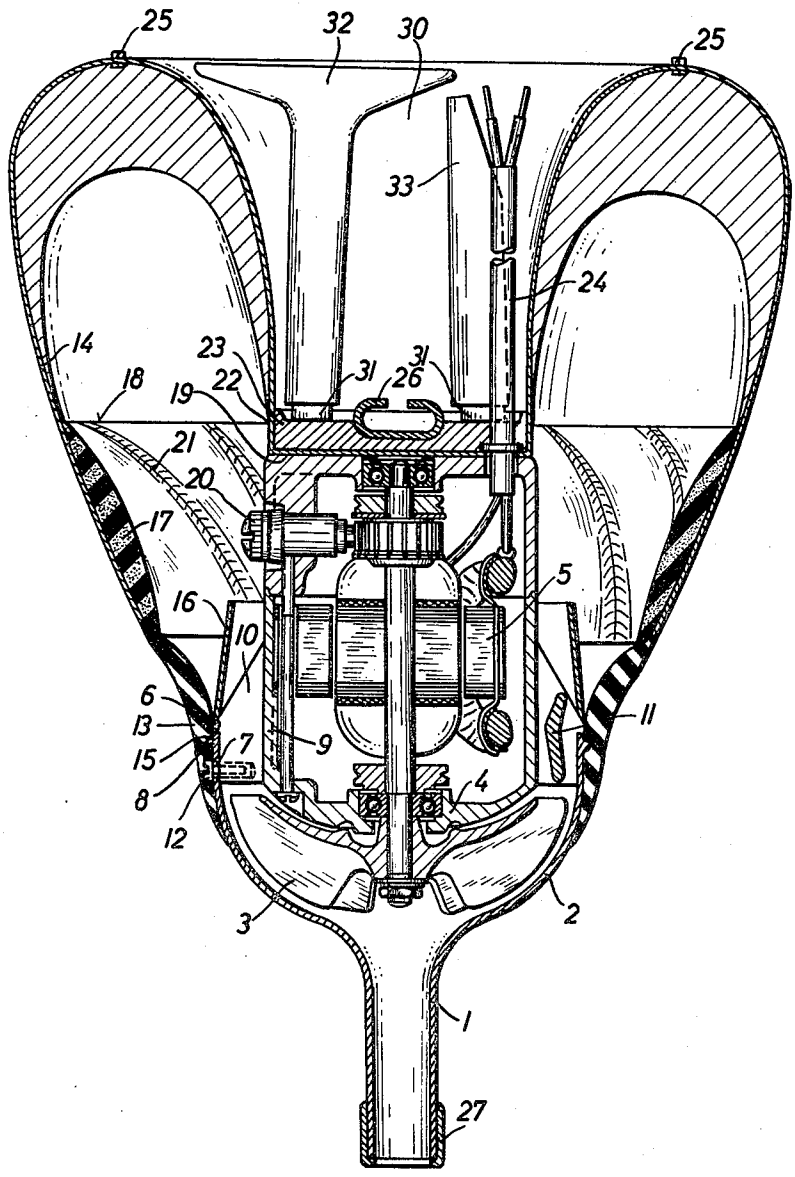
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SUCTION CLEANER

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INVENTOR

B. von Grumbkow

BY

Glascock Downing & Seebold

ATTYS.

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SUCTION CLEANER

Botho von Grumbkow, Schilder-Gasse 120, Koln, Germany

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Suction cleaners are known in which the motor lies in the air current of the centrifugal blower and the impeller is arranged at the forward end of the motor shaft at the suction end of the cleaner. The impeller is surrounded by a bell shaped blower casing which has the suction connection at its forward end.

Such suction cleaners are notable particularly for their light weight and small bulk. They have the disadvantage, however, that the dust bag is either arranged behind the motor so that in all a considerable length is necessary, or underneath at an acute angle to the motor axis and thus occupying considerable space. Above all, however, it is disadvantageous that the motor is in the direct neighbourhood of the long nozzle and therefore gives rise to damage to furniture or the like.

According to the invention the length and bulk are reduced and cushioning of the motor is achieved by the front edge of the dust bag protectingly surrounding the rear edge of the blower casing over its whole periphery and preferably overlapping to a considerable distance forward, as well as extending rearwardly in an annular form at least over the whole length of the motor which itself is attached to the blower casing by means of spacing wings.

The attachment of the motor to the blower casing can be effected by known means, as for example screws, direct threading, catches or the like, and the releasable attachment of the dust bag can also be effected in a known manner, for example by shackles or the like, but in a particular form consists in making the edge of the dust bag elastic and stretching it over the rim of the blower casing.

Further developments of the invention will be described and pointed out in the claims.

An example embodying the invention is illustrated in the accompanying drawing which will now be described and further advantages of the invention will be pointed out.

The example of suction cleaner according to the invention is shown in the drawing in longitudinal section and it comprises a suction connection 1 for example of synthetic material, which is widened bell fashion at 2 to the rear and serves as a blower casing to receive an impeller 3. In the illustrated example this also surrounds bell fashion the convex end 4 of the motor 5. The blower casing 2 terminates with its rear edge 6 a little behind the end 4 of the motor and is here provided with bores 7 and an external peripheral rib 8. The motor casing on its cylindrical part 9 has a row of wings 10 which are curved guide blade fashion, that is helically and as is shown on the right hand side of the drawing, have a cross section 11 of small curvature. This cross section can naturally be opposite to the curvature of the impeller blades. The attachment of the motor to the blower casing is effected by screws 12 which externally are covered by the elastic rim 13 of the dust bag 14. This elastic rim is made very stout and serves to cushion the casing and thus to avoid damage to furniture; this rim 13 may advantageously be made of foamed material. At the same time it has recesses for the heads of the screws 12 which thus ensure good anchoring of the resilient rim 13 on the blower casing 2. It is provided on the outside of the bag so that the fabric of the bag is protected at this particularly exposed region. An annular groove 15 in the elastic rim 13 corresponding with the peripheral rib 8 fully secures the anchoring of the bag on the blower casing. The necessary resilience of the forward rim of the bag can be ensured by cuts or folds in the fabric.

In order to ensure a free passage for the air around the whole periphery of the motor when the suction cleaner makes contact with the funiture, a guide ring 16 is provided which in the illustrated example is tapered conically towards the rear. The air passing through therefore undergoes a slight acceleration. This ring serves at the same time however for another important purpose, namely of preventing any particles of dust falling forward, that is downwardly, from falling into the air current, the ring forming with the dust bag, which rapidly widens towards the rear, a dead zone in which these particles of dust can collect. This falling back of dust can additionally be hindered for example by a web valve arranged at the rear edge of the guide ring after the fashion of a non-return valve. The rear edge of this guide ring 16 lies in the region of the middle of the length of the motor and extends only a little beyond it. A further desirable feature is the provision of an internal cushion 17 which may also be of foamed material and be made very stout. This has its rear edge 18 a little beyond the rear end 19 of the motor so that if the bag is pressed against the motor no damage can be done to the bag or to furniture by the motor, for example by the projecting brush retaining screw caps 20. Advantageously the internal cushioning consists of spiral guide blade-like guide ribs 21 which are preferably secured to the fabric of the bag, for example stuck, welded or vulcanised thereto, and which smooth the flow of the air after its exit from the guide ring 16 and increase the air path in the bag but which leave the fabric exposed between them so that in this region also the bag permits the passage of air but is effectively cushioned.

While the bag can be formed in the usual way and it would be possible to mount the motor by the suction connection 1, according to a particularly advantageous manner of achieving the above mentioned object of decreasing the overall length of such a suction cleaner, the rear end 22 of the bag is swept inwards towards the rear end wall 19 of the motor. This sweeping back can be to any desired extent but in the illustrated example it is carried right up to the rear wall 19 of the motor. Here the bag is clamped between the motor end wall 19 and correspondingly shaped plate 23. In the illustrated example the bag is complete and only provided with holes for the means for securing the plate 23 and for the passage of the cable 24 supplying the motor. The bag could, however, be made as a bag open at the rear end and only its rear edge be clamped between the motor and the clamping plate.

The advantage of this sweeping back of the rear end of the bag is two fold. In the first place in accordance with the above expressed object, the overall length is considerably reduced. In the second place the surface of the bag extends mainly rearwardly and internally and only to a small extent rearwardly. The distribution of air when it passes into the room is therefore particularly satisfactory. A further advantage is that a sliding clasp fastener of ring form can be provided at 25 which permits particularly simple emptying without the need for detaching the forward end from the blower casing. The emptying is further facilitated in that it is only necessary

to hold the suction cleaner by the one part projecting from the bag namely the suction connection **1** which is made long enough to serve as a handle and to shake the bag vigorously.

A third advantage arising from the construction according to the invention is that the clamping plate **23** can also serve as a mounting for a coupling element **26**, for example for a stick. The detailed construction of the coupling is not a subject of the invention and it can be made of any desired kind. Any suitable handle, stick or the like can be attached to the clamping plate.

Although as above explained the provision of holding members for the suction cleaner are conceivable on the suction connection **1** or on the blower casing **2**, the fact that the dust bag is attached to the rear edge of the blower casing in the region of the front end of the motor leads to the motor not being suitable for the provision of holding members. It becomes necessary, therefore, to provide holding members elsewhere and this is provided by the advantageous feature of sweeping the rear end of the bag up to the rear end of the motor, which in this way is made accessible to receive holding members. This sweeping back of the dust bag can also be used in other constructions of suction cleaner in which the complete cushioning of the motor is not made use of.

As well as the coupling element **26** the clamping plate **23** can be provided with blind connections **31** for receiving exchange nozzles such as a carpet nozzle **32** and a crevice nozzle **33**, so that these nozzles can be stored in the beaker shaped space **30** in a space saving manner ready for use and protected against shocks and blows and are thus always at hand if during the use of the cleaner it is necessary to change the nozzle on the connection **1** for another of different form. The blind connections **31** are preferably made of resilient material. Padding can be provided on the dust bag in the region of the exchange nozzles and/or on the nozzles themselves, and the nozzles may be made of thermoplastic material.

The invention can be modified in various ways in particular in that the features above described can be used in some other combination or in combination with other known features. Other improvements are also possible. Thus the rim of the dust bag and the rear edge of the blower casing may have a threaded connection, the peripheral rib **8** on the blower casing **2** being replaced by one or more screw threads in which case the spiral, helical form guide ribs **21** must have their hand chosen so that the torque exerted by the air current tends to tighten the attachment of the bag on the threads, i.e. the ribs **21** must be to the same hand as the thread. Also a padding **27** can be provided on the mouth of the suction connection **1**, the forward edge of which can serve as a seal for nozzles to be attached, but which with the nozzle removed prevents damage if the suction cleaner is allowed to fall.

I claim:

1. In a suction cleaner, a bell-shaped casing having an end to which a cleaning tool is adapted to be attached and a mouth end, enclosed drive motor means connected to said casing adjacent to and spaced inwardly of the mouth end thereof, a motor shaft extending from the drive motor means in the direction of and terminating short of said end of the casing, an impeller on the free end of said motor shaft operative on activation of the drive motor means to draw dust laden air through said end into the casing for discharge through the space between the motor means and the mouth end of the casing, and a flexible dust retaining bag for receiving the dust laden air leaving the mouth of the casing, said dust retaining bag including a neck portion connected to the casing in proximity to the mouth end, an annular portion of sufficient length to extend beyond the end of the drive motor means opposite said impeller, and said annular portion having a substantially centrally located well, the closed wall of which is secured to the end of the drive motor means.

2. A suction cleaner as claimed in claim 1, further including guide ring means surrounding the drive motor means secured to the neck portion of the flexible bag adjacent the mouth end of the casing and of sufficient length to extend substantially to the longitudinal midpoint of the drive motor means for imparting a slight acceleration to the dust laden air and for forming with the annular portion of the bag a dead zone in which dust particles may collect.

3. A suction cleaner as claimed in claim 2, in which the neck portion of the bag is of resilient material of relatively thick cross-section thereby cushioning the bell-shaped casing to prevent damage to furniture.

4. A suction cleaner as claimed in claim 3, in which the inner face of the annular portion of the bag adjoining the neck portion is provided with a resilient cushion of such length as to terminate adjacent the end of the drive motor means thereby preventing damage to the motor means and annular portion of the bag.

5. A suction cleaner as claimed in claim 4, which said resilient cushion includes spiral blade-like guide ribs fixedly secured to the inner face of said annular portion and operative to smooth the air flow leaving the guide ring means.

6. A suction cleaner as claimed in claim 1, in which a clamping plate secures the wall of the well to the end of the drive motor and mounting means on the plate for receiving cleaning attachments within said well.

7. A suction cleaner as claimed in claim 6, in which said clamping plate carries a coupling component to which a handle means is adapted to be coupled.

8. A suction cleaner as claimed in claim 1, in which the annular portion of the bag adjacent the well includes concentric complemental separable fastener means operable to open said bag for emptying the contents thereof.

9. A suction cleaner as claimed in claim 8, in which the annular portion of the bag is provided with internal cushioning material in the area adjacent the well.

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