

March 17, 1936.

E. F. MARTINET

2,034,196

SUCTION CLEANER NOZZLE AND BRUSH

Filed June 11, 1931

3 Sheets-Sheet 1

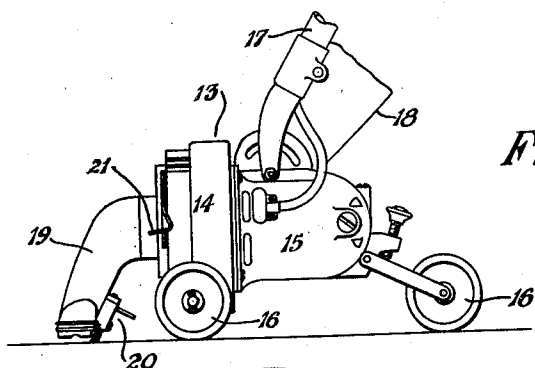


Fig. 1

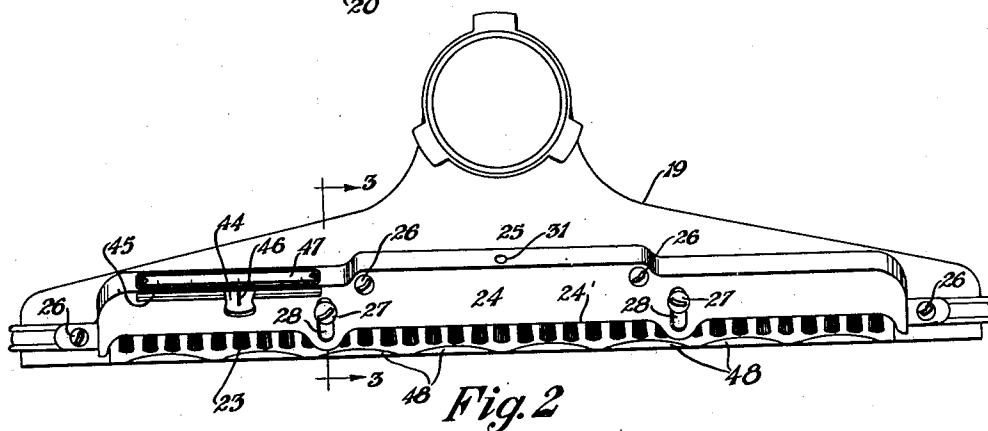


Fig. 2

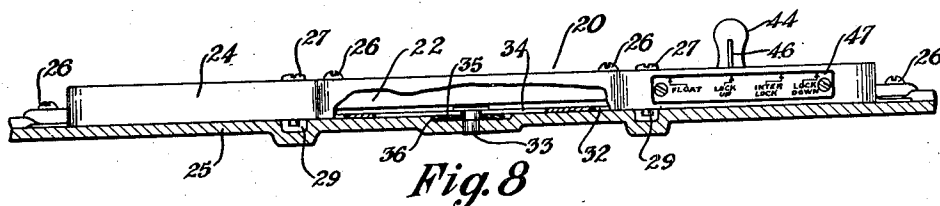


Fig. 8

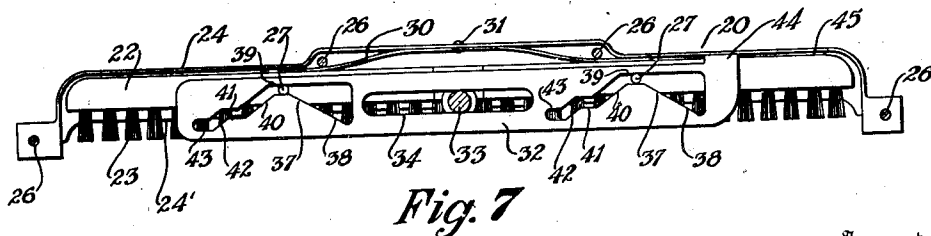


Fig. 7

Inventor

E. F. Martinet

384

Thress and Bishop
Attorneys

March 17, 1936.

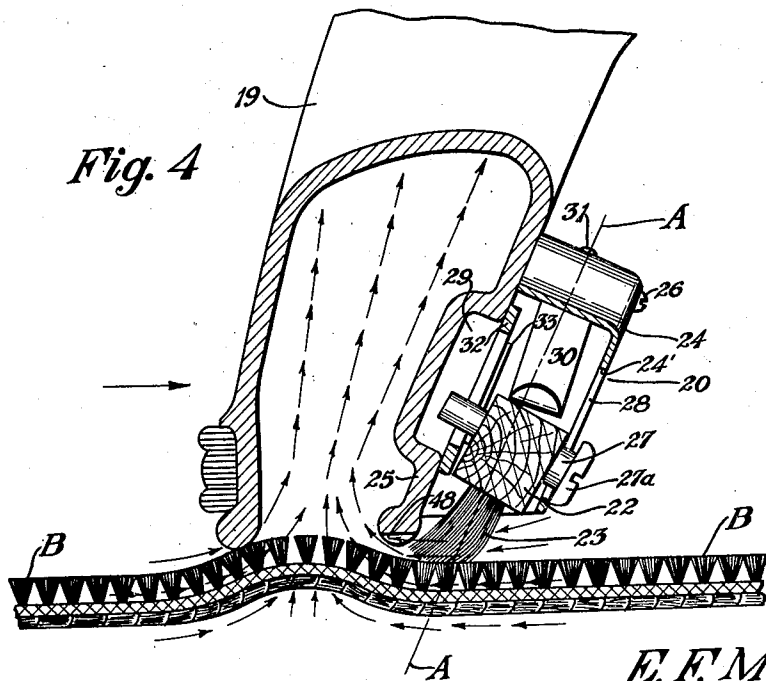
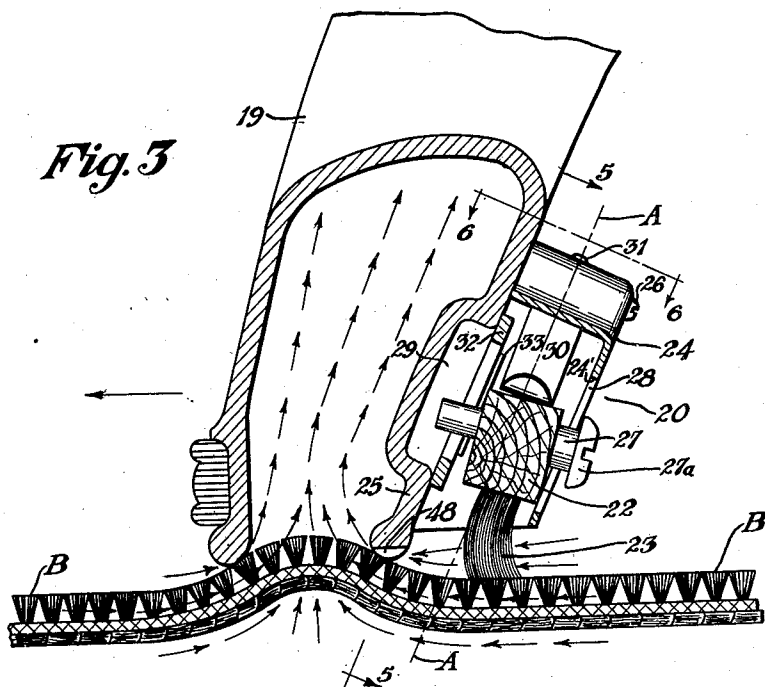
E. F. MARTINET

2,034,196

SUCTION CLEANER NOZZLE AND BRUSH

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3 Sheets-Sheet 2



Inventor

E. F. Martinet

334

Trease and Bishop
Attorneys

March 17, 1936.

E. F. MARTINET

2,034,196

SUCTION CLEANER NOZZLE AND BRUSH

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3 Sheets-Sheet 3

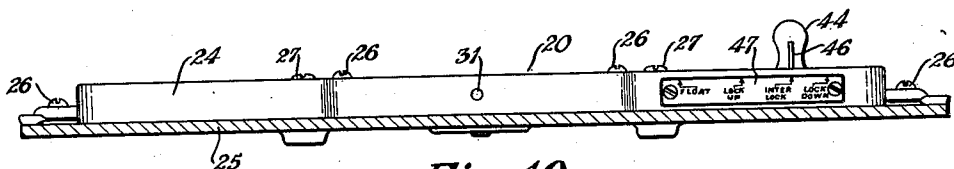


Fig. 10

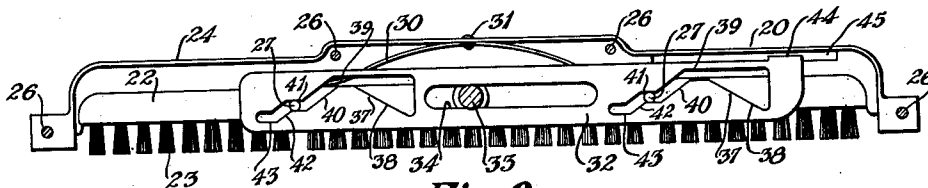


Fig. 9

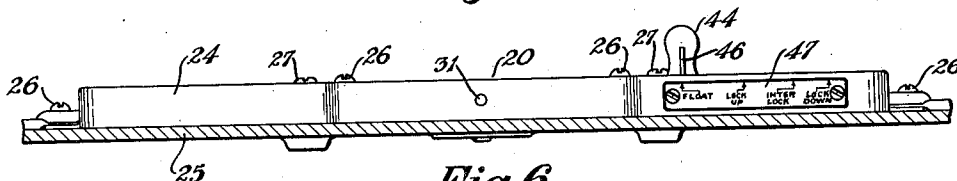


Fig. 6

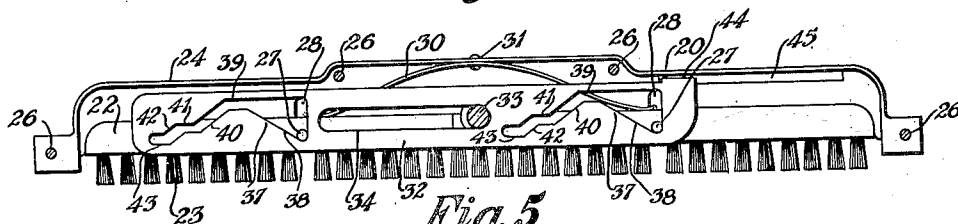


Fig. 5

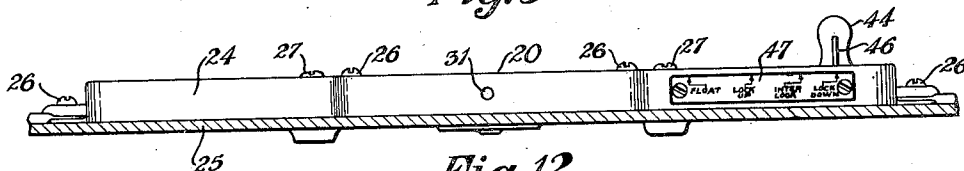


Fig. 12

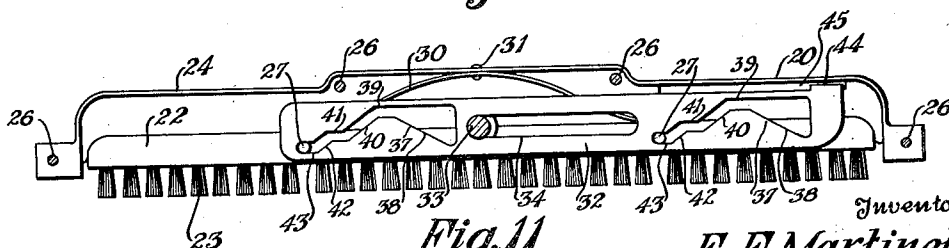


Fig. 11

Inventor
E. F. Martinet

By *Freese and Bishop*
Attorneys

UNITED STATES PATENT OFFICE

2,034,196

SUCTION CLEANER NOZZLE AND BRUSH

Eugene F. Martinet, Cleveland, Ohio, assignor to
The P. A. Geier Company, Cleveland, Ohio, a
corporation of Ohio

Application June 11, 1931, Serial No. 543,673

16 Claims. (Cl. 15—158)

The invention relates to suction cleaning apparatus, and more particularly to a floating, self-cleaning or self-clearing brush for suction cleaning apparatus; to a special type of nozzle construction which facilitates the self-cleaning or self-clearing operation of a brush at all times during manipulation or use of the suction cleaning apparatus; to an adjustable device for a brush adapted to be actuated to move the brush to, and lock the same in, any one of a plurality of operative or inoperative positions with respect to the surface being cleaned by the cleaning apparatus; and to an improved combined mounting device and cover or enclosure for a floating brush and its adjusting device which substantially conceals the same from view, but which facilitates the self-cleaning or self-clearing operation of the brush regardless of the adjusted position of the brush; and this application is a continuation of the common subject matter contained in my co-pending application, Serial No. 366,953.

Efficient operation of a suction cleaner requires the same to be adapted to clean a great variety of types of surfaces, materials, etc., and in the past cleaners have been adapted for such operation by providing the same with a nozzle brush movable to a plurality of different operative or inoperative positions; first, a floating position, as shown in the Robertson Patent No. 1,382,548, in the Martinet Patents Nos. 1,694,273 and 1,753,799, and in the Martinet application, Serial No. 216,849; second, a locked fully extended position, as shown in said Patents Nos. 1,694,273 and 1,753,799, and in said application, Serial No. 216,849; and third, a locked retracted inoperative position as shown in said Patents Nos. 1,382,548, 1,694,273 and 1,753,799.

However, it has been found desirable if not necessary for satisfactorily cleaning certain types of surfaces and materials, to utilize a brush which may be adjusted to and locked in a fourth, intermediate position, in which the plane of the lower ends of its bristles is located only slightly below and preferably angularly with respect to the plane of the nozzle lips.

It is therefore an object of the present invention to provide suction cleaning apparatus with a nozzle brush which may be operated in a floating position, in a locked extended position, in a locked intermediate position, or in a locked retracted position.

Satisfactory and efficient suction cleaner brush operation can usually be maintained only so long as the brush bristles remain free, clear or clean of accumulations of litter, dust particles, threads

and the like. A self-cleaning or self-clearing of such accumulations from brush bristles may be partially accomplished by mounting the brush for rocking movement as shown in said application, Serial No. 216,849; and as contemplated in the present invention by mounting the brush to be disposed at an acute angle with respect to the surface to be cleaned.

However, it has been found that it is necessary to draw swift currents of air through and around the brush bristles at all times during the operation of the cleaner for maintaining the brush bristles completely clean and clear of accumulations of litter, dust particles, threads and the like.

Such air current brush cleaning may be accomplished by mounting the brush on and adjacent to a nozzle wall and by forming the lower lip edge of said nozzle wall with shallow, concaved recesses so that the lip edge cannot become sealed to the surface being cleaned during operation of the cleaner. By constructing a nozzle lip in such a manner, air currents are drawn through the brush bristles, between the recessed nozzle lip and the surface being cleaned, and into the nozzle air duct at all times during operation of the cleaner; the air currents maintaining the brush bristles clean and clear of accumulations of foreign matter.

It is therefore a further object of the present invention to provide suction cleaning apparatus with a brush adjacent a nozzle wall preferably disposed at an acute angle with respect to the surface to be cleaned; and mounted for rocking movement as the cleaner moves to and fro; and to provide said nozzle wall with shallow concavities in its lip edge, whereby air currents are drawn through the brush bristles at all times during operation of the cleaning apparatus to maintain the brush clean and clear of litter, dust particles and the like.

It is desirable from the standpoint of appearance, to conceal from external view as much of a cleaner brush and its mounting and adjusting devices as possible. This has been accomplished by mounting the brush inside of the nozzle duct as shown in said Patent No. 1,753,799, and in said application Serial No. 216,849.

However, the mounting of a brush interiorly of a suction cleaner nozzle may obstruct the free passage of air currents therethrough, or may render it impractical to provide for the various movements or adjustments of the brush.

For these reasons, it is desirable to mount the brush exteriorly of the nozzle duct; but under

such conditions, the problem of housing the brush, and its mounting and adjusting devices in such a manner that air current cleaning of the brush can be maintained at all times, becomes difficult to solve.

It is therefore a further object of the present invention to provide suction cleaning apparatus with an enclosed brush mounted exteriorly of the cleaner nozzle and substantially concealed from view, but mounted in such a manner that air current brush cleaning may be maintained at all times during operation of the cleaner.

These and other objects may be obtained by the improved suction cleaning apparatus constructions, devices and combinations of the present invention, preferred embodiments of which are shown in the drawings and are hereinafter described in detail, which may be stated in general terms as including in combination with a suction cleaning nozzle having walls forming a mouth adapted to be moved across a surface to be cleaned, a brush member provided with bristles; means for supporting the brush member adjacent to the nozzle mouth; means slidably cooperating between the brush member and supporting means mounting the brush member for movement in a plane located at an acute angle with respect to said surface to permit the brush to accommodate itself to the contour of said surface; there being sufficient looseness in said cooperating slidable means to permit the brush member to rock to positions angular with respect to said plane on an axis parallel to the nozzle mouth by contact between the bristles and said surface when the nozzle is moved forwardly and rearwardly across the surface; means for yieldingly pressing said brush member toward said surface to maintain said bristles in "floating" contact with the surface; means for adjusting and locking said brush member selectively, in a fully extended position, in an intermediate slightly extended position, in a retracted position, or in said "floating" yieldingly pressed position; the nozzle wall adjacent the brush member being provided with recessed concavities or notches whereby air currents are at all times during operation of the suction cleaning apparatus drawn through the brush bristles to maintain the same clean; the supporting means including a cover member enclosing the brush member and the mounting and adjusting devices; and said cover member having its lower edge cut away to permit the brush bristles to be air current cleaned.

In the drawings,

Figure 1 is a side elevation of a suction cleaner equipped with the improved brush and nozzle construction;

Fig. 2 is an enlarged rear elevation of a detachable nozzle constructed in the improved manner showing the adjustable brush thereof locked in a retracted position;

Fig. 3 is a sectional view through the improved nozzle and brush taken as on the line 3—3, Fig. 2, showing the brush in "floating" position and showing the position which the brush assumes when the cleaner is moved forwardly across a surface;

Fig. 4 is a view similar to Fig. 3, but showing the position which the brush assumes when the cleaner is moved rearwardly across a surface;

Fig. 5 is a front view of the improved brush and adjusting and mounting devices therefor, looking in the direction of the arrows 5—5, Fig. 3, and showing the brush in "floating" position;

Fig. 6 is a sectional plan view of the brush ad-

justed as in Fig. 5, taken on the line 6—6, Fig. 3;

Fig. 7 is a view similar to Fig. 5, but showing the brush locked in a retracted position;

Fig. 8 is a view similar to Fig. 6, but showing the brush locked in "retracted" position;

Fig. 9 is a view similar to Fig. 5, but showing the brush locked in an intermediate position;

Fig. 10 is a view similar to Fig. 6, but showing the brush locked in "intermediate" position;

Fig. 11 is a view similar to Fig. 5, but showing the brush locked in an extended position; and

Fig. 12 is a view similar to Fig. 6, but showing the brush locked in "extended" position.

Similar numerals refer to similar parts throughout the several figures of the drawings.

The portable suction cleaner 13, shown in Fig. 1 includes a fan casing 14, in which is mounted a fan driven by a motor mounted in the motor housing 15, and is mounted for actuation upon wheels 16 by means of a handle 17. The usual dust bag, indicated at 18, is connected to the exhaust side of the fan casing 14, while the improved nozzle 19 having walls forming an air duct therethrough and provided with the improved brush indicated generally at 20 is detachably connected, by suitable means 21, to the inlet side of the fan casing 14.

Referring to Figs. 3 and 4, the improved brush 20 is mounted rearwardly of the nozzle 19 for movement generally in a plane, indicated at A, located at an acute angle with respect to the surface or rug B to be cleaned, the brush being inclined forwardly downwardly of the nozzle 19.

The improved brush 20 includes a brush member 22 provided with bristles 23, and a supporting cover wall 24, which forms with the wall 25 a compartment separate from the nozzle air duct. The cover 24 is generally angularly shaped in cross section and is mounted on the rear wall 25 of the nozzle 19 preferably by screws 26.

The brush member 22 is supported or mounted within the compartment formed by the cover 24 for slidable movement generally in the plane A by studs 27 cooperating in the elongated slots 28, provided in the outer wall of the cover 24, and in the grooves 29 provided in the rear nozzle wall 25. A resilient bowed spring 30, preferably riveted at 31 to the upper wall of the cover 24, yieldingly presses the brush member 22 downwardly and forwardly toward the surface B to maintain the brush bristles 23 in contact with the surface at all times when the brush member 22 is in so-called "floating" position, later described.

As shown particularly in Figs. 3 and 4, the brush member 22 is loosely mounted within the cover support 24, because the heads 27a of the studs 27 are spaced from the brush member 22 a sufficient distance to provide a substantial clearance between the rear wall of the cover member 24 and the brush member 22. The loose mounting of the brush member 22 permits a rocking movement of the same to one position angular with respect to its normal position in the plane A, upon forward movement of the nozzle 19 across the surface B to be cleaned. The rocking movement is caused by the frictional engagement between the brush bristles and surface B, and results in a tendency of the bristles to dig into the surface or rug B and pick up surface litter, all as shown in Fig. 3.

The loose mounting of the brush member 22 also permits a rocking movement of the same to another position angular with respect to its normal position in the plane A, upon rearward movement of the nozzle 19 across a surface B to be

cleaned. Such rocking movement is also caused by the frictional engagement or contact between the brush bristles and surface B, and results in a movement of the brush bristles forwardly and downwardly to a position in close proximity with the rear nozzle wall 25, so that the bristles wipe across and are cleaned by the surface B and also break the seal between the rear nozzle wall 25 and the surface B, all as shown in Fig. 4.

The brush member 22 rocks substantially on an axis parallel to the nozzle mouth when the above described rocking movements to the several positions angular with respect to the normal position in the angular plane A, result from a forward or rearward movement of the nozzle across a surface or rug to be cleaned.

A slidable plate brush adjusting and locking member 32 is provided for moving and/or locking the brush member 22 to a plurality of different operative or inoperative positions, later described. The plate member 32 is slidably mounted on the rear nozzle wall 25 (Fig. 8) by means of the stud 33, which projects from the nozzle wall through an elongated slot 34 provided in the plate; a flat leaf spring 35 being interposed, in the recess 36, between the nozzle wall and plate 32, to maintain the plate member 32 in any position of adjustment and to prevent the plate from rattling due to vibration of the suction cleaning apparatus during operation thereof.

The plate member 32 is preferably provided with a plurality of irregularly shaped cam slots generally indicated at 37, each of which includes in order a triangularly shaped portion 38, an upper locking portion 39, an inclined portion 40, an intermediate locking portion 41, an inclined portion 42, and a lower locking portion 43, the purposes of which will be hereinafter described.

The plate member 32 is also provided with an operating lug 44, which projects angularly therefrom outwardly through the slot 45 in the cover 24, to a place accessible to the suction cleaning apparatus operator. The lug 44 is preferably provided with an indicator mark 46 for being aligned with the designations on an indicator strip 47, preferably provided on the upper outer surface of the cover 24 adjacent the slot 45. Designations on the strip 47 refer to the several adjusted positions of the brush member 22.

As shown in Figs. 3, 4, 5, 7, 9 and 11, the brush mounting studs 27 project through the irregularly shaped slots 37 in the adjusting and locking plate 32, for being moved and/or locked by movement of the plate 32.

When the member 32 is adjusted to "floating" position, by moving the lug 44 so that its indicator 46 is aligned with the designation "Float", (Figs. 3, 4, 5 and 6) the studs 27 are free to move up and down in the triangularly shaped portions 38, of the slots 37. When thus positioned, the brush member 22 is maintained in a spring pressed floating relation with respect to the nozzle 19, by the spring 30, so that the brush bristles 23 are maintained in contact with the surface B at all times. When the brush member 22 is in "floating" position, the same is free to slide up and down, generally along the angular plane A, and to rock on its longitudinal axis.

When the member 32 is adjusted to "retracted" position, by moving the lug 44 so that its indicator 46 is aligned with the designation "Lock Up" (Figs. 2, 7 and 8), the studs 27 are maintained in the upper locking portions 39 of the cam slots 37. The brush member 22 is thus locked in a retracted position in which the brush bristles 23

are out of contact with any surface over which the apparatus is moved.

When the member 32 is adjusted to "intermediate" position, by moving the lug 44 so that its indicator 46 is aligned with the designation "Interlock" (Figs. 9 and 10), the studs 27 are locked immovable in the intermediate locking portions 41 of the cam slots 37. The brush member 22 is thus maintained in a position in which the plane of the lower ends of the bristles 23 is located only slightly below the plane of the lips of the nozzle 19. When the brush member 22 is in "intermediate" position, the same cannot slide up or down in its supporting means, but the brush member is free to rock on its longitudinal axis by the frictional engagement between the brush bristles and the surface being cleaned.

When the member 32 is adjusted to "extended" position, by moving the lug 44 so that its indicator 46 is aligned with the designation "Lock Down" (Figs. 11 and 12), the studs 27 are locked immovable in the lower locking portions 43 of the cam slots 37. The brush member is thus maintained locked in a fully extended position with its bristles extending materially below the plane of the lips of the nozzle 19. When the brush member 22 is in "extended" position, the same cannot slide up or down in its supporting means, but it is free to rock on its longitudinal axis.

Referring to Figs. 2, 3, and 4, the lower lip edge of the rear nozzle wall 25 is provided with a plurality of shallow, concaved recesses 48 to form passages along that portion of the lower lip edge which is adjacent the brush bristles 23, so that the rear lip of the nozzle 19 cannot become sealed to a carpet or rug being cleaned during operation of the cleaner. By preventing the rear nozzle lip from being sealed to the carpet, swift air currents at all times are drawn underneath the rear wall of the nozzle into the nozzle duct (Fig. 3), which air currents pass through and around the brush bristles 23 and maintain the same completely clean and clear of accumulations of litter, dust particles, threads and the like.

Referring particularly to Fig. 2, the cover supporting member 24 substantially completely encloses the brush and its adjusting mechanism so that the same has a pleasing and attractive appearance. However, the lower edge of the outer wall of the cover member 24 is cut away as indicated at 24' (Figs. 2 and 7), so that regardless of the position to which the brush may be adjusted, the bristles 23 are always exposed to the action of air currents drawn into the nozzle duct through the shallow concavities 48 for maintaining the brush bristles clean and clear of litter and the like.

I claim:

1. In suction cleaner nozzle construction, a floating brush member, means supporting the brush member for slidable movement adjacent the nozzle mouth, a slidable plate brush adjusting member provided with a cam slot having in order an enlarged portion, an upper locking portion, an intermediate locking portion, a lower locking portion, and means communicating in order between the said portions, the said cam slot being cooperatively connected with said brush member, and plate operating means projecting exteriorly of the nozzle adapted to be actuated to adjust said brush member selectively in order to floating, locked retracted, locked intermediate, or locked extended position with respect to said nozzle.

2. In suction cleaner nozzle construction, a

floating brush member, means supporting the brush member adjacent the nozzle mouth for slidable movement in a plane located at an acute angle with respect to the plane of the nozzle lips, and means for selectively slidably adjusting the brush member to various positions in its plane of movement and for locking said brush member in floating, locked retracted, locked intermediate, or locked extended position with respect to said nozzle.

3. In suction cleaner nozzle construction, a floating brush member, means supporting the brush member adjacent the nozzle mouth for slidable movement in a plane located at an acute angle with respect to the plane of the nozzle lips, there being sufficient looseness in said supporting means to permit the brush member to rock on its longitudinal axis to positions angular with respect to said plane, and means for selectively slidably adjusting the brush member to various positions in its plane of movement and for locking said brush member in floating, locked retracted, locked intermediate, or locked extended position with respect to said nozzle.

4. In suction cleaner nozzle construction, a floating brush member provided with bristles, means for adjustably supporting said brush member adjacent a nozzle wall, means for adjusting the brush member selectively to a plurality of operative or inoperative positions, and said nozzle wall being provided with shallow recesses in its lip edge adjacent the brush; whereby air currents are drawn through the brush bristles, between the recessed nozzle lip and the surface being cleaned and into the nozzle at all times during operation of the cleaner, to maintain the brush bristles clean and clear of foreign matter in any adjusted position of the brush.

5. In suction cleaner nozzle construction, a floating brush member provided with bristles, means for adjustably supporting said brush member adjacent a nozzle wall exteriorly thereof, means for adjusting the brush member selectively to a plurality of operative or inoperative positions, said supporting means including a cover member substantially enclosing the brush member and its adjusting means, and said cover member having its lower edge cut away to expose the brush bristles at different positions of adjustment of the brush.

6. In suction cleaner nozzle construction, a floating brush member provided with bristles, means for adjustably supporting said brush member adjacent a nozzle wall exteriorly thereof, means for adjusting the brush member selectively to a plurality of operative or inoperative positions, said supporting means including a cover member substantially enclosing the brush member and its adjusting means, said cover member having its lower edge cut away to expose the brush bristles at different positions of adjustment of the brush, and said nozzle wall being provided with shallow recesses in its lip edge adjacent the brush, whereby air currents are drawn through the brush bristles, between the recessed nozzle lip and the surface being cleaned and into the nozzle at all times during operation of the cleaner, to maintain the brush bristles clean and clear of foreign matter in any adjusted position of the brush.

7. In suction cleaner nozzle construction, a brush member provided with bristles, means for supporting said brush member adjacent a nozzle wall exteriorly thereof, means slidably cooperating between the brush member and supporting

means mounting the brush member for movement in a plane located at an acute angle with respect to the plane of the nozzle lips, there being sufficient looseness in said cooperating slidable means to permit the brush member to rock on its longitudinal axis to positions angular with respect to said plane, means for adjusting the brush member selectively to a plurality of operative or inoperative positions, said supporting means including a cover member substantially enclosing the brush member and its adjusting and mounting means, said cover member having its lower edge cut away to expose the brush bristles at different positions of adjustment of the brush, and said nozzle wall being provided with shallow recesses in its lip edge; whereby air currents are drawn through the brush bristles, between the recessed nozzle lip and the surface being cleaned and into the nozzle air duct at all times during operation of the cleaner, to maintain the brush bristles clean and clear of foreign matter in any adjusted position of the brush.

8. In combination with a suction cleaning nozzle having walls forming a mouth adapted to be moved across a surface to be cleaned, a brush member provided with bristles, means for supporting the brush member adjacent to the nozzle mouth, means slidably cooperating between the brush member and supporting means mounting the brush member for movement in a plane located at an acute angle with respect to said surface to permit the brush to accommodate itself to the contour of said surface, and there being sufficient looseness in said cooperating slidable means to permit the brush member to rock to positions angular with respect to said plane on an axis parallel to the nozzle mouth by contact between the bristles and said surface when the nozzle is moved forwardly and rearwardly across the surface; whereby when the brush member rocks to one position upon forward movement of the nozzle, the bristles dig into said surface, and when the brush member rocks to another position upon rearward movement of the nozzle, the bristles move forwardly to a position in close proximity with the rear nozzle wall and break the seal between the rear nozzle wall and said surface.

9. A suction cleaning nozzle adapted to be moved across a surface to be cleaned, a brush member provided with bristles, means mounting the brush member rearwardly of the nozzle for slidable movement in a plane located at an acute angle with respect to said surface to permit the brush member to accommodate itself to the contour of said surface, and there being sufficient looseness in said mounting means to permit the brush member to rock to positions angular with respect to said plane on an axis parallel to the nozzle mouth by contact between the bristles and said surface when the nozzle is moved forwardly and rearwardly across the surface; whereby when the brush member rocks to one position upon forward movement of the nozzle, the bristles dig into said surface, and when the brush member rocks to another position upon rearward movement of the nozzle, the bristles move forwardly to a position in close proximity with the nozzle and break the seal between the nozzle and said surface.

10. In a suction cleaner nozzle construction, a floating brush member provided with bristles, walls forming an air duct through the nozzle, a wall forming with one of said walls a compartment separate from said air duct, means support-

ing the brush member within said compartment, and one of the walls being provided with passages adjacent to the brush bristles; whereby air currents are drawn through the brush bristles and into the air duct at all times during operation of the cleaner, to maintain the brush bristles clean and clear of foreign matter.

11. In a suction cleaner nozzle construction, a floating brush member provided with bristles, walls forming an air duct through the nozzle, a wall forming with one of said walls a compartment separate from said air duct, means supporting the brush member within said compartment, and one of the walls having its lower edge cut away adjacent to the brush bristles to expose the brush bristles to the action of air currents drawn into the air duct.

12. In a suction cleaner nozzle construction, a floating brush member provided with bristles, walls forming an air duct through the nozzle, a wall forming with one of said walls a compartment separate from said air duct, means supporting the brush member within said compartment, one of the walls being provided with passages adjacent to the brush bristles, and another of the walls having its lower edge cut away; whereby air currents are drawn through the brush bristles and into the air duct at all times during operation of the cleaner, to maintain the brush bristles clean and clear of foreign matter.

13. A nozzle for suction cleaners comprising a narrow elongated suction chamber and a narrow elongated brush chamber located adjacent each other and having independent mouths located side by side, air suction producing means communicating with said suction chamber, a brush located within said brush chamber having bristles at all times operatively engaging the working surface at one side of the suction mouth, there being a common lip between said mouths having provisions substantially at the working surface for admitting air from said brush chamber to said suction chamber, and said brush chamber having a communication with the outer air, whereby there is provided a movement of air through said brush bristles at all times during operation of the cleaner.

14. A nozzle for suction cleaners comprising an inlet mouth and a brush mouth distinct from each other and located side by side, each having a narrow elongated shape and there being a common lip between them, a suction connection to the inlet mouth, air suction producing means communicating with said suction connection, a brush located within said brush mouth, said brush being provided with bristles, said brush mouth having a communication with the outer air at a level above the floor, and said common lip having provisions establishing communication between said mouths substantially at the floor level, whereby there is provided a movement of air through said brush bristles at all times during operation of the cleaner.

15. In a suction cleaner, a suction chamber and a brush chamber having narrow elongated inlet mouths located side by side with a common lip between them for application to one and the same working surface and at all times communicating with each other under said lip and across and adjacent to said working surface, air suction producing means communicating with said suction chamber, a brush mounted within said brush chamber having bristles projecting sufficiently to at all times engage said working surface, and said brush chamber having a communication with the outer air above the level of said working surface, whereby there is provided a movement of air through said brush bristles at all times 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 with a common lip between them for application to one and the same working surface and at all times communicating with each other under said lip and across and adjacent to said working surface, a brush located in said brush chamber having bristles projecting sufficiently to at all times engage said working surface, means yieldingly supporting said brush to enable it to move in accordance with inequalities in the working surface, and said brush chamber having communication with the outer air above the level of said working surface.

EUGENE F. MARTINET.