A simplified and highly effective mounting arrangement for the cleaning head or other component of a vacuum cleaner or the like, involving the use of interfitting, generally cylindrically shaped members, which arrangement enables the head to be quickly removed merely by the application of foot pressure on a lever, and thereafter easily reinstalled upon the vacuum cleaner with but single handed effort.
Simplified Mounting Arrangement

Relationship to Prior Invention

This invention is related to the co-pending application of W. W. Selley and Richard H. Schaffer entitled "Vacuum Cleaner and Power Unit," filed June 20, 1968, Ser. No. 739,595.

Background of This Invention

1. Field of the Invention

This invention can be categorized with attachment devices utilized on the front of vacuum cleaners and the like whereby the cleaning head or other implements or components can be attached and thereafter removed.

2. Description of the Prior Art

The pertinent prior art is believed to principally involve certain pieces of mechanical apparatus utilized for supporting the cleaning head, suction nozzle, or other component associated with cleaning devices in operative position. Unfortunately, such prior art devices were complicated, expensive, and difficult to operate, and frequently involved the use of hand operated levers, bolts, and other securing means. In addition, the securing means frequently had to be utilized in addition to belt lifters and other components that were involved in the prior art designs.

Summary of This Invention

The present invention is based upon the use of interfiting components in the nature of generally cylindrical members, which can be easily locked together by a third member surrounding one of the interfiting members. One of the generally cylindrical interfiting members is provided with a plurality of spaced projections thereon, and the other generally cylindrical member is provided with recesses spaced to receive such projections when the members have been interfitted. The third or locking member is in the nature of a rotatable ring arranged to be selectively movable toward and away from a position in which portions of the ring prevent movement of the projections out of the recesses.

The locking ring is preferably spring biased into the locking position, but is typically provided with an operating lever so that the user of the device from a standing position can cause separation of the interfiting members merely by stepping on the lever. Advantageously, the locking ring is configured so that when the interfiting members are to be refitted together, motion in the interfiting direction causes the locking ring to rotate automatically so that the spaced projections can be admitted into the recesses of the other member as well as into angled slots in the locking member. These angled slots, upon the locking member being caused to rotate by pressure on the operating lever, are responsible for causing the interfiting members to be easily yet forcefully separated. Thereafter, by a simple, one-handed operation, the components can be reassembled.

It is therefore a principal object of my invention to provide a novel, easily operated and highly effective mounting arrangement whereby two generally cylindrical members can be removably held in interfiting relation.

It is another object of my invention to provide a low cost arrangement for effectively securing a cleaning head or other component upon a vacuum cleaner or similar device.

It is yet another object of my invention to provide a simplified arrangement by the use of which components can be readily added or removed from a cleaning device without the necessity for levers, bolts or the like to be manipulated.

It is still another object of my invention to provide a mounting arrangement in which interfiting components can be quickly separated by foot pressure, and the components thereafter reassembled with but the use of one hand.

These and other objects, features and advantages will be more apparent from a study of the appended drawings in which:

FIG. 1 is a perspective view of the power unit of a vacuum cleaner, with the rug nozzle or cleaning head removed to reveal the novel mounting arrangement in accordance with this invention;

FIG. 2 is a perspective view to a somewhat smaller scale, revealing the manner by which a user causes separation of the cleaning head with foot pressure;

FIG. 3 is a perspective view of the blower housing of a vacuum cleaner, upon which is mounted one of the generally cylindrical members that is interfitted in accordance with this invention;

FIG. 4 is a perspective view of the operating lever and locking ring component which is to be mounted upon the generally cylindrical member shown in FIG. 3;

FIG. 5 is a perspective view of the plate upon which the other of the generally cylindrical members to be interfitted is mounted;

FIG. 6 is a perspective view showing the generally cylindrical members in interfitting relationship, and revealing the locking ring in the locking position; and

FIG. 7 is a view related to FIG. 6 but showing how upon rotation, the locking ring causes the expulsion of one interfitting member from the other, this being brought about forcefully yet effectively.

Turning to FIG. 1 it will be noted that I have there shown a vacuum cleaner arrangement in which the rug nozzle assembly or cleaning head unit 12 has been removed from the wheeled motor portion or power unit 11 in order to reveal the construction pertinent to this invention. The appearance of the vacuum cleaner with the rug nozzle in place is illustrated to a smaller scale in FIG. 2, as is the manner in which the user applies her foot on separation lever 20 in order to bring about on occasion the separation of the rug nozzle 12 from the rest of the machine. The foregoing reference numerals as well as certain other reference numerals used hereinafter are the same as those used in parent application Ser. No. 739,595.

As will be noted in FIG. 1 from an inspection of the rear portion of the cleaning head 12, a plate 36 is there shown, on which is centrally disposed a ring shaped mounting member 41, around the outer periphery of which a plurality of lugs or projections 42 are disposed at spaced locations. The member 41 may hereinafter be referred to as the first generally cylindrical member. On the front of the power unit 11 is disposed a somewhat similarly shaped inlet pipe or nipple 26 which is slightly larger in diameter than the member 41, so that it can receive the member 41 when the cleaning head 12 is to be installed in its operative position on the power unit. Appropriate slots or recesses 27 are disposed about the female member 26 in the proper spacing, width and orientation in order that the lugs 42 of the rug nozzle may be received by the member 26 may hereinafter be referred to as the second generally cylindrical member, and it may be integral with or attached to the blower housing 25. Further details of this construction will be more apparent as the description proceeds.

Also revealed in FIGS. 1 and 2 are the wheels 17 upon which the motor unit 11 is movable, the carrying handle 14, the tiltable headlight unit 16, the height adjustment lever 21, and the separating lever or pedal 20 that is manipulated by the foot of the user at such time as the rug nozzle 12 is to be removed. It will be noted that any implement to be utilized in lieu of the rug nozzle will be equipped with a male mounting boss or generally cylindrical member similar or identical to the member 41 shown at the rear of the present rug nozzle.

As will be apparent from a further study of FIG. 1, an aperture is disposed in the interior of the generally shaped member 41, through which dirt picked up by the rug nozzle is carried into the interior of the motor unit. Centrally disposed in this aperture is a coupling 38 by which the rotary brush (not shown) disposed in the lower portion of the nozzle 12 is driven in rotation at such time as the member 26 has received the member 41, for at that time the coupling 38 is received upon the driving shaft 39 disposed in the interior of member 26. The shaft 39 is of course driven by the electric motor (not shown) disposed in power unit 11.
Referring to FIG. 3, it will be noted that I have there shown the front portion of a casting 25 utilized to form the blower housing portion of the power unit 11, with the generally cylindrical female member 26 being disposed about a central aperture 30. The plurality of intended or slots 27 provided or spaced locations about member 26 are to be seen in this figure, as is the spring 29. The member 26 does not have a smooth outer surface, but rather has valleys or indentations 32 therein, there being three in this instance, which are spaced about the exterior of member 26. FIG. 4 reveals the separating lever 20 in exploded relation to the blower housing 25, and it is to be understood that the ring shaped portion 58 of the lever 20 is of a diameter that surrounds the generally cylindrical shaped member 26, in the manner shown in FIGS. 6 and 7. However, I prefer that the interior of the ring shaped portion 58 not be in sliding contact with the exterior of member 26, but rather I provide three spaced shoulders or engagement members 33 on the interior of member 58, which engage a suitable circular recess 34 about the outer rear portion of the member 26, which recess extends behind the raised portions 35 disposed between the indentations 32. At the time of the installation of the lever 20, it is rotated so that the engagement members 33 coincide with the location of the indentations 32, so that the ring shaped portion 58 can be pushed all the way onto the member 26. Then, the lever 20 is rotated into the position shown in FIG. 6, which causes the engagement members to be disposed in the circular recess 34, behind the raised portions 35 of the member 26, which of course serves to lock the lever 20 in place. A portion (not shown) on the rear of the lever-ring member may extend into the slot in which the compression spring is mounted, to engage one end of the spring 29. Suitable stops may be used to limit rotation of member 58 of lever 20 to a suitable arc of travel.

As will be described, when the user steps upon the extended portion of the lever 20 to cause rotation of the ring shaped member 58 with respect to the mounting member 26, this brings about ejection and removal of the cleaning head 12 from the motor unit 11. A plurality of angled slots 59 involving the use of inclined ramps 62 are disposed about the periphery of the member 58, placed so as to generally coincide with the location of the recesses 27, and these aid in such cleaning head removal.

The FIG. 5 reveals cleaning head plate 36 which may be a casting upon which the ring shaped mounting member 41 may be disposed. The member 41 may either be an integral part of the casting, or else a member secured upon the plate 36. A plurality of screw holes 44 are disposed adjacent the corners of the plate so that the results of the use of suitable screws, this plate can be removable secured to the upper rear portion of the cleaning head 12. In the interior of the member 41 is revealed a portion of the gear box 40 associated with one type of driving means for the rotary brush (not shown) which is located in the lower front portion of the rug nozzle. However, in some embodiments, such a gear box is not used. Between the gear box and the ring 41 is an aperture 45 through which air is drawn as a result of the efforts of the blower (not shown) located behind the casting 25. As previously mentioned, the placement of the lugs or projections 42 about the outer surface of the ring 41 is such as to agree with the positioning of the slots 27 and the angled slots 59 associated with the securing arrangement on the front of the blower housing. All of these members may be made of metal or plastic.

Turning to related FIGS. 6 and 7, it will be seen that the ring shaped mounting member 41 associated with the cleaning head has been shown inserted in assembled relation with the female inlet pipe or nipple 26 that is mounted on the front of the blower case. Only the rearmost portion of the mounting member 41 of the cleaning head is illustrated in these figures for reasons of clarity. As will be apparent, the projections or lugs 42 member about the male member 41 have been shown received into the slots 27 formed in the nipple 26. It will be additionally apparent that the lugs 42 have been received in the angled slots 59 of the ring 58, with the ring 58 thereafter having been rotated a few degrees so as to cause a locking action to take place, in which the points 60 formed in the angled slots 59 prevent the lugs 42 from moving out of the slots 27. The compression spring 29 serves to bias the lever 20 into the upper position shown in FIG. 6, such that the ring portion 58 resides in the locking position.

It should also be noted in FIGS. 4 and 6 that the angled slots 59 each have a long sloped portion or inclined ramp 62 serving to define the rearmost edge of the slot 59, as well as a short angled portion 64 immediately in front of each point 60. As will be noted from an inspection of the figures of drawing, the inclined ramp portions 62 are of a smooth, substantially unbroken contour, extending the length of the slots 59. The reason for these configurations will soon be apparent.

Turning now to FIG. 7 it will be noted that the elongated portion of the lever 20 has been moved to its lower position against the bias of spring 29, with this motion serving to cause movement of the ring portion 58 with respect to the lugs 42. This motion of course serves to bring the inclined ramp portion 62 of each of the slots 59 into forceful contact with the rear portion of each lug 42 as viewed in FIG. 7, with the application of this long, continuous surface smoothly causing the expulsion of the spaced projections 42 from their recesses 27. This of course causes the nozzle assembly 12 to be separated from the motor unit 12. Thereafter, the lever 20 including the ring portion 58 is caused to return approximately the position shown in FIGS. 1 and 6, due to the influence of spring 29.

Re-insertion of the nozzle assembly 12 on the front of the power unit is simplified by the provision of the bevel 28 adjacent the forward portion of each recess 27, and the short sloped portion 64 in front of each of the points 60 on the ring 58. As is obvious, under the influence of spring 29, the portions 28 and 64 are caused to reside relatively close together, but upon the rounded projections 42 being caused to be pushed against the portions 28 and 64, the portions 64 are caused to move in the clockwise direction as viewed in FIG. 6, thus causing ring 58 to rotate and admit the projections into inner portions of the slots 27, and of course into the innermost portions of the angled slots 59. Thereafter, the spring 29 functions to rotate the ring shaped portion 58 counterclockwise to the position in which the points 60 of the angled slots prevent further displacement of the projections 42 from the slots 27. This is a simple operation to perform, and the housewife can accomplish the reinsertion procedure using only one hand.

I claim:

1. An arrangement for removable securing in interfiting concentric relation, a pair of generally cylindrical members, said arrangement comprising a first generally cylindrical member having a plurality of spaced projections thereon, and a second generally cylindrical member having recesses spaced to receive said projections when said members have been interfitted, a locking ring rotatable about the axis of said cylindrical members mounted around said second cylindrical member and means for holding said ring against radial movement on said second member, said rotatable locking ring being arranged to be selectively movable toward and away from a position in which portions of said ring prevent movement of said projections out of said recesses, said portions of said ring serving a locking function when said ring is rotated in one direction, and means on said ring engaging said projections during rotation of the ring in the opposite direction for positively driving said projections completely out of said recesses, said engaging means traversing the whole length of each of said recesses during rotation of said ring in said opposite direction.

2. The arrangement as defined in claim 1, in which a foot pedal is attached to said ring, with pressure on said pedal causing said ring to rotate to engage said cylindrical members.

3. The arrangement as defined in claim 2 in which said ring is spring biased in the rotative direction opposite the rotation caused by pedal pressure.
4. The arrangement as defined in claim 3 in which portions of said ring are angled and configured so that as said spaced projections are pushed against such portions, said ring is caused to rotate to admit said spaced projections, and thereafter to rotate back into the locking position under the influence of said spring bias.

5. The arrangement as defined in claim 1 in which the cylindrical members are hollow so that air can flow through them, said locking ring has angled slots therein generally coinciding with the placement of said recesses, said portions of said ring which prevent movement of said projections out of said recesses being end portions of said slots, said locking ring is normally spring biased to a rotative position to prevent movement of said projections out of said recesses and lock said cylindrical members together and said locking ring has means associated therewith to cause rotation against its bias.

6. The arrangement as defined in claim 5 in which the means on said ring engaging said projections for positively driving said projections completely out of said recesses are inclined ramp portions extending substantially the entire length of said angled slots.

7. The arrangement as defined in claim 5 in which portions of said ring are angled and configured so that as said spaced projections are pushed against such portions, said ring is caused to rotate to admit said spaced projections, and thereafter to rotate back into the locking position under the influence of said spring bias.

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