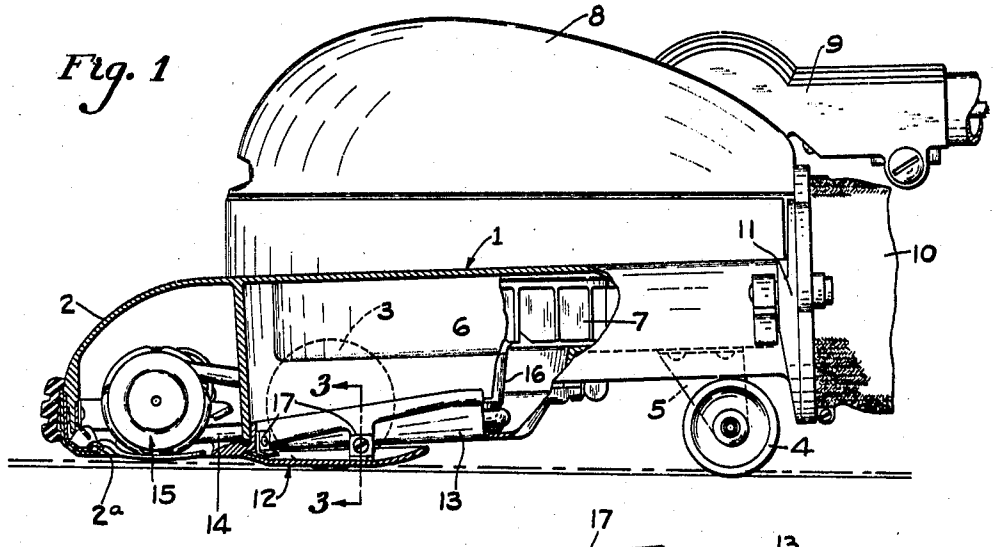
Feb. 25, 1941. R. S. BOYLE 2,232,766

SUCTION CLEANER

Filed Feb. 2, 1938

Fig. 1



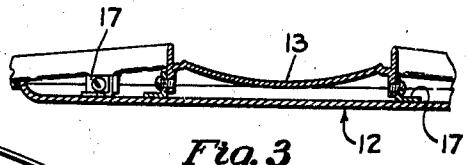


Fig. 3

Fig. 2

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SUCTION CLEANER

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3 Claims. (Cl. 15—16)

This invention relates to improvements in suction cleaners and more particularly to means for maintaining the nozzle of a suction cleaner substantially at a constant height above the surface of the floor covering to be cleaned regardless of its quality, texture or other characteristics.

It has been the standard practice to equip suction cleaners with some form of mechanism or device for adjusting the height of the nozzle for different grades of carpet to compensate for varying depths to which the wheels will sink into the nap depending on the depth and thickness thereof.

The object of the present invention is to provide a suction cleaner with a carpet contacting member in the form of a flat plate capable of gliding over the surface without appreciable penetration in the carpet nap while supporting the load which otherwise would tend to depress the forward or nozzle portion of the cleaner.

A preferred embodiment of the invention is fully disclosed in the accompanying drawing in which:

Figure 1 is a general view in side elevation of a suction cleaner equipped with the nozzle height regulating means, with portions shown in vertical section as taken on line 1—1 of Figure 2;

Figure 2 is a bottom plan view of the cleaner showing the contact plate; and

Figure 3 is a detail view in vertical section taken on line 3—3 of Figure 1.

The suction cleaner herein disclosed is typical of any standard handle-maneuvered device and consisting generally of a casing 1, including a nozzle portion 2 extending transversely of its forward end and having a nozzle chamber with a downwardly opening suction mouth 2a extending substantially the full width of the nozzle portion.

The casing 1 is supported upon pairs of front and rear wheels 3,3 and 4,4, respectively, both pairs being preferably journalled on suitable bearings so located that the casing is supported in a substantially horizontal position with the suction mouth 2a parallel with and elevated slightly above the surface of the floor covering to be cleaned. As clearly shown in Figure 2, the front wheels 3,3 are located immediately to the rear of the nozzle chamber and just inwardly from the side edges of the casing 1. The rear wheels 4,4 preferably form a caster including a bracket 5 fixed to the underside of the casing 1 just forwardly of its rear end.

To complete the cleaner assembly, the casing 1 includes a centrally located fan chamber 6 in which is mounted a motor-driven fan 7, the motor (not shown) being supported upon the cleaner casing 1 with its axis arranged vertically and enclosed within a removable hood or cover 8. A handle 9 has pivotal connection with the cleaner casing and preferably near its rear end, the pivotal mounting for said handle being partially enclosed by the rear end portion of the cover 8. And finally, a bag forms the dirt collecting receptacle 10 and has detachable connection with the flanged outlet 11 from the fan chamber 6. The design and operation of the cleaner being more or less conventional, need not be described in further detail.

In designing a suction cleaner, it is obviously desirable to distribute the load as uniformly as possible between the front and rear wheels, but with the force of suction acting at the nozzle, there is a definite tendency for the front wheels to sink into the surface of a rug or carpet to a greater depth than the rear wheels and thus bring the nozzle closer to the carpet surface than is proper for effective cleaning. This tendency can be counteracted somewhat by using wheels of relatively wide tread surfaces at the front of the cleaner, but equally effective is the utilization of wheels of standard size which offer relatively little resistance to carpet penetration and combine therewith a carpet contacting plate so located to offer a substantial support for the forward portion of the cleaner and to establish a horizontal plane below which the suction mouth may not be depressed regardless of the depth of nap, texture or other characteristics of the carpet being cleaned.

Such a plate is herein disclosed, being preferably located beneath the casing 1, immediately to the rear of the nozzle chamber and occupying the transverse space between the front supporting wheels 3,3. This carpet contacting member has the form of a rectangular plate or shoe of a slightly dished or concave form due to a slight bevel around the edges thereof. The bottom face of the plate 12, exclusive of the upwardly inclined or beveled edge portions thereof, lies in and determines a horizontal plane extending substantially midway between the plane of the suction mouth of the nozzle and the horizontal plane defined by the contact points of the wheels with the floor covering.

Now, if the cleaner is resting upon a hard surface as in Figure 1, the plate 12 will clear the surface by a fraction of an inch, say $\frac{1}{32}$, while the suction mouth will be spaced above the floor sur-

face a somewhat greater distance, say 1/8 of an inch. But should the cleaner be placed upon a carpet of medium thickness, the penetration of the supporting wheels into the carpet nap would bring the plate 12 into contact with the carpet surface and it would now support the load which previously was carried on the front wheels 3, 3 and without appreciable penetration into the carpet nap. In other words, the bottom surface of the plate 12 would float substantially on the top surface of the carpet nap and thereby maintain the plane of the suction mouth a predetermined distance above and out of contact with the carpet surface.

It is to be noted however, that the fixed distance separating the parallel planes of the suction mouth and the contact plate 12 may not determine the actual spacing of the suction mouth above the carpet surface due to the fact that there is another factor to be taken into consideration, namely, the penetration of the rear wheels 4, 4 into the carpet surface. Consequently, even assuming that the plate 12 in contact with the carpet surface limits the vertical displacement of the forward portion of the cleaner, the sinking of the rear wheels into the carpet nap causes the cleaner to tilt bodily upon the plate 12 and which, due to the convexity of its bottom face, acts as a rocker, permitting the nozzle portion to be elevated slightly and thus compensate for the penetration of the front wheels. Thus it is the combined load supporting ability of the plate 12 plus the bodily tilting movement of the cleaner on the plate as a fulcrum that maintains the suction mouth of the nozzle substantially at the proper height for effective cleaning regardless of the type and characteristics of the particular carpet being cleaned.

It follows therefore, that the primary purpose of the plate 12 is to support the forward portion of the cleaner in gliding contact with the surface of the carpet while the sinking of the rear wheels into the carpet nap introduces a certain additional compensating effect calculated to bring about a substantially constant nozzle height for a considerable range of different carpet characteristics. It perhaps should be mentioned in this connection that the suction of a cleaner in operation lifts the carpet into sealing contact with the mouth of the nozzle, so that it is incorrect to consider the nozzle as being spaced above the carpet surface but rather with relation to some fixed horizontal plane such as the floor surface. In any case, the plate 12 functions to produce a virtual gliding of the forward portion of the cleaner over the carpet surface (usually combined with a slight tilting of the nozzle by virtue of the penetration of the rear wheels into the carpet nap), thereby compensating for the initial penetration of the front wheels 3, 3.

Having determined the size and location of the plate 12, the manner in which it is attached to the underside of the cleaner casing is relatively unimportant. As clearly shown in Figures 1 and 3, the plate 12 is preferably attached to and made integral with a removable bottom plate 13 which forms the passage extending forwardly from the entrance to the fan chamber to the nozzle chamber, said passage also housing the belt 14 which drives a cylindric shaped agitator 15, located in the nozzle chamber, from a pulley 16 located at the lower end of an extended hub portion of the fan 7. A simple method of attaching the plate 12 to the bottom plate 13 is to use several L-shaped pieces 17 screwed or riveted to the top of the plate 12 and to the vertical side faces of the bottom plate 13 which is itself somewhat dish-shaped or concave from front to rear. If desired, however, the plate 12 and bottom plate 13 might readily be made in a single piece.

Having disclosed a practical application of the invention, I claim:

1. In a suction cleaner, the combination of a body having a nozzle at its forward end and supporting wheels journalled on fixed bearings mounted adjacent its front and rear ends, and a substantially flat plate mounted on the underside of said body adjacent said nozzle and disposed at a predetermined distance below the plane of the mouth of said nozzle, said plate having a downwardly facing carpet contacting surface of an area sufficient to support the adjacent portion of said body upon the surface of the carpet with the nozzle elevated at a substantially uniform height above the carpet surface irrespective of its quality and texture.

2. In a suction cleaner, the combination of a casing having a nozzle at its forward end and pairs of supporting wheels journalled on fixed bearings mounted at its front and rear ends and positioned to support said nozzle at a predetermined height above the floor level, and a fixed plate mounted on the underside of said casing between said pairs of wheels and defining a horizontal plane intermediate the plane of said nozzle mouth and the plane defined by the points of contact of the wheels with the floor surface and having an area sufficient to support the casing with the mouth of said nozzle elevated above the surface of the carpet and at a substantially uniform height regardless of the texture and thickness of the carpet being cleaned.

3. In a suction cleaner, the combination of a casing having a nozzle at its forward end and pairs of supporting wheels journalled on fixed bearings mounted at its front and rear ends, said front wheels being positioned to support said nozzle at a predetermined height above the floor level, and a fixed plate mounted on the underside of said casing adjacent said nozzle and having a substantially flat bottom face defining a horizontal plane disposed intermediate the planes of said nozzle mouth and the plane defined by the points of contact of said wheels with the floor surface, said plate having an area sufficient to support the forward portion of said casing upon the carpet surface with the mouth of said nozzle elevated at a substantially uniform height above the surface of the carpet regardless of its texture and the thickness of its nap.

ROBERT S. BOYLE.