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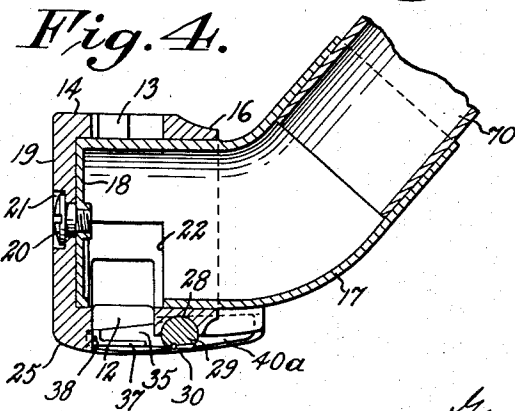
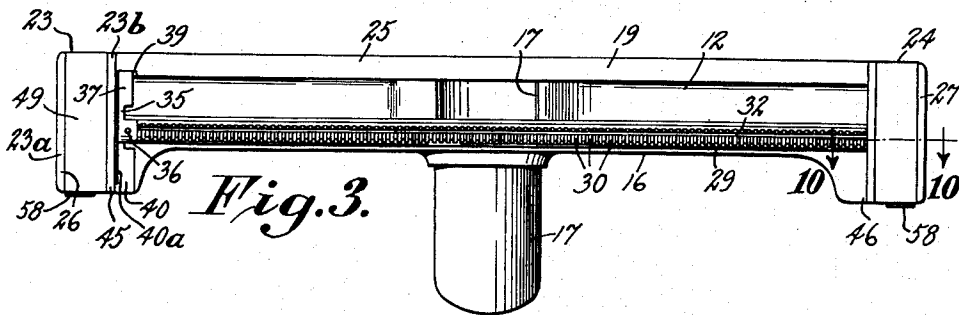
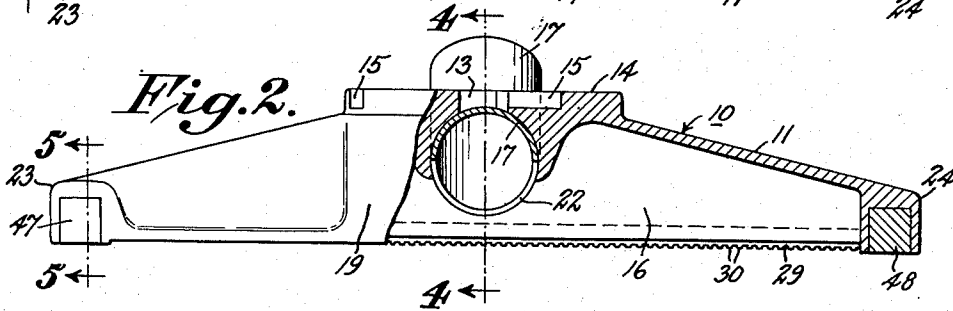
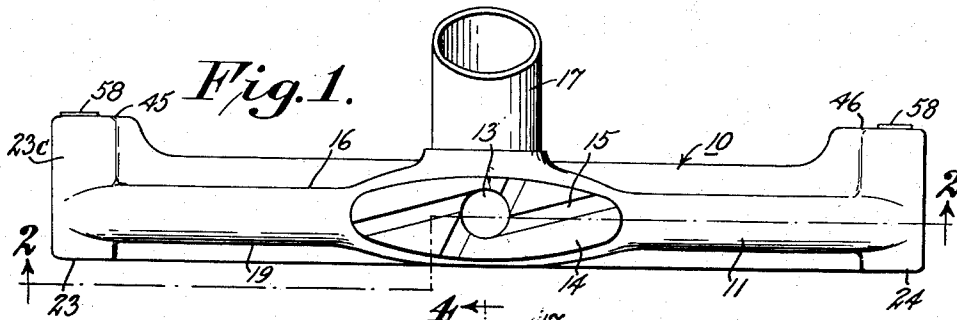
G. H. CRANMER

2,227,299

VACUUM CLEANER

Original Filed Jan. 28, 1937

3 Sheets-Sheet 1



INVENTOR

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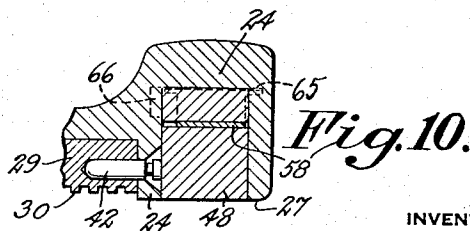
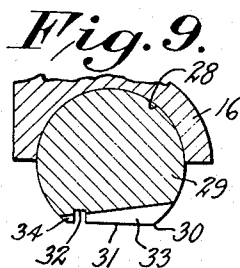
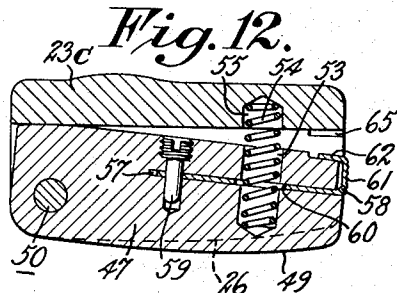
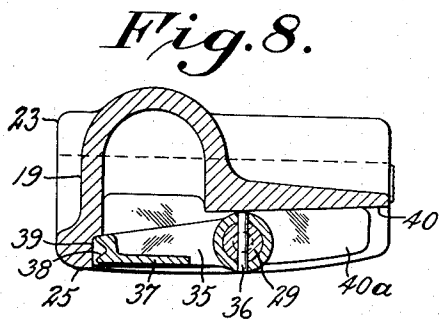
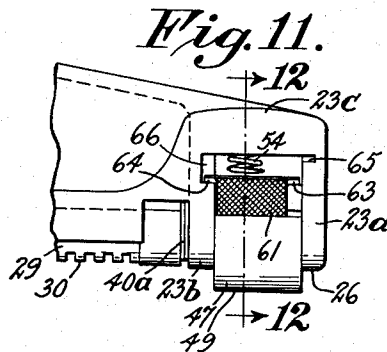
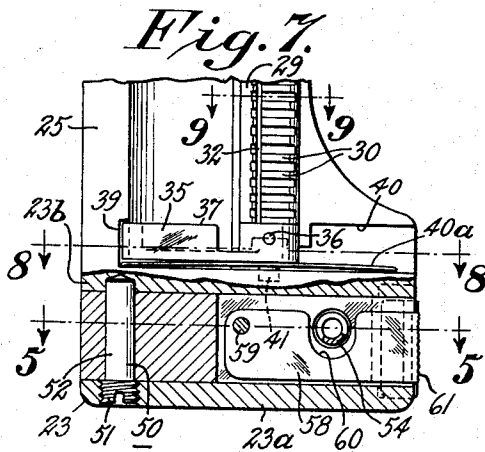
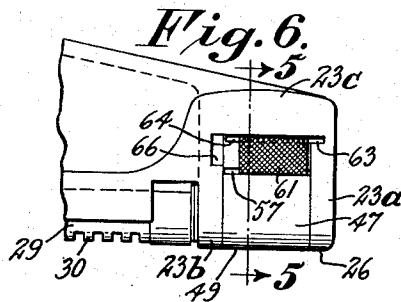
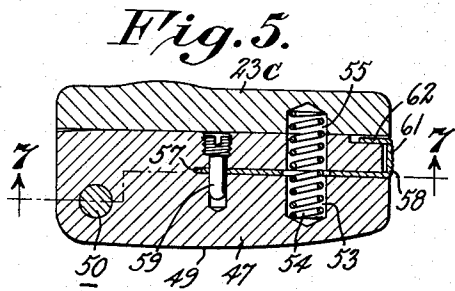
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3 Sheets-Sheet 2



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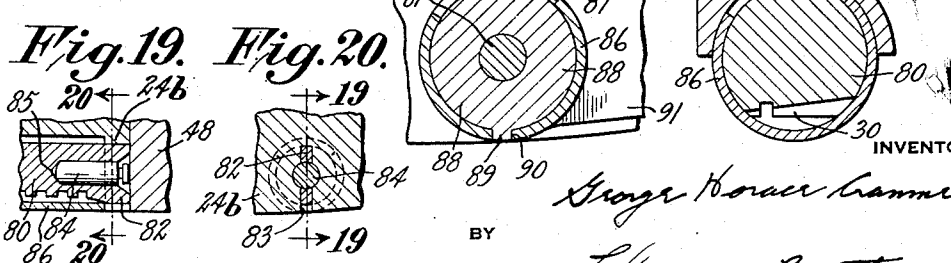
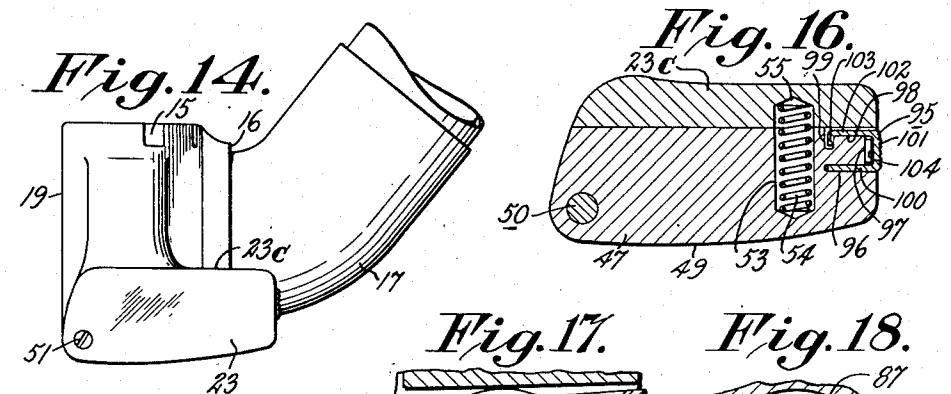
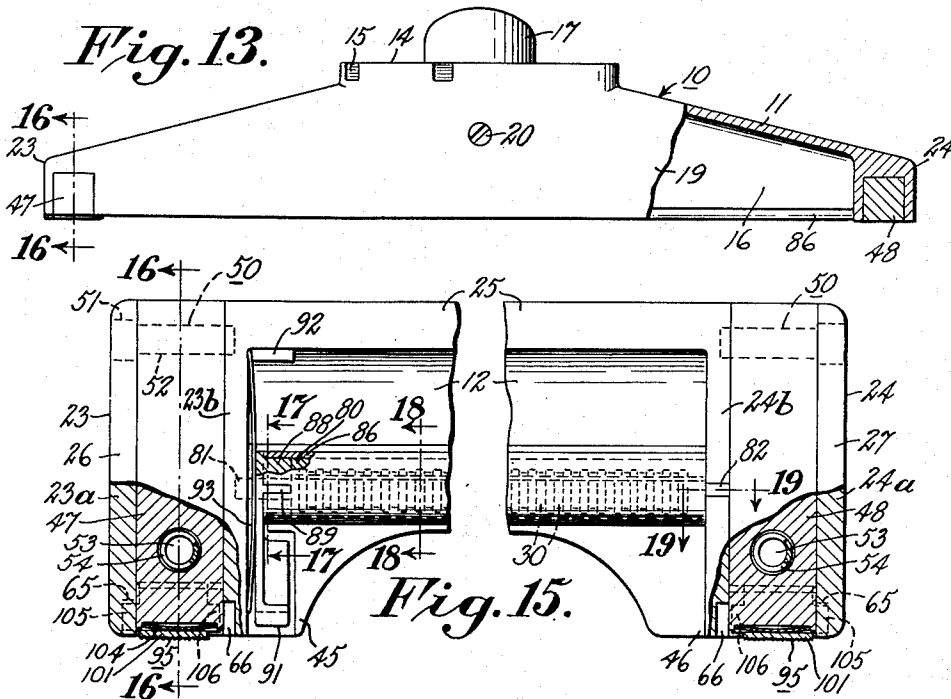
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VACUUM CLEANER

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3 Sheets-Sheet 3



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2,227,299

VACUUM CLEANER

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Original application January 28, 1937, Serial No. 122,691. Divided and this application December 6, 1937, Serial No. 178,199

4 Claims. (Cl. 15—157)

This application is a division of my co-pending application Serial No. 122,691 filed January 28, 1937.

My invention relates to vacuum cleaners and more particularly to suction nozzles for use in connection with vacuum cleaners.

One of the objects of my invention is to provide an improved thread picking lip for a nozzle, which is both efficient in removing threads and other objects which tend to adhere to the surface of the rug, and which will not become clogged by threads or any object removed from the rug.

Further objects and advantages of my invention will be apparent from the following description considered in connection with the accompanying drawings which form a part of this specification, and of which:

Fig. 1 is a top view of a preferred embodiment of my invention;

Fig. 2 is a front view, partially in cross-section of the nozzle shown in Fig. 1, and is taken along the line 2—2 thereof;

Fig. 3 is a bottom view of the nozzle shown in Figs. 1 and 2;

Fig. 4 is a cross-sectional view on an enlarged scale taken on the line 4—4 of Fig. 2;

Fig. 5 is a cross-sectional view on an enlarged scale taken on the lines 5—5 of Figs. 2, 6 and 7;

Fig. 6 is an enlarged view, as seen from the rear, of a portion of the nozzle shown in preceding figures;

Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 5;

Fig. 8 is a cross-sectional view taken on the line 8—8 of Fig. 7;

Fig. 9 is a cross-sectional view taken on the line 9—9 of Fig. 7;

Fig. 10 is a cross-sectional view on an enlarged scale taken on the line 10—10 of Fig. 3;

Fig. 11 is a view similar to Fig. 6, but with certain of the parts in a different position;

Fig. 12 is a cross-sectional view taken on the line 12—12 of Fig. 11 and is similar to Fig. 5, but shows certain of the parts in a different position;

Fig. 13 is a front view, partially in cross-section, of a second embodiment of my invention;

Fig. 14 is an end view of the nozzle shown in Fig. 13;

Fig. 15 is a bottom view, partially in cross-section, of the nozzle shown in Figs. 13 and 14;

Fig. 16 is a cross-sectional view taken on the lines 16—16 of Figs. 13 and 15;

Fig. 17 is a cross-sectional view taken on the line 17—17 of Fig. 15;

Fig. 18 is a cross-sectional view taken on the line 18—18 of Fig. 15;

Fig. 19 is a cross-sectional view taken on the lines 19—19 of Fig. 15 and Fig. 20; and

Fig. 20 is a cross-sectional view taken on the line 20—20 of Fig. 19.

Referring to the drawings, reference character 10 designates generally my improved nozzle. The nozzle 10 includes a hollow body member 11 provided with an elongated suction opening 12 at what is normally the bottom of the nozzle and a small circular opening 13 at what is normally the top of the nozzle. Opening 13 is formed in a substantially flat surface 14 provided with grooves 15 extending tangential to the opening. The rear wall 16 of the hollow body is formed with a circular opening which rotatably receives a hollow elbow member 17. The horizontal end of elbow 17 is closed by a wall 18 which abuts against the forward wall 19 of the body 11, and the elbow is secured in place by means of a screw 20 threaded into wall 18 and having a head received in a recess 21 formed in the forward wall. A portion of the cylindrical wall of elbow 17 in alignment with openings 12 and 13 is cut away, as is shown at 22. In the position of the parts shown, particularly in Fig. 4, opening 13 is closed by elbow 17 while opening 12 communicates with the interior of the elbow through the opening 22. If the nozzle body is rotated through 180° around elbow 17, thus bringing opening 13 to the bottom and opening 12 to the top, the opening 13 will communicate with the interior of the elbow while the opening 12 will be closed.

Opening 12 is bounded by rear wall 16, forward wall 19 and end walls 23 and 24. The lower edge or lip of forward wall 19 is preferably formed with a smooth face 25, while the lips of end walls 23 and 24 are likewise formed with smooth faces 26 and 27, respectively. Faces 26 and 27 are slightly arcuate, as may be seen particularly in Fig. 12. The lower edge of rear wall 16 is formed with a semi-cylindrical groove 28 in which is rotatably received a rod 29, as shown particularly in Figs. 4 and 9. A portion of the surface of rod 29 is smooth and cylindrical, while another portion thereof is formed with a plurality of teeth 30. The outer surface contacting faces 31 of the teeth are straight. A lengthwise slot 32 intersects teeth 30 dividing the teeth into outer portions 33 and inner portions 34. The depth of the cross-wise slots 35 formed between the teeth 30 varies from a maximum at the outer end of the slot

to a minimum at the inner end thereof which communicates with the nozzle opening 12. This reduction in depth results in a decrease in the cross-sectional area of each slot.

8 Rigidly secured to one end of rod 29 is an arm 35. The arm may be secured to the rod by means of a pin 36. The arm is provided with a finger engaging piece 37 and with a finger engaging notch 38. A recess 39 is formed in forward wall 19 for receiving arm 35 when in the position shown, and a recess 40 receives the arm when in a position substantially 180° from the first position. A flat spring 40a is disposed between arm 35 and end wall 23 for frictionally resisting turning of the arm and rod 29.

The end of rod 29 to which arm 35 is secured is formed with a cylindrical projection 41 which is adapted to be received in a cylindrical bore formed in end wall 23. The opposite end of rod 29 is formed with a recess into which extends a pin 42 carried by end wall 24. The rod 29 is thus rotatably retained within the semi-cylindrical groove 28 and may be turned through 180° by turning arm 35 against the friction of spring 40a. 25 With the arm in the position shown in Figs. 3, 4, 7 and 8 the teeth are exposed, while if the arm is rotated through approximately 180°, the teeth are turned to a position within the groove 28 and the smooth cylindrical face of the rod is exposed. Accidental rotation of the rod is prevented by spring 40a and, when the nozzle is on the floor, by the fact that the end of the arm 35 must project below the bottom of the nozzle in order to be turned from one position to the other.

35 End walls 23 and 24 extend rearwardly beyond rear wall 16 to form wing portions 45 and 46. The smooth faces 26 and 27 thus have a greater contact area than they would if the end walls terminated at rear wall 16. Each end wall is formed with a recess extending inwardly from its smooth face 45 and 46, respectively, and members 47 and 48 are movably positioned within these recesses. Inasmuch as members 47 and 48 are identical, only the member 47 located at the left end of the nozzle as viewed in Fig. 2 need be described. Member 47 is provided with a surface contacting face 49 which conforms in contour with the face 26 of end wall 23 and forms a substantial part of this face. Member 47 is pivotally secured within the recess by means of a pin 50 having a head 51 threaded into the outer portion 23a of end wall 23 and having a shank 52 extending through a cylindrical opening in member 47 and engaging a recess formed in the inner portion 23b of the end wall. Pin 50 is located about opposite the end of forward wall 19, that is, near the front of the nozzle.

Member 47 is formed with a bore 53 within which is received a coil spring 54. Spring 54 extends into a recess 55 formed in the upper horizontal portion 23c of the end wall 23. The effect of spring 54 is to yieldingly project member 47 to the position shown in Fig. 12 where its face 49 extends beyond the face 26 of the end wall.

65 Member 47 is formed with a slot 57 within which is received a flat portion of a latch member 58. A pin 59 is threaded into member 47 and extends through a circular hole in latch 58, whereby the latch is pivotable about the pin. The latch is formed with an opening 60 of sufficient size so that spring 54 may pass therethrough without contacting the latch regardless of the position of the latter. Latch 58 includes a knurled or roughened portion 61, at right angles to the flat portion, which may be contacted with the finger to pivot

the latch back and forth. From the upper part of portion 61 there extends another portion 62 having projections 63 and 64 at opposite sides. Outer portion 23a of the end wall is formed with a narrow slot 65 while inner portion 23b is formed with a comparatively wide slot 66. When the latch member is in the position shown in Fig. 6, with projection 63 received within narrow slot 65, it holds member 47 in a position with its face 49 flushed with face 26 of the end wall. On the other hand, when latch 58 is pivoted to the position shown in Fig. 11, projection 64 engages within slot 66 and limits the distance which spring 54 is able to project the member 47.

A rigid tubular member 70 is adapted to be secured within the outer end of elbow 17 and serves as a handle for moving the nozzle over the floor. Tubular member 70 also serves to connect the interior of elbow 17 with a suitable source of suction through the medium of a flexible hose. 20 The operation of the above described device is as follows:

For cleaning an ordinary rug, rod 29 is rotated to a position in which its smooth face is exposed. The nozzle, being connected to a source of suction as above described, is moved forward and backward over the surface. Air flows into the nozzle through the opening 12. A portion of this air is drawn through the material of the rug while the remainder passes underneath the nozzle lips. 30 Thus, dirt imbedded in the rug or lying on its upper surface is removed by the air and carried to the vacuum cleaner unit.

In the event that an occasional thread is encountered on the rug which adheres to the surface of the rug so strongly that the air flowing into opening 12 does not remove it, the nozzle body 10 may be rotated through 180° around elbow 17 so as to bring the small opening 13 into contact with the rug. The more concentrated flow 40 of air combined with the whirling produced by the tangential grooves 15 will remove the thread.

If there is a comparatively large number of threads on the rug, it would be inconvenient to go over the entire rug with the small nozzle opening 13. In this event, rod 29 is turned to the position shown particularly in Figs. 3, 7 and 9 so that the teeth 30 are exposed. Most of the air drawn into the nozzle now passes through the grooves 33 between the teeth. This results in a much greater flow of air under the rear lip than was the case previously when both the rear and the front lips were smooth. This greater flow of air is better able to remove threads, lint and other materials which cling to the surface of the rug. 55

Due to the fact that the cross-sectional area of grooves 33 decreases toward the inner ends of the grooves, the velocity of air increases as it passes through the grooves. This increased velocity near the inner ends of the grooves and in the region of lengthwise groove 32 tends to prevent threads and the like from getting caught in the lengthwise grooves, and around the inner portions 34 of the teeth. This effect is increased by locating the lengthwise grooves 34 close to the inner ends of the cross-wise grooves 33.

If the nozzle has a tendency to chatter as it is moved back and forth over the rug, latches 58 are moved from the position shown in Fig. 6 to that shown in Fig. 11, thereby releasing the spring-pressed members 47 and 48. The strength of spring 54 is such that, upon forward movement of the nozzle when the operator naturally bears down on tubular member 70, the members 47 and 48 are forced into the recesses so that the faces 75

49 are substantially flushed with the faces of the end walls, and the nozzle operates as above described. However, on the rearward stroke of the nozzle, the operator does not bear down on the tubular member 70 and the springs 54 are able to project the members 47 and 48 to the position shown in Fig. 12. In this position, the faces 49 project beyond the faces 26 and 27 of the end walls and thus raise the entire nozzle a slight distance from the floor. This distance is sufficient to raise the lengthwise lips from the rug, and hence these lips do not have to bend the nap, which, as previously stated, causes the chattering.

In Figs. 13 through 20 there is shown a nozzle in accordance with a second embodiment of my invention. This nozzle differs from that previously described chiefly with respect to, first, the toothed bar forming the rear lip of suction opening 12, and second, the latch device for the members 47 and 48. The members and elements which are similar in the two embodiments have been designated by the same reference characters and a repetition of the description thereof is not necessary.

In the embodiment now under consideration the toothed bar forming the rear lip of the nozzle is not rotatable, as it was in the first embodiment, but is rigidly fixed in the nozzle body. This rod, designated by reference character 80, is formed at one end with a portion 81 of reduced diameter which is received within an opening formed in portion 23b of the end wall 23. The other end of the rod is formed with two flattened wing portions 82 and, as will be seen particularly in Figs. 19 and 20, these wing portions are adapted to be received in a slot 83 extending upwardly from the bottom face of portion 24b of end wall 24. The central part of slot 83 is enlarged so as to receive a pin 84 which extends into a bore 85 formed in rod 80. Thus, the wing portions 82 received in slot 83 prevent rotation of the rod while pin 84, the diameter of which is bigger than the end portions of the slot 83, holds the wing portions in the slot. Pin 84 may be inserted before member 48 is secured in place. When the latter member is secured in place it prevents accidental removal of the pin.

Rotatably mounted on rod 80 is a tubular masking member 86. Member 86 is not a complete cylinder, but is formed with a portion cut away so as to provide an open space 87. The left hand end of member 86, as viewed in Fig. 15, encloses a bushing 88 rotatably mounted on the extension 81 of rod 80. Bushing 88 is formed with a rib 89 which engages within a slot 90 formed in masking member 86, whereby relative rotation between the bushing and the masking member is prevented. Integral with bushing 88 is a handle member 91 which may be rotated through approximately 180° from the position shown in Figs. 15 to a position in which the end of the handle is received in a recess 92. A spring 93 is disposed between bushing 88 and portion 23b of end wall 23 to prevent accidental rotation of the bushing.

In the position of the handle 91 and masking member 86 shown particularly in Figs. 15 and 18, the masking member serves to cover the teeth 30 of rod 80, thus presenting the smooth outer face of the masking member to the surface undergoing cleaning. If it is desired to employ the teeth 30, the handle 91 is turned through approximately 180°, as above described so as to bring the opening 87 of the masking member in alignment with the teeth 30, whereby the teeth are exposed.

The latch mechanism for members 47 and 48

includes a latch member 95 slidable with respect to the member 47 or 48. Inasmuch as both latch mechanisms are the same only the one used in conjunction with member 47 will be described. Member 47 is formed with a horizontally extending slot 96, a vertically extending recess 97, a horizontally extending recess 98, and a vertically extending slot 99. Latch member 95 includes a portion 100 disposed in slot 96, a portion 101 disposed in recess 97, a portion 102 disposed in recess 98 and a portion 103 disposed in slot 99. A spring 104 is disposed behind portion 101 within recess 97 and serves to prevent unintended movement of the latch member 95. Portion 102 of the latch member is formed with projections 105 and 106, which correspond to similar projections 63 and 64, shown particularly in Figs. 6 and 11. The length of the latch member is somewhat less than the width of member 47 whereby it may be slid with respect to member 47 so that projection 105 may extend into the narrow slot 65 formed in outer portion 23a of end wall 23, or so that projection 106 may extend into the wide slot 66 formed in the inner portion 23b of the end wall. With the latch in the former position, member 47 is held with its lower face 49 substantially flush with the lower face 26 of end wall 23. When the latch is moved to the latter position, that is with projection 106 extending into slot 66, spring 54 is able to pivot member 47 about pin 50 to an extent which is limited by the projection striking the bottom of the slot.

The embodiment just described may be used in the same manner to accomplish the same results as has been described in connection with the first embodiment. Consequently, a repetition of the description of the operation is not necessary.

While I have shown two more or less specific embodiments of my invention, it is to be understood that this has been done for purposes of illustration only, and that the scope of my invention is to be limited only by the appended claims when viewed in the light of the prior art.

What I claim is:

1. A suction nozzle including a hollow body having lips formed with surface contacting faces and defining a nozzle opening, the face of at least one of said lips being formed with a lengthwise groove and a plurality of grooves extending across said face and intersecting said lengthwise groove, the cross-wise grooves communicating at their inner ends with said nozzle opening and at their outer ends with the atmosphere and having a greater cross-sectional area at their outer ends than at their inner ends, the lengthwise groove being located closer to the inner ends of the cross-wise grooves than to their outer ends.

2. A suction nozzle as defined in claim 1 in which the cross-sectional area of the cross-wise grooves decreases substantially evenly from their outer ends toward their inner ends.

3. A suction nozzle including a hollow body having lips formed with surface contacting faces and defining a nozzle opening, the face of at least one of said lips including a substantially cylindrical member formed with two rows of teeth, the teeth of each row being separated by transverse grooves and the rows being separated by a longitudinal groove, the lower faces of said teeth being substantially flat, the transverse grooves communicating at their inner ends with said nozzle opening and at their outer ends with the atmosphere, the lengthwise groove being located closer to the inner ends of the transverse grooves than to their outer ends.

4. A suction nozzle including a hollow body having lips formed with surface contacting faces and defining a nozzle opening, the face of at least one of said lips including a substantially cylindrical member formed with two rows of teeth, the teeth of each row being separated by transverse grooves and the rows being separated by a longitudinal groove, the lower faces of said teeth being substantially flat, the transverse grooves

communicating at their inner ends with said nozzle opening and at their outer ends with the atmosphere and having a greater cross-sectional area at their outer ends than at their inner ends, the lengthwise groove being located closer to the inner ends of the transverse grooves than to their outer ends. 6

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