



## UNITED STATES PATENT OFFICE

2,057,499

## VACUUM CLEANER

Carl F. Nystrom, Springfield, Mass., assignor to  
Westinghouse Electric & Manufacturing Com-  
pany, East Pittsburgh, Pa., a corporation of  
Pennsylvania

Application December 20, 1934, Serial No. 758,371

9 Claims. (Cl. 15—8)

My invention relates to vacuum cleaners and particularly to rotary brushes used in such cleaners.

An object of my invention is to provide means for absorbing the vibration and deadening the sound accompanying such vibration caused by the rotary brush of a vacuum cleaner.

Another object of my invention is to provide a resilient support for rotary brushes of vacuum cleaners to dampen both lateral and longitudinal vibrations of the rotary brush occurring during operation of the cleaner.

Other objects of my invention will either be apparent from a description of one form of device embodying my invention, or will be specifically pointed out hereinafter.

In practicing my invention, I provide, in combination with the rotary brush of a vacuum cleaner located in the nozzle casing thereof, a sleeve bearing at each end of the rotary brush, and mount the bearing sleeve in a bearing housing, of substantially cup-shape, which bearing housing is covered with a tightly adherent coating of a resilient material, such as rubber. I provide further a resilient metal clip to support and hold the bearing housing at each end of the brush, which resilient clip is coated, on its outside surface, with a resilient material, such as rubber.

In the single sheet of drawing:

Figure 1 is a view, mainly in front elevation, of a vacuum cleaner, with a part thereof cut away to show the internal construction thereof and embodying my invention;

Fig. 2 is a view in side elevation of the device shown in Fig. 1 of the drawing with a part cut away to show the assembly embodying my invention;

Fig. 3 is a fragmentary view partly in front elevation and partly in longitudinal section of the device particularly embodying my invention; and

Fig. 4 is an enlarged view in lateral section therethrough and taken on the line IV—IV of Fig. 1 of the drawing.

One of the most common types of vacuum cleaners is that which embodies a rotary brush, which is located in the mouth of the nozzle casing, in order that it may not only beat the fibrous material, such as a rug, which is to be cleaned but also to assist in removing short pieces of thread, lint or small pieces of cloth of a fibrous nature from their engagement with the rug or carpet with the surface of which it has become enmeshed. As long as the bristles

on such a rotary brush are located thereon in other than straight longitudinal lines, there was little or no tendency for any lateral vibration of the shaft to occur, at least so far as might have been caused by the bristles. However, where the bristles are so located as to extend in a straight line longitudinally of the brush, there is a tendency for the brush to vibrate, since it operates at rather high speeds, which vibration will cause wear of the bearing parts and will also cause noise.

Referring to Figs. 1 and 2 of the drawing, I have there illustrated a vacuum cleaner comprising a nozzle casing 11, which is either integral with or secured to the front face of a fan casing 13, in which is located, in a manner well known in the art, a suction fan, which fan is driven by an electric motor located in a motor housing 15. Since my invention has nothing to do with the fan or the motor, I have elected to show the body structure of a vacuum cleaner in outside views only.

The fan casing 13 may be provided with a lateral and rearwardly extending portion 17, of tubular shape, and to which is adapted to be connected, in a manner well known in the art, a removable dust bag 19. The path of air sucked in is through the mouth of the nozzle casing 11 upwardly and through the fan casing 13 and then to one side thereof into the tubular outlet 17 and from there into the dust bag 19.

A plurality of rear wheels 21 may be located adjacent to and beneath the rear end of motor housing 15 and a pair of front wheels 23 are also provided which may be located in lateral chambers 25 formed in the nozzle casing 11. The position of wheels 23 at the front of the vacuum cleaner relatively to the nozzle casing 11 and particularly relatively to the lower edge thereof may be adjusted by mechanism including a manually adjustable lever arm 27 pivotally mounted on the fan casing 13 on a pivot pin or stud 29 and having a recessed surface 31 of arcuate shape adapted to be engaged by a resilient detent or pawl 33. The front-wheel adjusting means includes also a shaft 35 which is connected by suitable linkage (not shown) to lever arm 27 and also to wheels 23. Guards for the lower edge or mouth of the nozzle casing 11 are provided in the form of resilient members 37 of substantially U-shape, as are shown more particularly in Fig. 1 of the drawing.

A rotary brush structure includes a body portion 39 having inserted therein a plurality of tufts of bristles 41 in any manner now known

in the art. The rotary brush includes also either a single shaft 43 extending through the entire length of the body 39 or it may include a pair of short stub shafts fitting into body 39 at each end and extending thereinto for a short distance only.

A sleeve bearing 45 is provided to support the free or clear parts of the respective shaft ends 43 and I may use a spacing washer 47 between the inner face of sleeve bearing 45 and a reduced end portion 49 of the rotary brush. It is thus possible to take care of slight variations in the dimensions of the cooperating parts by the use of spacing washers 47 of different thicknesses.

A bearing housing 51, of cup-shape, surrounds the bearing sleeve 45 and is made long enough axially of the brush to extend well over the part 49 of reduced diameter in order to prevent the entrance of dust and lint into the bearing structure. The bearing housing 51 has secured thereto over its entire outer surface a thin layer of a resilient material 53, such as rubber. This coating or covering extends not only around the peripheral portion of housing 51 but also at the intermediate end portion thereof, and the thickness thereof is made such that its outer face will come into relatively close operative engagement with the inner face of wall 55, which defines one end of the auxiliary chamber 25 hereinbefore described.

I provide further a resilient clip 57 which is, in general, of substantially U-shape, and which has an intermediate flattened portion 59 having an opening therethrough to receive a clamping or securing screw 61, which screw extends into an inwardly extending flange or bracket 63 integral with wall 55. Another portion of the supporting clip 57 is of substantially arcuate shape, as will be seen more particularly in Fig. 4 of the drawing, to cooperate with the outer arcuate surface of the bearing housing, and more particularly with a portion of the cover 53 of resilient material.

The outer surface of the resilient supporting clip 57 is covered with a layer of a resilient material 64, such as rubber. I provide a holding, or clamping screw 65 in order to adjustably press the longer part of clip 57, and particularly that portion thereof of arcuate shape against the bearing housing 51 and its cover 53.

The rotary brush assembly, including the bearing housing 51, can be easily and quickly removed from its location in the nozzle casing, so that the brush may be inspected when away from the nozzle whenever desired.

In the case of a rotary brush in which the rows of tufts of bristles extend in a straight line axially of the brush, there will be some tendency to lateral vibrations of the brush relatively to its bearings, and where the bearings of the respective ends of the rotary brush are located in a bearing housing which is provided with a resilient or yielding cover, the greater part of this vibration will be absorbed by the resilient covering. The use of a supporting clip having associated therewith a resilient coating has the further or additional tendency to prevent vibration or to absorb such vibrations and at the same time these resilient coatings will act as a sound deadening means.

When the vacuum cleaner is moved angularly relatively to its lateral axis, as may occur at times, there may be a tendency for longitudinal vibrations to occur, and that part of covering 53

engaging one face of wall 55 will act to absorb or prevent such longitudinal vibrations.

I prefer to use a relatively thin layer of rubber on the bearing housing and on the supporting clip, which layer of rubber is molded to the metal to be tightly adherent thereto.

I have illustrated a handle to be operatively associated with a vacuum cleaner in the form of a fork 67, which fork is pivotally mounted as at 69 on the motor housing, and a latch plate 71 may be provided in a manner well known in the art to hold the handle in a plurality of positions relatively to the body of the vacuum cleaner when the same is stored. Means for energizing the motor are shown as including a supply circuit conductor cord 73 and a plug 75 which fits into a casing 77 in which is located a connecting socket, all in a manner well known in the art.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are set forth in the appended claims.

I claim as my invention:

1. In a vacuum cleaner, the combination with a nozzle casing having a bracket therein, a rotary brush in said nozzle casing, and a bearing housing, of cup-shape, for the rotary brush, of a resilient casing, of cup-shape, surrounding the bearing housing, and means suspended from said bracket for supporting said resilient casing in the nozzle casing.

2. In a vacuum cleaner, the combination with a nozzle casing having an arched bracket therein, a rotary brush in said nozzle casing, and a bearing housing, of cup-shape, for the rotary brush, of a resilient casing, of cup-shape, surrounding and tightly adherent to the outer surface of the bearing housing, and a resilient clip suspended from said bracket for supporting said resilient casing in the nozzle casing, said resilient casing also contacting one portion of said arched bracket.

3. In a vacuum cleaner, the combination with a nozzle casing, a rotary brush in said nozzle casing developing lateral unbalanced forces during rotation and a bearing for the rotary brush, of a bearing housing, of cup-shape, for the bearing and a cup-shaped layer of resilient material around the bearing housing to dampen both lateral and longitudinal movements of the brush and the bearing.

4. In a vacuum cleaner, the combination with a nozzle casing having a bracket therein, a rotary brush in said nozzle casing developing lateral unbalanced forces during rotation and a bearing for the rotary brush, of a bearing housing, of cup-shape, for the bearing, a cup-shaped layer of resilient material around the bearing housing to dampen lateral vibrations of the brush and of the bearing and a resilient member including vibration-damping means suspended from said bracket for supporting the bearing housing.

5. In a vacuum cleaner, the combination with a nozzle casing, a rotary brush in the nozzle casing, a pair of bearings at the respective ends of the rotary brush subjected to both lateral and longitudinal unbalanced forces during operation of the vacuum cleaner, of bearing housings, of cup-shape, around the respective bearings, a cup-shaped layer of rubber around the outside surface of the respective bearing housings to dampen both lateral and longitudinal vibrations

of the brush and to reduce noise resulting from such vibrations, and a resilient support for the bearing housing having a layer of rubber thereon to dampen lateral vibrations of the brush and of the bearing housing.

6. In a vacuum cleaner, the combination with a nozzle casing having an integral bracket therein, a rotary brush in the nozzle casing, a pair of bearings at the respective ends of the rotary brush subjected to both lateral and longitudinal unbalanced forces during operation of the vacuum cleaner, of bearing housings, of cup-shape, around the respective bearings, a cup-shaped layer of rubber around the outside surface of the respective bearing housings to dampen both lateral and longitudinal vibrations of the brush and to reduce noise resulting from such vibrations, a resilient clip suspended from said bracket for supporting the bearing housing having a layer of rubber thereon to dampen lateral vibrations of the brush and of the bearing housing, and a single member for securing said bracket to said suspended clip and rubber layer thereon.

7. In a vacuum cleaner, the combination with a nozzle casing having a plurality of arched integral brackets therein, a rotary brush in the nozzle casing, a pair of bearings at the respective ends of the rotary brush subjected to both lateral and longitudinal unbalanced forces during operation of the vacuum cleaner, of bearing housings, of cup-shape, around the respective bearings, a cup-shaped layer of rubber around the outside surface of the respective bearing housings to dampen both lateral and longitudinal vibrations of the brush and to reduce noise resulting from such vibrations, a resilient clip suspended from said brackets for supporting the bearing housing having a layer of rubber thereon to dampen

lateral vibrations of the brush and of the bearing housing, and a single member for securing each bracket to the adjacent suspended clip and rubber layer thereon, said layer of rubber on each bearing housing also contacting a portion of the adjacent arched bracket below said single securing member.

8. In a vacuum cleaner, the combination with a nozzle casing, a rotary brush in the nozzle casing, a bearing for said brush subjected to both lateral and longitudinal unbalanced forces during operation of the vacuum cleaner, of a housing of cup shape around said bearing, a cup-shaped layer of resilient material around said bearing housing to dampen both lateral and longitudinal vibrations of the brush and to reduce noise resulting from such vibrations, and means including elongated longitudinally movable means for securing said bearing housing and layer of resilient material therearound in operative position.

9. In a vacuum cleaner, the combination with a nozzle casing, a rotary brush in the nozzle casing, a bearing for said brush subjected to both lateral and longitudinal unbalanced forces during operation of the vacuum cleaner, of a housing of cup shape around said bearing, a cup-shaped layer of resilient material around said bearing housing to dampen both lateral and longitudinal vibrations of the brush and to reduce noise resulting from such vibrations, and means including elongated longitudinally movable means for securing said bearing housing and layer of resilient material therearound in operative position, said resilient layer also frictionally contacting a portion of said nozzle casing for further support.

CARL F. NYSTROM.