This invention relates to a suction cleaning tool, and particularly to a suction cleaning tool wherein a brush is positioned directly in the suction path. This invention is particularly applicable to suction nozzles commonly utilized in connection with vacuum cleaners.

Much work has been done to develop a satisfactory arrangement for the mounting of a brush in a suction nozzle. The mounting of the brush has generally been accomplished by fastening means such as bolts, screws, etc., which have been either threaded into the nozzle or caused to pass through it.

Complications arise when the brush is to be located directly in the suction passage of the nozzle rather than located at the back edge of the nozzle and outside of the direct path of the suction. Further, difficulties are encountered when the nozzle is made of a plastic or rubber-like material since these materials generally do not have sufficient holding ability for threaded fasteners and the drilling of holes in plastic materials or the like causes weakening of the structure which may result in incipient cracking of the material. Also, some of the brush mounting arrangements proposed have been satisfactory from a mechanical or operating standpoint but have resulted in the nozzles being objectionable from an appearance standpoint.

In accordance with the present invention, the difficulties mentioned above are overcome, and an improved brush mounting arrangement is provided for a cleaning tool by which the brush is disposed longitudinally in the suction path of the nozzle opening intermediate the sides thereof. Also, the invention provides an improved brush mounting arrangement by which a brush may be mounted directly in the suction path of a nozzle without the use of screws or bolts and without drilling or machining holes or cavities in the nozzle. Further, an improved brush mounting is provided which does not weaken the nozzle and is simple in its construction and easy and low in cost to manufacture.

The present invention also provides a cleaning tool which has an aesthetically acceptable appearance and which is characterized by the simplicity of its components and the ease of manufacture and assembly thereof.

The specific nature of the present invention, as well as other advantages thereof, will become apparent to those skilled in the art from the following detailed description and the drawings, in which:

Figure 1 is a bottom view of the cleaning tool embodying the present invention.

Figure 2 is an enlarged sectional view, taken along line 2--2 of Figure 1, illustrating the particular brush mounting arrangement of the present invention.

Figure 3 is a further enlarged view of the mounting arrangement taken along line 3--3 of Figure 2.

Figure 4 is an enlarged perspective sectional view through a portion of the brush assembly showing one mounting bracket.

Figure 5 is an enlarged sectional view of the nozzle without the brush assembly.

As herein shown, a suction cleaning tool comprises an air conduit 10 and a suction nozzle 11, having end portions 12 and 13 and longitudinal side portions 14 and 15 which define an elongated suction opening and a suction passage to connect with an air conduit 10, which in turn is connected to a suction source.

Extending from the side walls of the nozzle transversely into the suction passage are pairs of cooperating ribs 16 and 17. These ribs are positioned in opposing relationship on the sides of the nozzle between the central air conduit and the ends of the suction opening of the nozzle. Each of the opposing ribs has a recess which forms a slotted portion 18 and a shoulder portion 19 which in combination with the corresponding slotted portion 18 and shoulder portion 19 of its cooperating rib acts to receive and hold a brush assembly in the manner hereinafter described.

A strip brush member 20 comprises bristles secured around a suitable wire and held in position by means of an elongated, channel-shaped holding member. To the elongated, channel-shaped member of the strip brush are mounted near each end portion of the brush supporting brackets 21 and 22 which may be secured thereto in any desired manner such as crimping, spot welding, etc. Supporting bracket 21 has outwardly extending flanges 23 and 24 which are provided with cut-out portions or slots 25 and 26, respectively. Supporting bracket 21 is also provided with upwardly extending stabilizer portions 27 and 28 and an upwardly extending spring means 29. Similarly, supporting bracket 22 has outwardly extending flanges, upwardly extending stabilizer portions, and spring means identical with those of supporting bracket 21.

To mount the brush assembly in the nozzle, the assembly is placed in the suction opening with the bristles extending outwardly. The assembly is placed so that the supporting brackets 21 and 22 each are positioned on the same side of the pair of ribs 16 and 17, respectively. Depressing the brush assembly into the suction nozzle causes a deflection of spring means 29 and a positioning of the supporting brackets 21 and 22 in alignment with the slotted portions 18 of the pair of ribs 16 and 17. Then movement of the brush assembly longitudinally causes the flanges of the supporting brackets to slide part way through slotted portions 18 until the pair of slots 25 and 26 on bracket 21 register with the pair of ribs 16, and the slots on the bracket 22 register with the pair of ribs 17. At this time, if pressure on the brush assembly is reduced or released, the assembly is caused, by the spring pressure against the interior of the suction nozzle, to slide outwardly from the nozzle toward the face of the suction opening. The flanges of supporting brackets 21 and 22 are thereby forced against the shoulder portions 19 of the ribs 16 and 17 whereupon the brush is locked in place against longitudinal movement but may be moved to a limited extent inwardly or outwardly of the nozzle.

To remove the brush assembly from the suction nozzle, the brush assembly is again depressed up into the suction opening causing the flanges of the supporting brackets to be realigned with the slotted portions of the ribs. Movement of the brush assembly longitudinally at this point causes the flanges of each supporting bracket to slide from the slotted portions of the ribs so that the brush assembly is freed from the ribs and may be removed from the suction nozzle.

According to the present invention, the brush member is resiliently mounted in such a manner that it is permitted to move bodily parallel to the side walls of the nozzle transversely in its plane, but is restricted against
longitudinal movement. Turning of the assembly is prevented by stabilizer portions 27 and 28 extending upwardly from brush supporting brackets 21 and 22. These stabilizer portions bear against the parallel end walls of the ribs and thereby prevent such turning or twisting of the brush assembly. As stated above, the springs maintain the brush member in an outwardly extending position against the extent of movement of the brush assembly being governed by the size of the shoulder portions 19 of the ribs 16 and 17.

The suction cleaning tool body comprising air conduit 10 and nozzle 11 may be made of any suitable nozzle material. Although the brush mounting arrangement is especially applicable to nozzles made of a plastic or rubber-like material, it may also be useful with nozzles made from a light metal such as an aluminum alloy, etc., in which the ribs sections may be molded or cast as an integral part of the nozzle.

The present invention, thus, provides an improved brush mounting arrangement for a suction cleaning tool which is of simple construction and which can be easily manufactured and assembled at low cost. Furthermore, an arrangement is provided for mounting a brush without the use of screws or bolts and without drilling or forming holes into the nozzle.

The brush mounting arrangement permits the brush to be mounted intermediate of the suction opening and in the direct path of the suction. This construction causes the dirt agitated by the brush to be sucked into the vacuum cleaner irrespective of the direction in which the suction nozzle is moving during the cleaning operation. As a result, the suction tool of the present invention operates more efficiently and with less effort on the part of the user compared with conventional suction tools having a brush located at the back part of the nozzle and outside of the direct suction path.

Although the invention has been illustrated and described with regard to the preferred embodiment of the invention, it will be apparent to one skilled in the art that various modifications may be made, and such modifications are intended to be within the scope of the invention as set forth in the following claims.

What is claimed is:

1. A suction cleaning tool comprising a nozzle having end portions and side walls defining a lower work face provided with an elongated suction opening, said suction opening extending upwardly to form a suction passage through said tool, pairs of cooperating ribs extending transversely into said passage from the side walls of the nozzle, each pair of said ribs being provided with opposing upwardly facing shoulder portions, an elongated brush member positioned longitudinally of said suction opening intermediate said side walls, supporting brackets mounted on said brush member, each of said supporting brackets having slotted outwardly extending flanges and upwardly extending spring means, said brush member and its supporting brackets being mounted by engagement of the slots in the flanges of said brackets with said transverse ribs, said brush member being maintained in an outwardly extending position by said spring means and being restrained from movement outwardly of the nozzle by the engagement of said flanges with the shoulder portions of said ribs.

2. A suction cleaning tool comprising a nozzle having end portions and side walls defining a lower work face provided with an elongated suction opening, said suction opening extending upwardly to form a suction passage through said tool, pairs of cooperating ribs extending transversely into said passage from the side walls of the nozzle, each pair of said ribs being provided with opposing slotted portions and opposing upwardly forming shoulder portions below said slotted portions, and elongated brush member positioned longitudinally in said suction opening intermediate said side walls, supporting brackets mounted on said brush member, each of said supporting brackets having slotted outwardly extending flanges and upwardly extending spring means, said brush member being detachably mounted by endwise movement while pressed within said nozzle, said flanges aligning with and moving longitudinally into said slotted portions of said ribs to permit engagement of the slots in the flanges of said brackets with said ribs, said brush member being maintained in an outwardly extending position by said spring means and being restrained from movement outwardly of the nozzle by the engagement of said flanges with the shoulder portions of said ribs.

3. A molded suction cleaning tool comprising a nozzle having end portions and side walls defining a lower work face provided with an elongated suction opening, said suction opening extending upwardly to form a suction passage through said tool, integrally molded pairs of cooperating ribs extending transversely into said passage from the side walls of the nozzle, each pair of said ribs being provided with opposing slotted portions and opposing upwardly facing shoulder portions below said slotted portions, an elongated brush member positioned longitudinally in said suction opening intermediate said side walls, supporting brackets mounted near each end portion of said brush member, each of said supporting brackets having slotted outwardly extending flanges, upwardly extending stabilizer portions, and upwardly extending spring means, said brush member being detachably mounted by endwise movement while pressed within said nozzle, said flanges aligning with and moving longitudinally into said slotted portions of said ribs to permit engagement of the slots in the flanges of said brackets with said ribs, said brush member being maintained in outwardly extending position by said spring means and being restrained from movement outwardly of the nozzle by the engagement of said flanges with the shoulder portions of said ribs.

References Cited in the file of this patent

UNITED STATES PATENTS
1,533,919 Keefer Apr. 14, 1925
2,414,853 Comiskey Jan. 28, 1947
UNITED STATES PATENT OFFICE
CERTIFICATION OF CORRECTION

Patent No. 2,972,771

February 28, 1961

John A. Kemper

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 13, for "forming" read -- facing --.

Signed and sealed this 25th day of July 1961.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents