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U. A. WHITAKER

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SUCTION CLEANER

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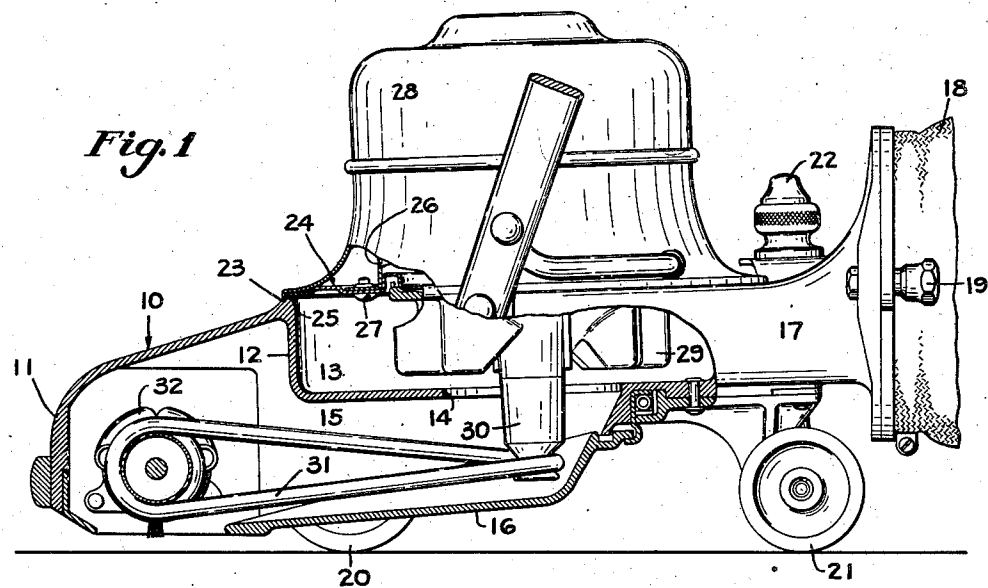
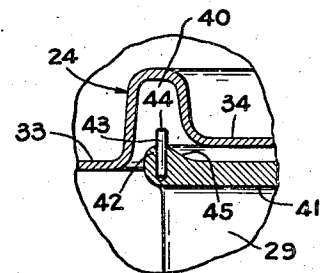


Fig. 2

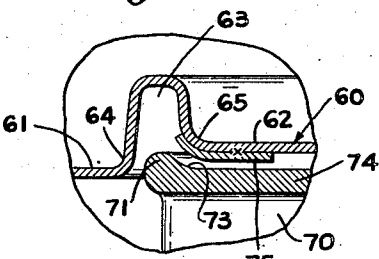


Fig. 3

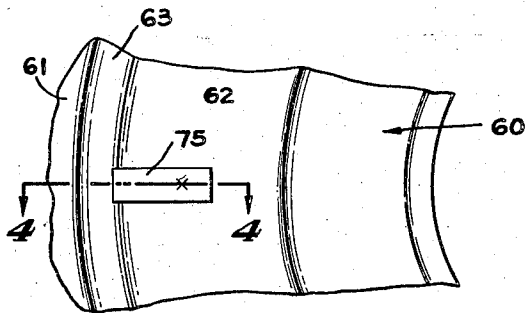


Fig. 4.

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SUCTION CLEANER

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10 Claims. (Cl. 230—117)

This invention relates to suction cleaners in general and in particular to a new and novel fan labyrinth for preventing accumulation of dirt at the back of the fan.

5 It is an object of the present invention to provide a new and improved suction cleaner construction. Another object is to provide a self cleaning fan labyrinth. A further object is to provide a fan labyrinth for a suction cleaner and having means for preventing the accumulation
10 therein of dirt removed from the floor covering being cleaned. Other objects and advantages of the invention will be apparent from the specification and drawing, wherein:

15 Figure 1 is a side elevational view partly broken away to illustrate one embodiment of the invention;

Figure 2 is an enlarged sectional view of the fan labyrinth construction shown in Figure 1;

20 Figure 3 is a sectional view of another embodiment of the invention and,

Figure 4 is a bottom view of Figure 3.

Referring to Figure 1, an embodiment of the invention is shown employed in a suction cleaner
25 which comprises a main casing 10 having a nozzle 11 and a fan casing 12 defining a fan chamber 13 having an inlet 14 communicating with the nozzle 11 through an air passageway 15 defined by the main casing 10 and a removable
30 cover plate 16. The fan chamber 13 communicates with an exhaust passage 17 which discharges into a dust bag 18 removably secured to the casing 10 by a pair of nut and bolt connections 19. The cleaner is supported on front and
35 rear wheels 20 and 21 respectively, the rear wheels being provided with height adjusting means 22 which function to raise and lower the nozzle relative to the surface being cleaned.

Secured to the upper rim 23 of the fan casing
40 12 is a plate 24 which closes the upper end of the fan chamber 13, and a gasket 25 is interposed between the plate 24 and the fan casing rim 23 to prevent leakage of air from the fan chamber 13. A stator frame 26 of an electric motor is secured by screws 27 to the plate 24 which func-
45 tions as the bottom plate of the motor, and arranged around the latter is a housing 28 secured to the rim 23 of the fan casing 12. Attached to the armature shaft is a fan 29 and a pulley
50 30 which carries a belt 31 extending to an agitator 32 rotatably mounted in the nozzle 11.

In order to form a fan labyrinth the motor bottom plate 24 has an outer portion 33 and an inner portion 34 arranged in different horizontal
55 planes, and formed therebetween is a labyrinth

groove 40 the outer side of which provides a seat for the stator frame 26 of the motor. The back
41 of the fan 29 is shaped in a new and novel manner, its peripheral edge being formed with a shallow circular flange or rim 42 which extends
5 upwardly to the entrance of the labyrinth groove 40 to the plane of the inner portion 34 of the labyrinth plate 24. A curved surface 45 is provided between the fan flange 42 and the back 41
10 of the fan to provide a gradual arcuate slope between the upper rim of the fan flange 42 and the fan back 41. A pin or lug 43 is provided in the fan flange 42 and extends upwardly from the latter a short distance, the top 44 of the pin 43
15 being spaced a relatively great distance from the upper and side walls of the labyrinth groove 40.

It has heretofore been the practice to provide the fan with an annular flange which projects into substantially the full length of the labyrinth groove. This construction permitted small fibers
20 and other foreign material to accumulate between the back of the fan and the motor bottom plate, and also to accumulate in the labyrinth groove. The accumulated foreign material formed frictional surfaces which acted as a
25 brake on the motor and eventually stalled the latter.

Now referring to the labyrinth construction in Figure 2 it will be seen that dirt will not accumulate in the labyrinth groove 40 or at the
30 curved surface 45 of the fan since the pin 43 rotates in the labyrinth groove 40 to dislodge the felting therefrom, and the curved surface 45 on the back of the fan 29 is of such a contour that the centrifugal force developed due to rotation of
35 the fan causes any dirt thereon to be discharged radially off of the fan back 41 into the labyrinth groove 40 where it is removed by the pin 43, and since the flange 42 is shallow the dirt cannot
40 pack tightly but is fragile and breaks away from the fan back 41 should it rub against the bottom plate 34. Accordingly, no additional load is placed on the motor.

Another embodiment of the invention is shown in Figures 3 and 4 and is adapted to be em-
45 ployed in the suction cleaner shown in Figure 1. This embodiment comprises a motor bottom plate 60 having portions in different horizontal planes, the outer portion 61 being below the plane of the inner portion 62. Formed in the plate 60 is a
50 labyrinth groove 63 having a peripheral edge 64 merging with the outer portion 61 and another peripheral edge 65 merging with the inner portion 62 of the plate 60.

Rotatable with respect to the labyrinth plate 55

60 is a centrifugal fan 70 having a peripheral flange 71 which is of such height as to extend upwardly to the entrance to the labyrinth groove 63 to the plane of the inner portion 62 of the labyrinth plate 60, and is spaced a relatively large distance from the defining walls of the labyrinth groove 63. A smooth curved surface 73 is provided between the fan flange 71 and the back 74 of the fan 70, whereby any dirt on the back of the fan will be discharged therefrom due to the centrifugal force developed by rotation of the fan and due to the low height of the flange 71, and the dirt will pass along the annular curved surface 73 and the flange 71 out of the labyrinth groove 63.

In order to clean and prevent felting from accumulating in the labyrinth groove 63 and dirt from packing between the fan back 74 and the bottom plate 60 a strip of metal 75 is welded to the stationary bottom plate 60. This litter clearing member 75 is elongated and extends to the entrance of the labyrinth groove 63 and opposite a portion of the back 74 of the fan 70, to thereby remove and prevent accumulation of foreign matter in the labyrinth groove 63 and between the fan and bottom plate 60.

From the foregoing it will be perceived that my invention provides a labyrinth cleaning mechanism and prevents accumulation of foreign matter between the fan and the motor bottom plate, and accordingly, prevents dirt from entering any motor bearings at the back of the fan on the armature shaft.

I claim:

1. In a suction cleaner, means defining a fan chamber, means defining a channel in said fan chamber defining means and open to said fan chamber, a fan in said fan chamber, a motor for rotating said fan, and means depending from said fan chamber defining means and disposed at the entrance to the opening of said channel to prevent the accumulation of dirt in said channel.

2. In a suction cleaner, means defining a fan chamber, means defining a channel in said fan chamber defining means and open to said fan chamber, a fan in said fan chamber, a motor for rotating said fan, and means depending from said fan chamber defining means and disposed at the entrance to the opening of said channel and along the back of said fan for preventing the accumulation of dirt in said channel and between said fan chamber defining means and the back of said fan.

3. In a fan casing defining a fan chamber, means defining one end of said fan chamber and having a circular channel open to said fan chamber, a centrifugal fan in said fan chamber and adapted to be rotated therein, and pin means upstanding from the back of said centrifugal fan and disposed at the entrance to the opening of said channel and adapted to be rotated with said fan to prevent accumulation of dirt in said channel.

4. In a fan casing defining a fan chamber, stationary means defining one end of said fan chamber and having a circular channel open to said fan chamber, a centrifugal fan in said fan chamber and adapted to be rotated therein, and means secured to said means defining said one

end of said fan chamber and disposed at the entrance to the opening of said channel and between the back of said centrifugal fan and the means defining said one end of said fan chamber to prevent the accumulation of dirt in said channel and between said fan back and said one end of said fan chamber.

5. In a fan casing forming a fan chamber, means defining one end of said fan chamber and having a circular channel open to said fan chamber, a fan having a wall and disposed in said fan chamber and adapted to be rotated therein, a shallow rim on said fan wall and disposed at the entrance to said channel, means defining a curved surface extending from the upper extreme end of said rim to the wall of said fan, and a pin projecting from said rim into said channel.

6. In a fan casing forming a fan chamber, means defining one end of said fan chamber and having a circular channel open to said fan chamber, a fan disposed in said fan chamber and adapted to be rotated therein, a rim on said fan and disposed at the entrance to said channel, and a pin projecting from said rim into said channel.

7. In a fan casing forming a fan chamber, means defining one end of said fan chamber and having a circular channel open to said fan chamber, a fan having a wall and disposed in said fan chamber and adapted to be rotated therein, a shallow rim on said fan wall and disposed at the entrance to said channel, and means defining a curved surface extending from the upper extreme end of said rim to the wall of said fan.

8. In a fan casing forming a fan chamber, means defining one end of said fan chamber and having a circular channel open to said fan chamber, a fan in said fan chamber and adapted to be rotated therein, and pin means projecting from said fan and disposed in said channel to remove foreign material from said channel when said fan is rotated, said pin means providing substantially point contact with the foreign material to remove the latter from said channel.

9. In a fan casing defining a fan chamber, means defining a wall of said fan chamber and having a circular channel open to said fan chamber, a fan in said fan chamber and adapted to be rotated therein, an upstanding flange on said fan disposed at the entrance to said channel, and means interposed between said channel and said flange, said means projecting into said channel for removing foreign material therefrom.

10. In a fan casing defining a fan chamber, means defining a wall of said fan chamber and having a circular channel open to said fan chamber, said wall having inner and outer portions offset in different planes at opposite sides of said channel to define the entrance to the latter, a fan in said fan chamber and adapted to be rotated therein, and an upstanding flange on said fan disposed at said entrance to said channel, said outer offset portion of said fan wall enclosing said flange and said inner offset portion of said fan wall being substantially in the same plane as the extreme end of said flange to prevent accumulation of dirt between said fan chamber wall and fan.