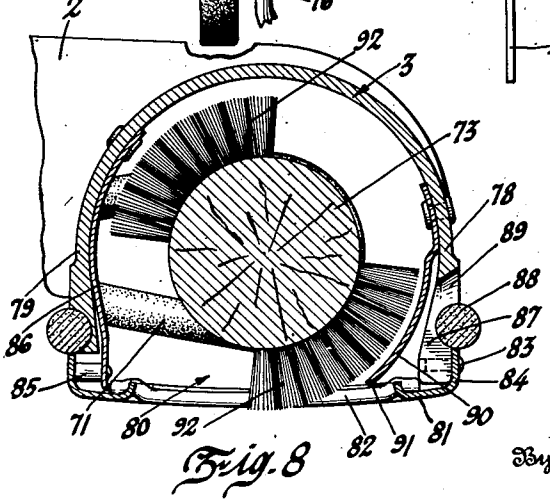


Fig. 8

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UNITED STATES PATENT OFFICE

2,128,525

VACUUM CLEANER

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Application May 4, 1933, Serial No. 669,319

16 Claims. (Cl. 15—8)

This invention relates generally to suction cleaning apparatus and more particularly to improvements in vacuum cleaners of the portable domestic type which embody a suction nozzle associated with an electric motor operated rotary suction producing fan.

One of the objects of this invention is to increase the cleaning efficiency of vacuum cleaners of this type by the provision of a novel nozzle construction and method of air induction.

It is another object of this invention to so arrange a brush within the nozzle as to provide a passage of air current therethrough to prevent any such accumulation of string, lint, hair and similar forms of litter on the brush as would interfere with its proper functioning to dislodge dust and dirt from the floor covering during cleaning and to comb and smooth the rug nap after cleaning.

Further objects and advantages of this invention such as refinements to simplify and facilitate operation and manufacture will be apparent from the following description of the two embodiments illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of a vacuum cleaner embodying my invention;

Figure 2 is an enlarged fragmentary perspective view of the vacuum cleaner of Figure 1 with parts in section;

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 2;

Figure 4 is an expanded perspective view of the nozzle and associated parts;

Figure 5 is a sectional view taken on line 5—5 of Figure 2;

Figure 6 is an enlarged fragmentary sectional view with parts broken away at the lower end of the handle of Figure 1;

Figure 7 is a fragmentary bottom plan view of a modified form of my invention;

Figure 8 is a sectional view taken on line 8—8 of Figure 7.

Referring to the drawings of both embodiments, the main casing of the vacuum cleaner is generally indicated as consisting of a fan housing 1 with a forwardly extending suction passage 2 terminating in a transverse, relatively narrow suction nozzle 3. Within the fan housing is the suction fan 4 which is driven by the substantially vertically disposed motor in the motor housing 5 supported on the fan housing. The fan housing 1 is provided with the usual lateral discharge outlet 6 with a detachable connection to the dust bag 7 and is also provided with the usual central inlet opening (not shown) from the suction passage 2. Integral bearing brackets 8 are formed on the fan housing for the axles 9 of the rollers 10 which support the rear portion of the cleaner, and as will be noted more fully hereinafter, the cleaner is supported at its forward end directly by the suction nozzle 3.

The operating handle 11 is received at its lower end within the socket 12 of the fork 13 and secured therein frictionally by the clamping screw 14 extending through lugs on opposite sides of a slot in the socket with a pin 15 on the handle extending into the socket slot to positively prevent separation of the handle from the fork by contact with the clamping screw 14. The arms 16 of the fork 13 are pivotally mounted on the axles 9 between the supporting rollers 10 and brackets 8, and means is provided to secure the handle in various positions of angular adjustment with respect to the cleaner casing about this pivotal mounting, which means is generally similar to that shown in my copending application, S. N. 445,111, filed April 17, 1930, which has matured into Patent No. 1,965,885, dated July 10, 1934, in that the same consists, in part, of a notched quadrant on the cleaner casing with a latch on the handle which may be retracted from engagement with the quadrant by a manually operable remote control adjacent the upper end of the handle.

As shown in Figures 1, 2 and 6, the handle adjusting mechanism includes an operating lever 17 near the upper end of the handle 11 which is attached to a wire 18 extending down within the handle to a connector 19 at the upper end of the latch or plunger 20 urged downwardly by a spring 21 located between a washer 22 secured to the plunger and a washer 23 bearing against the lower end of the handle 11. The latch or plunger 20 is guided in its vertical movement by the reduced lower portion 24 of the socket 12 and the washer 22 secured to the plunger is extended at one side to form a key portion 25 which is received within a vertical groove 26 in the socket to prevent rotation of the plunger therein. It is preferable to insulate the handle 11 from the fork 13 which may be accomplished by interposing an insulating sleeve 27 between the handle 11 and socket 12, providing a tube 28 of insulating material on the pin 15, and using some form of insulating material for both the washer 23 and the connector 19.

A notched quadrant 29 is secured to the rear side of the fan housing 1 and is provided with a portion which extends upwardly and forwardly

over the fan housing with a relatively narrow notch 30 which cooperates with the lower end of the latch or plunger 20 to normally hold the handle 11 in the substantially vertical position shown in Figure 6 and in full lines in Figure 1. The notch 30 is formed with a rear face 31 which is inclined in such a manner as to normally prevent lowering of the handle without releasing the plunger 20 from the notch 30 by operation of the lever 17 so that the entire cleaner may be tilted on its rear supporting rollers and readily wheeled from one room or floor covering to another. When it is desired to operate the cleaner over a floor covering or surface to be cleaned, the nozzle 3 should be maintained in contact therewith and the handle should be free to swing through the range of normal operating positions. The quadrant 29 provides a relatively wide notch 32 within which the plunger 20 may move freely to permit this range of normal operating positions. The notch 32 is defined at its upper end by a relatively smooth shoulder 33 which cooperates with the end of the plunger 20 to cam it upwardly as the handle is moved to the vertical position in which the plunger will be automatically urged into the notch 30 by the spring 21. The lower end of the notch 32 is defined by the abrupt shoulder 34 constituting the lower limit of the range of normal operating positions of the handle as is shown in dotted lines in Figure 1. As inferred hereabove, it is preferable when moving the handle from the vertical position to an inclined operating position to retract the plunger 20 from the notch 30 by manual operation of the lever 17, but if this is not done any damage which might ordinarily result is prevented by the provision of the inclined face 31 of the notch 30 which will function to cam the plunger upwardly against the force of spring 21 so that the plunger will automatically pass over this face 31 into the relatively wide notch 32 on the application of considerable force to move the handle from the vertical to an inclined position accompanied by exerting a downward pressure on the suction nozzle 3 to prevent tilting of the cleaner about the rear supporting wheels such as would ordinarily result from this movement of the handle without manually retracting the plunger from the notch 30.

During normal operation, as has been stated above, the handle 11 may be moved freely through a considerable range of operating positions with the plunger 20 in the notch 32. At the same time, the provision of the abrupt shoulder 34 to cooperate with the plunger and define the lower limit to the usual range of operating positions renders it possible by a slight downward movement of the handle beyond this limit to tilt the cleaner about its rear supporting wheels to clear obstructions or move readily from one rug to another without having to return the handle to a vertical non-operating position to accomplish this tilting and then having to release the handle plunger from the notch 30 to again assume the normal operating position. At this lower limit to the usual range of operating positions, the handle would still extend upwardly at such an angle (as indicated by the dotted line position in Figure 1) that it would possibly interfere with movement of the cleaner under beds or other low furniture, in which event, however, the plunger 20 may be retracted by manual operation of the lever 17 until it clears the shoulder 34 and continued lowering of the handle then permitted until the handle reaches substantially a horizontal position beyond which any further lowering (without tilting the cleaner about the rear supporting wheels) is prevented by contact of the lug 35 on one of the arms 16 of the fork 13 with the lug 36 on the adjacent bearing bracket 8 as is shown in dotted lines in Figure 3. It should be noted that if the quadrant 29 were extended sufficiently beyond the shoulder 34 to provide this lowermost limit to lowering of the handle, the lower end of the quadrant would interfere with tilting of the cleaner by contact with the surface over which the cleaner was being wheeled when not in operation. The curved surface 34' beneath the shoulder 34 is provided to engage with the plunger 20 and cam it upwardly to automatically enter the notch 32 as the handle is moved upwardly from below the lower limit to the normal range of operating positions, and to facilitate this camming action and that of the smooth shoulder 33 when the handle is being moved to the vertical position, the lower end of the plunger 20 is slightly rounded and one side is beveled as indicated at 37 in Figure 6.

Referring now to the cleaner particularly shown in Figures 1, 2, 4 and 5, it has been already mentioned that the main casing consists of a fan housing 1 with a forwardly extending suction passage 2 terminating in a transverse, relatively narrow suction nozzle 3, and as indicated in the drawings, these parts may be formed in a single casting except for the bottom plate 38 on the suction passage 2 attached thereto by screws 39. The suction nozzle 3 which is in communication with the suction passage 2 intermediate its ends is constituted by an upper wall 40 and depending side walls including front wall 41 and rear wall 42 thereby providing a downwardly directed open mouth 43 which is adapted to be moved over the surface to be cleaned, with the nozzle supported by and contacting with the surface to be cleaned at the lower edges of the depending nozzle walls. Although the lower edges of the depending walls could be utilized for the direct contact with the surface to be cleaned, it is preferable to provide a flanged nozzle guard or shoe 44 detachably secured to the nozzle by means of screws which are countersunk in the openings 45 in the nozzle guard 44 and threaded into the nozzle as at 46. This nozzle guard provides a smooth contact area of greater extent than the lower edges of the depending nozzle walls and limits the size of the open mouth 43 to that of the elongated opening in the nozzle guard which is formed with a vertical flange 47 around this opening and with a vertical flange 48 externally of the nozzle and of greater vertical extent than flange 47 for a purpose to be hereinafter set forth.

The external surface of the depending walls of the nozzle 3 is formed with a continuous shoulder 49 with a curved seat to receive the endless rubber bumper 50 and prevent upward displacement thereof, and the flange 48 on the nozzle guard 44 is adapted to contact with the bumper 50 to prevent downward displacement thereof. The front wall 41 of the nozzle is provided with a plurality of spaced vertical slots 51 which extend upwardly from the lower edge of this wall to above the bumper 50 and on reference to Figures 2 and 5 it will be seen that the lower ends of the slots 51 are externally closed by the flange 48 on the nozzle guard 44 and by the bumper 50 to thereby provide a plurality of spaced air inlet openings or passages 52 directly above the bumper in the front wall 41 of the nozzle above the lower edge of this wall and above the open mouth 43. With

further reference to Figures 2 and 5, the upper end of each vertical slot 51 is defined by the curved and beveled face 53 whereby each air inlet passage is inclined downwardly toward the open mouth 43.

Within the nozzle 3 is a partition 54 which extends from end to end of the nozzle intermediate the front and rear walls thereof and substantially divides the nozzle into two separate chambers 55 and 56. The chamber 55 between the partition 54 and rear wall 42 constitutes a suction chamber in communication with the suction passage 2 to create a vertical suction at the nozzle mouth 43 on the surface to be cleaned and the chamber 56 between the partition 54 and front wall 41 constitutes a brush chamber in which is mounted the brush 57. The partition 54 may be secured within the nozzle 3 in any suitable manner such as by forcing the same into tight engagement within the groove 58 in the upper wall 40 and in the end walls of the nozzle. The lower edge 59 of the partition 54 is above the lower edges of the depending nozzle walls or in other words, above the horizontal plane of the open mouth 43, so that said partition is adapted to be maintained in predetermined spaced relation to the surface to be cleaned.

The brush 57 is mounted in the chamber 56 for vertical movement and is urged downwardly by spring 60 so that the brush bristles 61 extend below the open mouth 43 to engage the surface to be cleaned. Vertical guides for the brush 57 are provided by the offset portions 62 on the partition 54 and the inwardly projecting portions 63 on the front wall 41 of the nozzle, and endwise movement of the brush is prevented by the spring clips 64 which may be attached to the upper wall 40 of the nozzle by screws received in openings 65. The spring clips 64 extend vertically downward at the ends of the brush and are each formed with a substantially horizontal shoulder 66 adapted to extend under the adjacent end of the brush to limit the downward movement thereof with a vertical extension 67 beyond shoulder 66 to facilitate removal of the brush which would obviously be accomplished by bending the spring clips away from the brush ends until the shoulders 66 no longer engage thereunder. The spring 60 consists of a strip of spring metal attached to the upper wall 40 of the nozzle by screws received in openings 68, with the ends 69 of the strip bent downwardly to such an extent as to engage with the brush 57 adjacent its ends and exert sufficient downward pressure thereon to maintain it in yielding contact with any surface over which the cleaner may be moved during normal operation.

Referring now to the above description and to the detailed disclosure in Figure 5, it will be apparent that when operating the cleaner over a surface to be cleaned, the suction fan will draw air through the openings in the front wall of the nozzle and downwardly and rearwardly below the lower edge of the partition thereby producing a horizontal passage of air at relatively high velocity through the relatively narrow space between the lower edge of the partition and the surface to be cleaned. It will also be apparent that the air drawn through the openings in the front wall of the nozzle will pass through the brush bristles and prevent any such accumulation of string, lint, hair and similar forms of litter on the brush as would interfere with its proper functioning to dislodge dust and dirt from the floor covering or surface to be cleaned. However, the number and size of the air inlet openings or passages in the front wall of the nozzle is such that the amount of air which may be drawn therethrough is less than the capacity of the suction producing means so that some air may be drawn through the floor covering at the open mouth of the nozzle and if the floor covering is a rug with a fairly thick nap, air may also be drawn horizontally through the nap under the nozzle guard or shoe as the same is moved thereover.

The cleaner illustrated in Figures 7 and 8 is principally distinguished from the cleaner of Figures 1, 2, 4 and 5 by a modification of the suction passage and suction nozzle to provide a brush in the nozzle which is rotated by the suction fan motor. In this modification, the motor shaft is extended below the suction fan in the fan housing 1 into the suction passage 2 and is provided with a driving pulley 70 for the endless belt 71 which extends forwardly within the suction passage into the nozzle 3 where it is engaged within a groove 72 in the rotatably mounted brush 73. Beneath the driving pulley 70 the bottom wall 74 of the suction passage 2 is provided with a readily removable cover 75 for access to the pulley and belt to permit inspection or renewal of the belt if required. This cover 75 may be normally held in place by any suitable means such as a wire bail 76 hinged to the suction passage and adapted to be sprung over a depending portion 77 of the cover.

Referring to Figure 8, the suction nozzle 3, which is in communication with the suction passage 2, is substantially semi-circular in cross section with a front wall 78 and rear wall 79 which are connected by an upper curved wall and end walls to provide a downwardly directed open mouth 80 which is adapted to be moved over the surface to be cleaned. A flanged nozzle guard or shoe 81 is preferably provided at the lower edges of the nozzle for contact with the surface to be cleaned, and guard wires 82 extend across the opening in the nozzle guard and may be welded thereto at their ends. The nozzle guard 81 is secured to the nozzle by a means which will permit the same to be readily detached for access to the brush and removal of the latter to replace the belt. This securing means consists of a forwardly projecting pin 83 on the front wall 78 of the nozzle which is adapted to be received within an opening in the external upwardly extending flange 84 on the nozzle guard, and a pin 85 extending inwardly from the flange 84 below the lower edge of the rear wall 79 of the nozzle with a reduced end which is adapted to be received within an opening in the lower end of the depending spring arm 86 riveted at its upper end within the nozzle and exerting a rearward pressure on the nozzle guard to normally hold the same in position. Such an arrangement is preferably provided adjacent each end of the nozzle guard and it will be seen that the nozzle guard may be readily removed by forcing it forwardly against the tension of the spring arms until the front openings are beyond the ends of pins 83 and the front of the nozzle guard moved downwardly and the nozzle guard then moved rearwardly to release the pins 85 from the openings in the spring arms. To replace the nozzle guard, the reduced ends of the pins 85 would first be inserted in the openings in the spring arms and the nozzle guard forced forwardly and the front end thereof moved upwardly until the front openings are in line with pins 83 which would then be engaged

therein on a slight rearward movement of the nozzle guard by the spring arms.

The front wall 78 of the nozzle is provided with a plurality of spaced vertical slots 87 which extend upwardly from the lower edge of this wall and have their lower ends externally closed by the flange 84 on the nozzle guard 81 and by an adjacent rubber bumper 88 to thereby provide a plurality of downwardly inclined spaced air inlet openings or passages 89 directly above the bumper 88, and in this respect the cleaner of Figures 7 and 8 is substantially identical with that shown in Figures 1, 2, 4 and 5. Within the nozzle in this modification there is a partition or baffle wall 90 which corresponds generally to the partition 54 shown in Figures 4 and 5, but the partition 90 does not depend vertically from the upper wall of the nozzle but consists of an elongated plate which is riveted to the front wall 78 above the horizontal plane of the openings 89 and extends rearwardly and downwardly to terminate in a lower edge 91 intermediate the front and rear walls of the nozzle and above the lower edges thereof or above the plane of the inlet mouth. The lower edge 91 of the partition 90 is therefore adapted to be maintained in predetermined spaced relation to the surface to be cleaned by the contact of the nozzle guard 81 and guard wires 82 with said surface.

The rotatable brush 73 may be mounted within the nozzle in any suitable manner which will permit the ready removal thereof and preferably permit also a vertical adjustment to vary the degree of contact of the brush bristles 92 with the surface to be cleaned. The method of mounting the brush in the nozzle forms no part of the present invention and has not been shown in detail but indicated only diagrammatically as including bearing retainers 93 on the brush ends which are received within vertically slotted bearing supports 94.

The operation of this modified form is generally similar to that heretofore described with reference to the form of Figures 1, 2, 4 and 5 in that the suction fan will draw air through the openings in the front wall of the nozzle and downwardly and rearwardly below the lower edge of the partition thereby producing a horizontal passage of air at relatively high velocity through the relatively narrow space between the lower edge of the partition and the surface to be cleaned. This air will then be drawn upwardly and rearwardly within the nozzle to the suction passage passing through the bristles of the rotating brush to prevent accumulation of string, lint, hair and similar forms of litter thereon. Some air may also be drawn through the floor covering at the open mouth of the nozzle and if the floor covering is a rug with a fairly thick nap, air may be drawn horizontally through the nap under the nozzle guard or shoe as the same is moved thereover.

While in accordance with the provisions of the statutes I have illustrated and described herein two embodiments of my invention, it will be apparent that changes may be made therein without distinguishing from the spirit of my invention as set forth in the appended claims, and that certain features of my invention may be used to advantage independently of other features.

I claim:

1. In a suction cleaner, suction producing means and a suction nozzle having an open mouth including spaced front and rear walls adapted to contact at their lower edges with a surface to be cleaned, a depending partition in said nozzle with its lower edge intermediate said walls and above the lower edges thereof, the space between said partition and front wall constituting a brush chamber and the space between said partition and rear wall constituting a suction chamber in direct communication with said suction producing means, and a brush in said brush chamber, and a plurality of air inlet passages in said front wall above the lower edge thereof through which air will be drawn and pass through the brush and between the lower edge of the partition and the surface to be cleaned into the said suction chamber.

2. In a suction cleaner, suction producing means and a suction nozzle with an upper wall and vertically depending walls providing a downwardly directed open mouth adapted to contact with and be moved over a surface to be cleaned, and a partition depending vertically from and secured to the upper inner wall of said nozzle intermediate the front and rear walls thereof, said partition terminating above the inlet mouth intermediate said front and rear walls and adapted to be maintained in predetermined spaced relation to the surface to be cleaned by the contact of the mouth with said surface.

3. In a suction cleaner, suction producing means and a suction nozzle having an upper wall and an open mouth including depending spaced front and rear walls adapted to contact with and be supported by a surface to be cleaned, a partition in said nozzle with its lower edge intermediate said walls and above the lower edges thereof, a brush mounted in said nozzle for limited vertical movement between said partition and the front wall, and spring means between said upper wall and said brush to force the brush downwardly against the surface to be cleaned with the brush bristles extending below the lower edge of said partition.

4. The elements set forth in claim 3, in which the front wall of the nozzle is provided with a plurality of air inlet passages above the lower edge thereof through which air will be drawn and pass downwardly and rearwardly through the brush bristles and between the lower edge of the partition and the surface to be cleaned.

5. In a suction cleaner, suction producing means and a suction nozzle having a downwardly directed open mouth including spaced front and rear walls and a nozzle guard secured to the lower edges of said walls and adapted to contact with a surface to be cleaned, a partition in said nozzle with its lower edge intermediate said walls and above the lower edges thereof, the space between said partition and rear wall constituting a suction chamber in communication with said suction producing means to create a vertical suction at the nozzle mouth on the surface to be cleaned, and air inlet passages in the front wall of the nozzle above the lower edge thereof through which air will be drawn and pass horizontally between the lower edge of the partition and the surface to be cleaned to the suction chamber.

6. The elements set forth in claim 5, in which a brush is mounted in the space between the partition and the front wall of the nozzle with the brush bristles located in the path of the air drawn through the air inlet passages in the front wall of the nozzle.

7. In a suction cleaner, suction producing means and a suction nozzle having an open mouth provided with a nozzle guard adapted to contact with and be moved over a surface to be

cleaned, a partition in said nozzle with its lower edge above said mouth, said nozzle being provided with air inlet passages through which air will be drawn and pass between the lower edge of said partition and the surface to be cleaned, and a brush mounted within said nozzle to contact with the surface to be cleaned, said nozzle guard and brush being so arranged as to prevent the surface to be cleaned from being drawn into the mouth into contact with the lower edge of said partition during operation of said cleaner.

8. In a suction cleaner, suction producing means and a suction nozzle having an open mouth including spaced front and rear walls adapted to contact with a surface to be cleaned, the front wall of said nozzle being provided with an air inlet passage spaced above the lower edge thereof, a partition secured to said front wall above said air inlet passage and extending rearwardly and downwardly therefrom with its lower edge intermediate said front and rear walls and above the lower edges thereof, and a brush rotatably mounted in said nozzle rearwardly of said partition with the brush bristles extending below the lower edge of said partition.

9. In a suction cleaner, suction producing means and a suction nozzle having an open mouth including spaced front and rear walls adapted to contact at their lower edges with a surface to be cleaned, a partition in said nozzle with its lower edge intermediate said walls and above the lower edges thereof, and a brush mounted within said nozzle to rotate in the space between said partition and the rear wall of said nozzle.

10. In a suction cleaner, suction producing means and a suction nozzle having a downwardly directed open mouth including spaced front and rear walls adapted to contact with a surface to be cleaned, a partition in said nozzle with its lower edge intermediate said walls and above the lower edges thereof, the space between said partition and rear wall constituting a suction chamber in communication with said suction producing means to create a vertical suction at the nozzle mouth on the surface to be cleaned, air inlet passages in the front wall of the nozzle above the lower edge thereof through which air will be drawn and pass horizontally between the lower edge of the partition and the surface to be cleaned to the suction chamber, and a brush mounted in said nozzle to rotate in said suction chamber with its bristles adjacent and extending below the lower edge of said partition whereby the air passing horizontally between the lower edge of said partition and the surface to be cleaned will be drawn through the brush bristles.

11. In a suction cleaner, suction producing means and a suction nozzle having an open mouth adapted to contact with and be moved over a surface to be cleaned, said nozzle being provided with a plurality of vertical slots extending upwardly from the lower edge of said mouth, and means extending over the lower ends of said slots to provide a plurality of air inlet passages above the lower edge of said mouth.

12. The elements set forth in claim 11, in which said means extending over the lower ends of the slots in the nozzle comprises a nozzle guard secured to the lower edge of said mouth and a bumper mounted on said nozzle adjacent said nozzle guard.

13. In a suction cleaner, suction producing means and a suction nozzle having an open mouth adapted to contact with and be moved over a surface to be cleaned, said nozzle being provided with a plurality of vertical slots extending upwardly from the lower edge of said mouth, and means to close the lower ends of said slots comprising a nozzle guard secured to the lower edge of said mouth to support the nozzle on the surface to be cleaned.

14. In a suction cleaner, suction producing means and a suction nozzle having an open mouth adapted to contact with and be moved over a surface to be cleaned, said nozzle being provided with a plurality of vertical slots extending upwardly from the lower edge of said mouth, and a bumper mounted on said nozzle and extending over a portion of said slots between the upper and lower ends thereof.

15. In a suction cleaner, suction producing means and a suction nozzle having an open mouth including spaced front and rear walls adapted to contact at their lower edges with a surface to be cleaned, a partition in said nozzle with its lower edge intermediate said walls and above the lower edges thereof, a plurality of air inlet passages in the front wall above the lower edge thereof through which air will be drawn and pass between the lower edge of the partition and the surface to be cleaned, and a brush member in said nozzle provided with bristles, means for mounting said brush with its bristles in contact with the surface to be cleaned at all times, said brush member being so arranged with respect to said partition and air inlet passages that air will be drawn laterally through the brush bristles during operation of the cleaner.

16. In a suction cleaner, a suction chamber and a brush chamber having narrow elongated inlet mouths located side by side for application to one and the same working surface and communicating with each other across and adjacent to said working surface, a brush located in said brush chamber, and means yieldingly supporting said brush to enable it to move vertically in accordance with inequalities in the working surface, said brush chamber having an air inlet therein located at a distance from the working surface.

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