June 18, 1940. F. RIEBEL, JR., ET AL 2,204,912

VACUUM CLEANER

Filed Oct. 16, 1936

Fig. 2

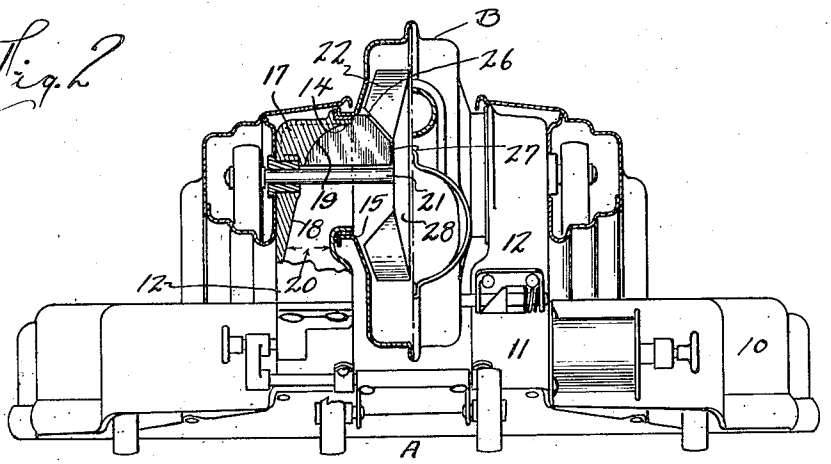



Fig. 1

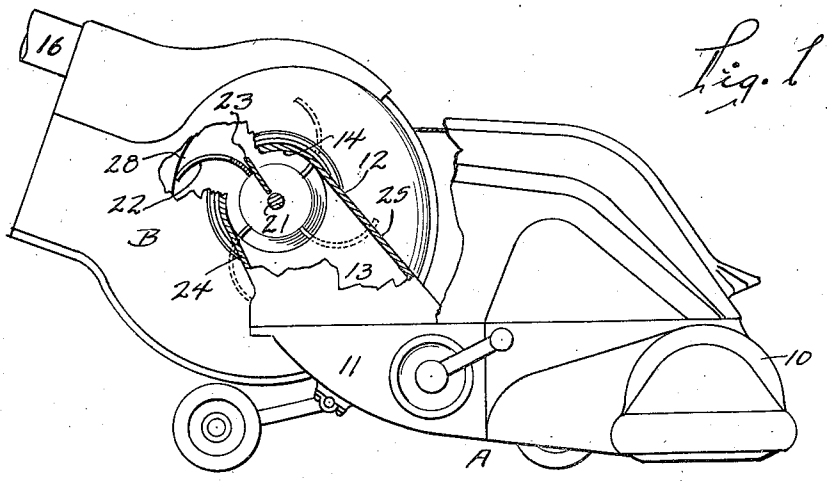
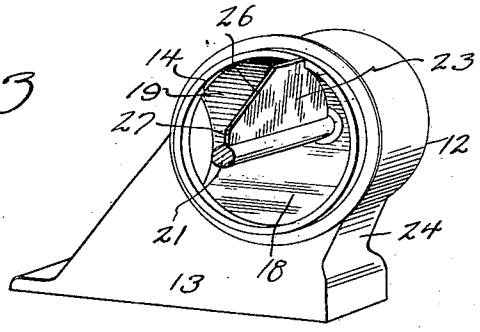



Fig. 3




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Patented June 18, 1940 2,204,912

# UNITED STATES PATENT OFFICE

2,204,912

## VACUUM CLEANER

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Application October 16, 1936, Serial No. 105,993

6 Claims. (Cl. 15—16)

This invention relates to suction cleaners of the type disclosed in application Serial Number 74,012, now Patent No. 2,168,899, in the name of Dewey M. Dow, and has for its object to improve upon the air passage arrangement in a cleaner of that type, i. e., one in which the fan casing is disposed in the vertical plane extending longitudinally of the cleaner, its axis transverse and horizontal, and in which the inlet or inlets of the fan casing are connected to the suction chamber by means of an elbow or elbows traversed by the fan shaft.

Considerable difficulty has been experienced in this type of cleaner with the clogging of the elbows adjacent the fan inlets. This is due to the fact that the air passage within the elbows makes a right angled bend and the fan shaft traverses such air passage at such bend so that lint, hairs, threads, etc., which are thrown against the bends in the elbows tend to wrap around the shaft at that point.

The present invention provides two features of improvement for eliminating this difficulty. In the first place, the outer wall of the elbow is thickened at the bend so that the inner surface thereof is inclined and curved toward the outlet, constricting the passage ahead of the shaft, so as to increase the velocity of the air currents and speed them up as they impinge the shaft, and to deflect the air currents toward the outlet of the elbow and into the inlet of the fan casing, doing away with any currents at the bend in the elbow.

In the second place, the invention provides a thin flat rib or blade secured in the elbow and projecting along the shaft in closely spaced relation thereto, into the fan so as to form a radial partition in the air passage, completely dividing the same, as it is considered as comprising a space extending circumferentially around the shaft so that air currents which would usually tend to whirl spirally around the shaft in response to the rotation of the fan blades will be prevented from thus whirling, and will be forced to pass into the fan in directions at all times parallel to the axis of the air passage through the elbow. The whirling action of the air currents creates a vortex effect which tends to draw the hairs, threads, etc., to the center of the axis of rotation, i. e., against the shaft. By breaking up this vortex this tendency of threads to be sucked toward the shaft is largely eliminated and also the movement of the threads circumferentially of the shaft, allowing them to adhere to the shaft is completely eliminated. In addition to this effect the blade acts as a physical barrier to prevent the threads passing around the shaft. The threads, hairs, etc., will contact against the blade, but will be stopped from passing circumferentially around the shaft, and will thence be swept longitudinally of the smooth sides of the blade by the air currents into the fan.

Further objects will appear in the perusal of the following detailed description of the invention in connection with the accompanying drawing in which:

Fig. 1 is a side elevation of a suction cleaner embodying the invention, parts being broken away and shown in section to better illustrate the construction,

Fig. 2 is a transverse sectional view of the same, and

Fig. 3 is a perspective view of one of the elbows.

A suction cleaner embodying the present invention comprises generally a suction chamber A and a fan casing B. The suction chamber A comprises an agitator chamber 10, a throat region 11, and a pair of elbows 12 having inlet regions 13 communicating with the throat 11 and outlets 14 communicating with the inlets 15 of the fan casing B. The fan casing B may be swivelled upon the outlets 14 of the elbows and a handle 16 thus rigidly attached to the fan case. It is immaterial, however, to the present invention whether the fan casing is swivelled or stationary with relation to the elbows 12 as long as the elbows, making a right angled bend in the air passage as it enters the fan case, are employed.

In the cleaner shown in the Dow application identified above, the air passages within the elbows constitute rather sharply defined right angle bends. According to the present invention the corner of each elbow is filled in as at 17 so that the inner surface 18 of the outer wall of the elbow is inclined inwardly toward the outlet 14 and the fan casing inlet 15. The inner surface 18 is connected with the outlet 14 by a curved region 19 eliminating all sharp bends in the air passage with the elbow. The inclination of the surface restricts the air passage at 20. This increases the velocity of the air current as it approaches the shaft 21 of the fan 22. The filling in of the corners and the rounding thereof as at 19 eliminate eddy currents which have previously tended to retain the threads, hairs, etc., in the region of the rotating shaft 21. The inclination of the surface 18 deflects the air current toward the fan case inlets 15.

Thus the difficulty of foreign material clogging at the bend of the elbows is largely eliminated.

In order to completely eliminate the difficulty and insure against any possible winding of threads on the shaft, the invention provides a thin rib or blade 23 either cast integrally with the elbow 13 or formed of a separate sheet of material and cast into the thickened region 17 of the elbow. The outlines of the separate blade where it is embedded in the elbow are indicated in dotted lines in Fig. 2.

The blade 23 is positioned slightly on one side of the shaft 21.

It is positioned on a plane which is radial with respect to the axis of the outlets 14 and which substantially bisects the planes of the side walls 24 and 25 of the elbow. Thus the plane of the blade is substantially parallel to the longitudinal axis of the inlet portion 13 of the elbow.

The blade projects beyond the outlets 14 of the elbow. Its outer end is mitered as at 26 to fit the conventional inclination of the inner edges of the blades of the fan 22. It is cut off square at the end as at 27 to lie closely adjacent the face of the fan skirt 28. Its inner longitudinal edge is straight and is spaced a slight distance from the fan shaft 21.

While the space between the blade and the fan shaft would be ample to allow a hair or thread to pass the likelihood of this happening is practically nil in view of the fact that even though one end of a hair or thread might start to enter this space the remainder of the hair or thread would be thrown against the side face of the blade and thereby stopped against further circumferential movement, whereupon the air currents wiping the face of the blade would wipe off the hair or thread and carry it into the fan. Furthermore, as has been previously noted, the blade completely prevents any spiral movement of the air currents within the elbow or within the eye of the fan. It is not until after the air currents have entered the path of the fan blades that they are allowed to move in a spiral direction. Any thread or hair or other piece of foreign material having reached the path of travel of the blades, will be thrown to the periphery of the fan case and thence carried to the outlet, and will have no change to wrap around the fan shaft.

We claim as our invention:

1. In a vacuum cleaner, a fan casing, a centrifugal fan therein, an elbow forming an air passage to the intake of said fan casing, a shaft on which said fan is mounted, passing through said elbow at the bend thereof, the inner face of the outer wall of said elbow being inclined toward the outlet of the elbow, and means in said elbow extending across the casing and into immediate proximity of the fan to prevent movement of the air currents therein circumferentially and fouling of the outlet, including a member secured in the elbow and contiguous to the fan and the shaft therefor.

2. In a vacuum cleaner, a fan casing, a centrifugal fan therein, an elbow having outlets communicating with the inlets of the fan casing, a shaft on which said fan is mounted, said shaft passing through the elbow at the bend thereof, and means extending across the casing and into immediate proximity of the fan within the elbow for preventing spiraling of the air currents and fouling of the elbow as the air currents pass through, including a member secured in the elbow and contiguous to the fan and the shaft therefor.

3. In a vacuum cleaner, a fan casing, a centrifugal fan therein, an elbow having outlets communicating with the inlets of the fan casing, a shaft on which said fan is mounted, said shaft passing through the elbow at the bend thereof, a thin partition wall in said elbow, lying on one side of the shaft remote from the inlets of the elbow and extending across the casing and into immediate proximity of the fan, and preventing spiraling of the air currents within the elbow outlet, said wall also preventing fouling of the elbow.

4. In a vacuum cleaner, a fan casing, a centrifugal fan therein, an elbow having outlets communicating with the inlets of the fan casing, a shaft on which said fan is mounted, said shaft passing through the elbow at the bend thereof, and a partition wall in the elbow positioned radially of the axis of the outlet thereof extending across the casing and into immediate proximity of the fan, and preventing spiraling of the air currents in said outlet and fouling of the elbow.

5. In a vacuum cleaner, a floor tool, a pair of trunnions mounted on said floor tool having an inlet and an outlet, a fan case rotatably mounted on said trunnions, a fan rotatably mounted in said fan case carried by a shaft journaled in said trunnions, the interior of said trunnions being built up opposite said outlet to remove corners and bends therefrom, and a partition wall secured in said built up portion of said trunnion disposed radially of said shaft and projecting beyond said outlet and into the eye of the fan.

6. In a structure as defined in claim 5, in which the built up portion of the trunnions is constructed and arranged such that the inlet of the air passage is shaped and restricted to increase the velocity of the air through the passage.

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