Dec. 2, 1958 M. B. PEALE 2,862,226

SUCTION HEAD FOR A VACUUM CLEANER

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FIG. 1

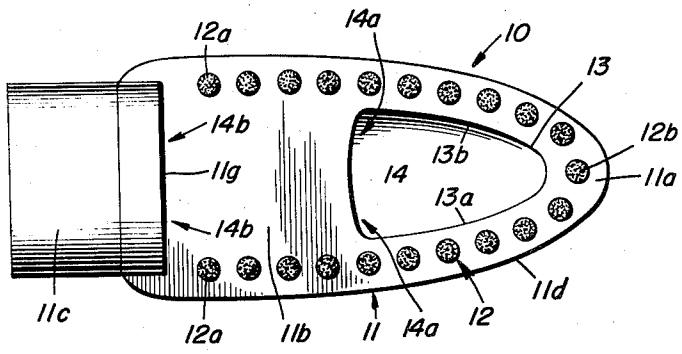


FIG. 2

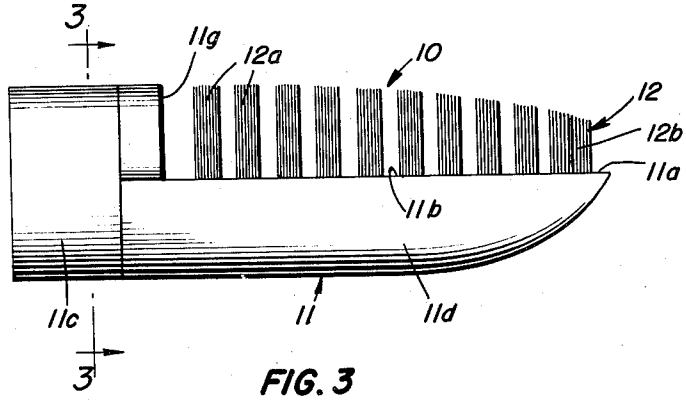
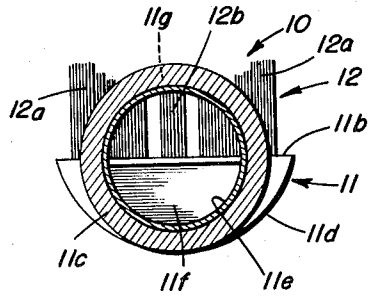


FIG. 3



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SUCTION HEAD FOR A VACUUM CLEANER

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3 Claims. (Cl. 15—395)

My invention concerns a vacuum brush or tool for attachment to, and use with, conventional vacuum cleaning equipment. It is particularly intended for use in highly restricted and confined spaces, such as are normally difficult of access.

An object of my invention is to provide a vacuum tool of the general type described which at once is simple and sturdy, displaying long useful life, and being practically fool-proof in operation; which tool, in direct and efficient manner, combines mechanical agitation of detritus to be removed with turbulent vacuum withdrawal thereof by vacuum pull of substantially constant value throughout the entire brush area of the tool.

Other objects and advantages will in part be obvious and in part more fully pointed out during the course of the following disclosure, particularly when considered in the light of the accompanying drawings which form part of this application.

Accordingly, my invention resides in the several parts, elements and features of construction, together with both the combination of each of the same with one or more of the others and the product resulting from such combination, the scope of the application of all of which is more fully set forth in the claims at the end of this specification.

In the several views of the drawings, wherein I have disclosed that embodiment of my invention which I prefer at present,

Figure 1 discloses my new brush in bottom plan view;

Figure 2 is an inverted side elevation of my new tool, with the working face upturned; while

Figure 3 is a transverse, vertical section, taken on the line 3—3 in Figure 2, and showing one vacuum outlet which is provided by the collar construction.

And now, to permit more ready and thorough understanding of my invention, it may here be noted that for proper operation of a small hand tool comprising auxiliary equipment for a vacuum cleaner, it is essential that it will pass readily into the crevice or other remote point in which it is to be inserted.

But it is recognized that when a tool is contoured for such use, numerous disadvantages attend such construction. Illustratively the known brush-equipped vacuum tools have no quality of self-cleaning. And it has been uniformly observed that they tend to foul and clog up in and around the tufts of bristles after but limited use, the dirt entering and lodging within and between these bristles. Frequent hand-cleaning is a necessity. And such cleaning is at once difficult, tedious and laborious.

Usually, with brushes of this general type, size and shape, it is found that the available vacuum as exerted by such vacuum brush tools is insufficient to accomplish its intended purpose. In many instances, the tool fails to free the dirt from the article undergoing the cleaning. In other cases, once some of this dirt is loosened and removed under pull of vacuum, it fouls up in the bristles. With vacuum insufficient to pull this dirt through and from the bristles, it simply remains there. A trap is built up, lessening influence of vacuum draw, and seriously impairing the efficiency of the brush until it is cleaned. Standby time for servicing reaches important proportions.

Particularly is this lack of sufficient vacuum draw observed near the tip of the tool, be this tip tapered or of other design. This vacuum inadequacy is particularly noticeable, however, where the lead end of the brush has substantial taper. As these tools have heretofore been known and been available, a vacuum sufficient both in quantity and in desirable turbulent effect has not been obtainable in brushes of this general type.

Thus, when viewed from a practical standpoint, the known hand vacuum tools have uniformly proven deficient for their intended purpose. If made sufficiently large to have adequate vacuum, they are incapable of searching and ferreting into the small spaces where thorough cleaning is desired. On the other hand, when constructed to reach confined spaces, difficult of access, the vacuum pull is insufficient either to clean the article undergoing vacuuming, or to clean the bristles of the vacuum tool itself. For one reason or another, therefore, known vacuum tools of this general type have proved unacceptable in the art.

An important object of my invention, therefore, is to avoid, or at least in substantial measure to relieve and minimize, the many disadvantages and defects heretofore confronting the art and at the same time to provide a vacuum hand tool of the general type described which, small in compass and rugged, sturdy and reliable in operation and characterized by freedom from moving parts, and with minimum of fabricated structure, at the same time will have high maneuverability into confined intricate and small spaces undergoing cleaning; will readily clean itself during use; and will apply high degree of vacuum throughout its entire operating area, both at the leading and trailing edges thereof, whereby a high degree of uniform and turbulent vacuum pull is achieved.

As seen in the drawings, my new vacuum brush, indicated generally at **10** in Figure 2, comprises an elongated, somewhat flattened and hollow body portion indicated generally at **11**. This body portion **11** of course may be formed of any suitable and desirable material, provided only that it is of sufficiently rugged character to have enduring life. Subject to the foregoing requirement coupled with that of pleasing appearance, the essential and controlling criteria in the selection of such material are ready availability of material; low unit weight; and low cost of both the base material and of the subsequent steps of fabrication. Typically, light gauge aluminum, available plastics and the like serve adequately for the intended purpose.

As shown in Figures 1 and 2, I preferably taper this body portion **11** longitudinally and inwardly and forwardly towards a blunt, pointed outer or leading tip, indicated generally at **11***a*. The taper employed is usually on a compound curve, empirically selected, and sufficient to permit adequate and ready penetration of the tool into small and confined spaces, such as the springs of beds and other and allied furniture, of which chairs, sofas and the like are typical. The degree of curvature can be selected with impunity so far as concerns proper vacuum operation of the device, in view of the ingenious construction hereinafter narrated.

As perhaps best shown in Figure 2, the body portion **11** includes a flattened undersurface **11***b*. This undersurface extends from the tip **11***a* to the rear portion thereof. At its rear end, and as best shown in Figures 1 and 2, the body portion **11** terminates in a circular collar portion **11***c*. This also may be of suitable and readily available material such as plastic, light-weight metal, and the like. If possibility exists of contacting electrical leads, use of a di-electric material is indicated. This collar portion **11***c* encompasses a full circle, and enables the tool to be

fastened, as by a bayonet slot, friction fit or other conventional fastening means to the hose (not shown) or other conventional part of the cleaner itself. This flat undersurface **11***b* is approximately plane. And the projected plane of this undersurface **11***b* passes transversely and almost medially through the collar **11***c*. The collar **11***c* is of course hollow, and the vacuum exerted by the vacuum cleaner itself (not shown) is exerted through this collar and onto the tool **10**. The other and outer surface **11***d* (Figures 2 and 3) of the body portion **11**, complemental to the flat undersurface **11***b*, is substantially dome-shaped in cross-section and curves, both in longitudinal and transverse directions, downwardly at its forward or leading end, towards the blunted tip **11***a*.

Thus the two cooperating and complemental surfaces comprised of the flat undersurface **11***b* and the outer, domed surface **11***d* of the body portion **11** cooperate to provide therein a hollow vacuum chamber **11***e*. Vacuum is impressed within this hollow chamber **11***e* through collar **11***c*. And this vacuum to the domed portion **11***e* is exerted primarily through the shaded region **11***f* of the collar portion (at bottom in Figure 3). Viewing the collar **11***c* in section in Figure 3, it is apparent that the upper portion **11***g* thereof is opened to the exterior. This construction is implicit from Figure 2. And this vacuum pull is exerted to the exterior of the collar **11***c*, in the region of the underface **11***b* of body portion **11**, utilization being made thereof in manner shortly to be described.

Now, as is apparent from Figures 1 and 2, one or more rows of bristles are placed in desirable, suitable and convenient manner around the active or working undersurface **11***b* of the tool **10**. And as is seen from these two figures these tufts of bristles, indicated generally at **12**, are provided in a row which extends completely around the periphery of the underface **11***b* of the body portion **11**, projecting generally at right angles thereto and outwardly therefrom. And these bristles are preferably disposed just inside of and slightly removed from the margins of the peripheral edge of this underface **11***b*. They should be as close to the edge as possible consistent with good mechanical strength in the anchor of these bristles in the surface **11***b*. This ensures maximum facility in cleaning.

Now, it has been stated hereinbefore that a highly important feature of my invention is that the brush tool strongly exerts its vacuum almost uniformly throughout the entire extent of its working surface. And this is true, right at the very tip end thereof. And is also true, despite the narrow outline which with impunity I may impart to the tool, to permit it to be used in small spaces, normally difficult of access. Moreover, and as I have also pointed out, a further important feature is that, for all practical purposes, my new brush tool is self-cleaning. That is, dirt and debris which normally lodges either in the bristles or between the bristles of known brush tools, becoming trapped there and clogging the same so that the vacuum available in such tool is inadequate to pull it out, will not, in my new tool, be permitted to lodge in such regions of entrapment. On the contrary, and by my new construction, the loosened dirt is directly submitted to the turbulent vacuum stream, created by "beating" two separate and strong sources of vacuum. Thereby it is violently pulled past the brushes and directly into the main vacuum line connected to the collar **11***c*.

As stated hereinbefore, a serious and important defect of vacuum hand tools of the general type described is that, where designed for penetration into small-dimensioned and intricately-contoured crevices, the benefits attending this substantial penetration are in large measure nullified due to absence of sufficient vacuum pull at the leading or tip end of such tool, once the same has been inserted. Quite on the contrary, and with my new hand tool, vacuum is directly applied where it is most needed, i. e., where the leading edge of the tool explores the innermost regions of the article undergoing cleaning, that is, while in known tools of this general size and type vacuum pull is insufficient to thoroughly clean the bristles or to pull the loosened dirt into the vacuum stream, with my new utensil adequate vacuum pull is exerted to satisfy both of these requirements.

I achieve this by providing, in the underface **11***b* of the body portion **11**, an elongated opening **13** which has a shape generally similar to that of the underface **11***b*. That is, the major or longitudinal axis of this opening **13** is coincident with that of the underface **11***b*. The opening is substantially triangular in shape, but with rounded outer edges **13***a*, **13***b*. Preferably, although not necessarily, the edges **13***a* and **13***b* and the tip **13***c* are nearly equi-distant throughout their extent, from the outer periphery of the underface **11***b* of the body portion **11**. The opening **13** terminates, at its inner end, at a region near the transverse median-line of the underface **11***b*. Moreover, the distance of the periphery of the edges **13***a* and **13***b* of this opening from the adjacent tufts of bristles **12** is about uniform, throughout the extent of these edges. Thus the vacuum which comes through to the region **11***f* of the collar **11***c* is exerted almost entirely through the opening **13**, establishing a vacuum pull at the very forward end, including the tip end, of the tool. This contouring of the vacuum **11** enables the latter to employ to maximum advantage, the negative pressure imposed through this opening. The tufts of bristles **12** disturb and agitate the adherent dirt, and loosen the same. The vacuum then draws the loosened dirt between the tufts of bristles and directly into the opening **13**, where it is exhausted. Adequate vacuum is insured where it is most needed. And this, without any compromise is the important factor of contouring and dimensioning the tool for maximum access into the spaces for which it is intended.

I have just discussed the manner in which adequate vacuum pull is provided by opening **13** at the very tip end of my new tool. Adequate vacuum for the trailing end of the tool is also provided. And vacuum pull through the opening **11***g* in collar **11***c*, as shown by the arrows **14***b* in the several figures, ensures that adequate vacuum is provided in the trailing end of the tool. This vacuum is particularly effective in drawing into the vacuum stream and exhausting the loosened dirt in the regions of the more rearwardly-located tufts of bristles **12**. Viewing the underface **11***b* of the body portion **11** of the tool **10**, along the major axis thereof, then near the midpoint of the tool the dirt, loosened by the tufs of bristles, comes under the influence of the vacuum from both the opening **13** and the opening **11***g*. This is shown by arrows **14***a* passing to opening **13** and by arrows **14***b* leading to opening **11***g*. This creates the turbulence in vacuum draw as heretofore referred to. The two vacuum pulls conflict with each other. This "beating" action subjects the loosened dirt to violent pulls. This turbulent action effectively contributes to the desired self-cleaning of the bristles of the tool.

In the preferred embodiment of my tool the tufts of bristles **12** are so cut and disposed that the lengths of the bristles diminish progressively from the rear end, as shown in Figures 1 and 2, as at **12***a*, towards the lead or tip end **12***b*. Thus, the bristles **12***a* are considerably longer than those at **12***b*. This reduction in tip dimension contributes appreciably to effective penetration of the tool into the desired restricted spaces, crevices and the like.

My new vacuum brush tool is simple to manufacture, requiring in production only minimum quantities of materials, themselves comparatively inexpensive and readily available. Thus, both material and labor costs are low. The new brush is sturdy, of long, useful life, and is substantially fool-proof in operation. It effectively combines ample vacuum pull with outstanding ease of manipulation

and penetration into confined and tortuous regions. Dirt is readily agitated and readily removed. The tool is non-clogging and self-cleaning. Vacuum pull continues substantially undiminished, during operation. No stand-by time is required for cleaning.

All the foregoing, as well as many other highly practical advantages, attend the practice of my invention.

It is apparent from the foregoing that once the broad aspects of my invention are disclosed, many embodiments thereof will readily suggest themselves to those skilled in the art. As well, many modifications will be evolved of the present embodiment. Since these all fall within the scope of my invention, I desire the present disclosure to be considered simply as illustrative and not as comprising limitations.

What is claimed is:

1. As a new article of manufacture, a suction head for a vacuum cleaner, comprising an elongated and somewhat flattened, hollow body portion, tapering longitudinally and forwardly, in generally converging manner, to define a blunt-pointed outermost and forward or leading tip; said body portion terminating at its rear end in a ring-shaped collar for application to a source of vacuum; and said body portion having an outermost and forward surface thereon and defining an under-surface, which is approximately flat and plane and which said plane, defined by said flat under-surface, passes transversely and nearly medially through said collar; said body portion also having a second, complemental and outer surface, which latter is substantially dome-shaped in cross-section, and which curves, both in longitudinal and transverse dimensions, downwardly and longitudinally convergingly at its forward or leading end, towards the blunted tip of said body portion, at the junction line defined between the under and outer surfaces thereof; that portion of the ring-shaped collar which is beyond the confines of the under and outer surfaces of the body portion being open to the atmosphere; the said under-surface of the body portion, near its tip end, having a suction opening to the exterior which follows generally the shape of the tip end of said undersurface of the body portion, but the margins of which terminate short of the edge of said under-surface; and tufts of bristles disposed in a row about and just short of the margin of the under-surface of said body portion and projecting outwardly therefrom and generally normally to the plane thereof; the domed space within the body portion, the two openings therein to the exterior, and the bristles cooperating to create thorough turbulence and removal of dirt, together with self-cleaning of the suction head itself.

2. As a new article of manufacture, a suction head for a vacuum cleaner, comprising an elongated and somewhat flattened, hollow body portion, tapering longitudinally and forwardly in generally converging manner to define a blunt-pointed outermost and forward tip; said body portion terminating at its rear end in a ring-shaped collar for application to a source of vacuum; said body portion having an under-surface which is approximately flat and plane, which said plane, defined by said flat under-surface, passes transversely and nearly medially through said collar, together with a second, complemental and outer surface of said body portion which is substantially

dome-shaped in cross-section, and which curves, both in longitudinal and transverse dimensions, downwardly and longitudinally convergingly, at its forward or leading end, towards the blunted tip of said body portion, at the junction line defined between the under and outer surfaces thereof; that portion of the ring-shaped collar which is beyond the confines of the under and outer surfaces of the body portion being open to the atmosphere; the said under-surface of the body portion, near its tip end, having a suction opening to the exterior which follows generally the shape of the tip end of said under-surface of the body portion, but the margins of which terminate short of the edge of the said under-surface; and tufts of bristles disposed in a row about and just short of the peripheral margin of the under-surface of said body portion, and projecting outwardly therefrom and at right angles thereto; the lengths of the tufts of bristles diminishing from the collar end of the body portion to the tip end thereof; the domed space within the said body portion, the two openings therein to the exterior, and the bristles cooperating to create thorough turbulence and removal of dirt, together with self-cleaning of the suction head itself.

3. A vacuum hand brush tool comprising an elongated hollow element having a leading working head and trailing collar portion, said work head having a leading, work portion with top and under surfaces thereon, the under or work surface of said work portion being flat and defining a plane which passes approximately medially through said trailing collar portion; said under-surface of said work head also having a row of tufts or bristles extending outwardly, exteriorly and away from said under-surface and generally normally thereto, and disposed in a row about and just inside of the peripheral margin of the under-surface of said body portion; said hollow element having a vacuum opening in the leading end of the under-surface of said work portion; said elongated hollow element also having a vacuum opening in the collar portion disposed approximately normally to and exteriorly of, and opening onto the said work surface which is provided on the under-surface of said work portion; whereby, in turbulent manner, streams of vacuum are pulled both through the bristles and generally parallel thereto and across the bristles and generally at right angles thereto, for effectively dislodging dirt and debris which has been initially loosened by said bristles.

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