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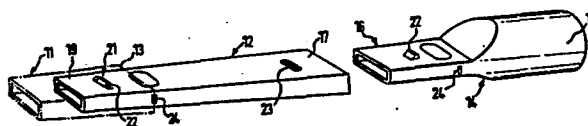
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54 **Vacuum cleaner attachment system for cleaning narrow spaces.**

57 A vacuum cleaner attachment system for cleaning narrow spaces having a flattened suction attachment tool (11) removably connected by one or more flattened extension tubes (12) to a flattened-to-round adapter (14) attachable to conventional circular cross-section vacuum cleaner suction hoses, the parts being releasably held together by manually operable detents (21).



"VACUUM CLEANER ATTACHMENT SYSTEM FOR
CLEANING NARROW SPACES"

This invention relates to vacuum cleaner attachment systems, and more particularly to systems using extension tubes between the cleaning tool and the vacuum cleaner hose.

5 Systems for removably attaching tools to a vacuum cleaner hose are well known in the prior art. All of the "tank type" vacuum cleaners currently on the market, and some of the "upright" vacuum cleaners, utilise flexible hoses to provide suction at positions remote
10 from the vacuum cleaner to afford better accessibility to such locations. Many of today's vacuum cleaners use extensions of various kinds for increasing the reach of the hose, with the suction tool being releasably mounted on the end of such extensions so that they can be
15 replaced with other tools.

 It has also heretofore been known to provide narrow, elongated suction tools for removing dust and dirt from narrow places see, for example, United States Patent 4,332,051 and the patents cited during the prosecution
20 thereof.

However, each of the prior art patents known to the applicant is narrow over only a portion of its length and then bulges outwardly to a circular cross-section adapted for connection to the end of a vacuum cleaner
5 hose. Many times the operator of the vacuum cleaner desires to clean narrow spaces of a length too great to be reached by conventional flattened end tools as, for example, the space beneath a refrigerator or stove. Dust, lint and other debris accumulate in such spaces
10 and cannot be removed by presently known vacuum cleaner attachments.

The applicant is also aware of the following U.S.A. patents which have relevance namely:

- U.S.A. Patent 1,403,524
- 15 U.S.A. Patent 1,694,257
- U.S.A. Patent 2,276,078, and
- U.S.A. Patent 2,789,307.

The vacuum cleaner attachment system of the present invention makes it possible to clean narrow, deep spaces
20 which have heretofore been unreachable by conventional vacuum cleaner tools. This is accomplished in the present invention by a flattened tool which can be fully inserted into the narrow, deep spaces. The effective length of the tool is selectively increased or decreased
25 at the will of the user by interposing flattened extension tubes between the attaching end of the tool and the flattened end of a round-to-flattened adapter

capable of being mounted on the end of a vacuum cleaner attachment hose.

Each flattened extension tube has a receiving end formed for telescoping engagement over the flattened end of the adapter and an opposite insertion end formed for
5 telescoping reception within the attachment end of the flattened tool. Since the receiving ends of the flattened extension tubes are all of the same size and configuration, as are the insertion ends, as many of the
10 flattened extension tubes as may be desired can be interposed between the adapter and the flattened tool.

The different parts of the system are held together in the described telescoping engagement by manually operable detents on the insertion ends releasably
15 engageable in openings formed in the receiving ends.

It is therefore an object of the present invention to provide a vacuum cleaner attachment system capable of cleaning long and deep narrow spaces between adjacent objects without requiring that the objects be moved.

20 Another object of the present invention is to provide a vacuum cleaner attachment system of the character described which may be readily lengthened or shortened to adapt the system to differing sizes of narrow spaces to be cleaned.

25 A further object of the present invention is to provide a vacuum cleaner attachment system of the character described in which the various parts are held

securely together for operation, but which can readily be manually detached from each other and parts removed or additional parts added.

To enable the nature of the invention to be fully understood, a particular and at present preferred
5 embodiment of the same is hereafter described by way of non-limitative example with reference to the accompanying drawings, in which:

Figure 1 is a perspective, partially exploded view
10 of a portion of a vacuum cleaner attachment system constructed in accordance with the present invention;

Figure 2 is a plan view on an enlarged scale of a flattened extension tube forming part of the vacuum cleaner attachment system of the present invention and
15 shown in operative association with fragmentary portions of other elements of the system illustrated in chain-dashed lines;

Figure 3 is a side elevational view of the flattened extension tube of Figure 2;

20 Figure 4 is an end view of the flattened extension tube of Figures 2 and 3;

Figure 5 is a vertical cross-sectional view on an enlarged scale of a telescoping engagement and detent means illustrating how the parts of the vacuum cleaner
25 attachment system of the present invention are releasably secured together;

Figure 6 is a plan view of a flattened suction cleaning tool forming part of the system of the present invention; and

Figure 7 is a vertical cross-sectional view
5 substantially on the plane of line 7-7 of Figure 6.

While only the preferred form of the invention is illustrated in the drawings, it will be apparent that various modifications could be made within the ambit of the appended claims.

10 As may be seen in the accompanying drawings, the vacuum cleaner attachment system of the present invention provides a flattened suction attachment tool 11 having a width substantially greater than its height, a flattened extension tube 12 removably attachable to an
15 end 13 of the tool 11 and likewise having a width substantially greater than its height, and an adapter tube 14 having a flattened end 16 attachable to an end 17 of the flattened extension tube 12 opposite to the tool 11, the adapter tube 14 having a substantially
20 cylindrical end 18 opposite the end 16 formed for removable attachment to a vacuum cleaner hose (not shown).

For ease of manufacture, the flattened attachment tool 11, the flattened extension tube 12 and the
25 flattened end 16 of the adapter tube 14 are shown to be of substantially rectangular cross-section commensurate in size, with the width of the rectangular cross-section being over three times its height.

In accordance with the present invention, the flattened attachment tool 11, the flattened extension tube 12, and the adapter tube 14 are releasably securable to each other by forming an end 17 of the extension tube 12 to telescope over the flattened end 16 of the adapter tube 14, and by forming the attaching end 13 of the flattened tool 11 to telescope over the insertion end 19 of the extension tube 12, the parts being releasably secured together when telescoped one on the other by detent means 21.

The detent means 21 is provided by making the end 16 of the adapter tube 14, and the end 19 of the flattened extension tube 12, both of which telescope within receiving ends 17 or 13, sufficiently resilient for the longer sides of the rectangular cross-sections to be squeezed together by the human hand in the manner illustrated in dotted lines in Figure 5. A raised bevelled protuberance 22 is formed on one or both sides of the ends 16 and 19 so as to be releasably engageable in detent openings 23 formed through the receiving ends 13 and 17. Alignment of the detents 22 with the openings 23 is assured by positioning shoulders 24 formed on the ends 16 and 19.

As will be apparent, insertion ends 16 and 19 are substantially identical to each other, as are the ends 13 and 17. Thus, the end 16 can be received in the end 13 of the flattened tool 11, or it can equally well be

received in the end 17 of the flattened extension tube 11. Likewise, the insertion end 19 of the flattened extension tube 12 can be received in the end 13 of the flattened tool 11 or in the receiving end 17 of another flattened extension 12. Thus, by interposition or removal of the flattened extension members 12, the effective length from the adapter 18 to the outer end of the flattened tool 11 can be increased or decreased as desired.

While any suitable flattened tool may be used in the vacuum cleaner attachment system of the present invention, the tool configuration illustrated in Figures 6 and 7 of the drawings functions particularly well. As there shown, the tool 11 is shaped similarly to the flattened portion of an ordinary vacuum cleaner crevice tool, that is, with the height and width of the tool tapering down toward the outer end 26 in the manner illustrated in Figures 6 and 7 of the drawings. The outer end 26 is bevelled at 27 in the manner shown in Figure 6 of the drawings and the tip 26 is open.

An opening 28 controlled by a sliding door is formed through one flat face 29 of the tool 11, and a comparatively flat brush 31 is mounted around the opening 28 to stir up dust and debris sufficiently for them to be drawn into the tool 11.

From the foregoing, it will be seen that the vacuum cleaner attachment system for cleaning narrow spaces of the present invention, and as described above, provides a novel approach and facility for cleaning those deep
5 and narrow spaces beneath stoves, refrigerators, and the like, and other similarly heretofore inaccessible spaces.

CLAIMS

1. A vacuum cleaner attachment system characterised by a flattened suction attachment tool (11) having a width substantially greater than its height, a flattened extension tube (12) removably
5 attachable to an end of said tool (11) and likewise having a width substantially greater than its height, and an adapter tube (14) having a flattened end (16) attachable to the end of said flattened extension tube (12) opposite to said tool (11), said adapter tube (14)
10 having a substantially cylindrical end (18) opposite to its said flattened end (16) formed for removable attachment to a vacuum cleaner hose.

2. A vacuum cleaner attachment system as claimed in Claim 1, wherein the widths of said flattened
15 attachment tool (11) and said flattened extension tube (12) and the flattened end (16) of said adapter tube (14) are substantially commensurate.

3. A vacuum cleaner attachment system as claimed in Claim 1, wherein said flattened attachment tool (11)
20 said flattened extension tube (12) and said flattened end (16) of said adapter tube (14) are of substantially rectangular cross-section.

4. A vacuum cleaner attachment system as claimed in Claim 3, wherein the width of said rectangular
25 cross-section is over three times its height.

5. A vacuum cleaner attachment system as claimed in Claim 1, wherein said flattened attachment tool (11), said flattened extension tube (12) and said adapter tube (14) are releasably securable to each other by forming
5 an end (17) of said extension tube to telescope over the flattened end (16) of said adapter tube (14), and by forming the attaching end (13) of said tool to telescope over the end (19) of said extension tube (12), said extension tube (12) and said tool (11) and adapter tube
10 (14) being releasably secured together where telescoped one on the other by detent means (21).

6. A vacuum cleaner attachment system as claimed in Claim 5, wherein the telescoping ends of said tool (11), extension tube (12) and adapter tube (14) are
15 sufficiently resilient for the inner sides of said rectangular cross-sections to be squeezed toward each other by the human hand, and further comprising an opening (23) formed through the ends of said tool, extension tube and said adapter tube which are on the
20 outside when telescoped, and a raised bevelled protuberance (22) on each said first named ends registerable with and releasably engageable in said opening.

7. A flattened extension tube for releasably
25 interposing in a connection between a flattened vacuum cleaner attachment tool (11) and the flattened end (16) of a flat-to-round adapter tube (14), comprising a

flattened tube (12) having one end formed for releasable attachment to the vacuum cleaner tool and an opposite end formed for releasable attachment to the flattened end of the adapter tube, said one end being formed for
5 releasable attachment to said opposite end whereby a plurality of said flattened extension tubes may be strung together to provide extensions of desired length

8. A flattened extension tube as claimed in Claim 7, and wherein portions of said attachment tool (11),
10 said adapter tube (14) and said extension tube telescope together, and are releasably held in such telescoped condition by manually operable detent means (21).

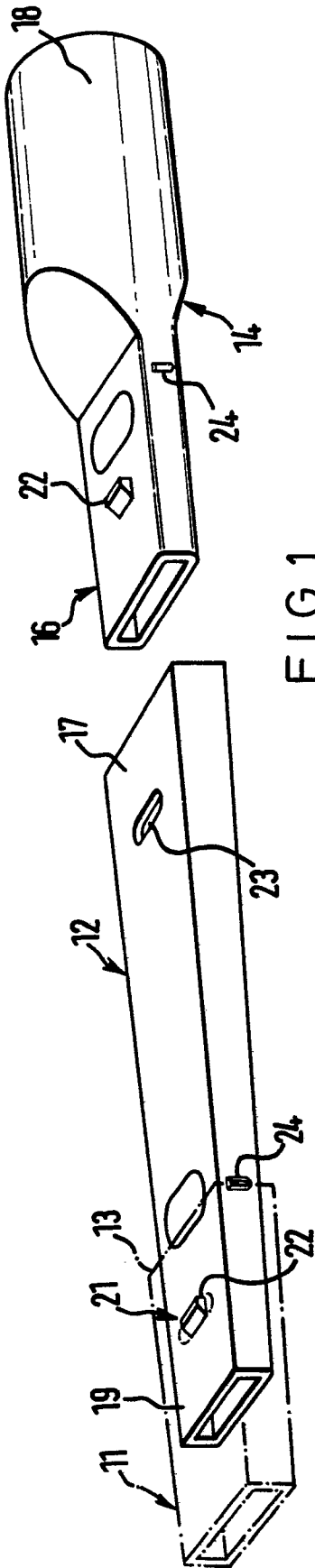


FIG. 1.

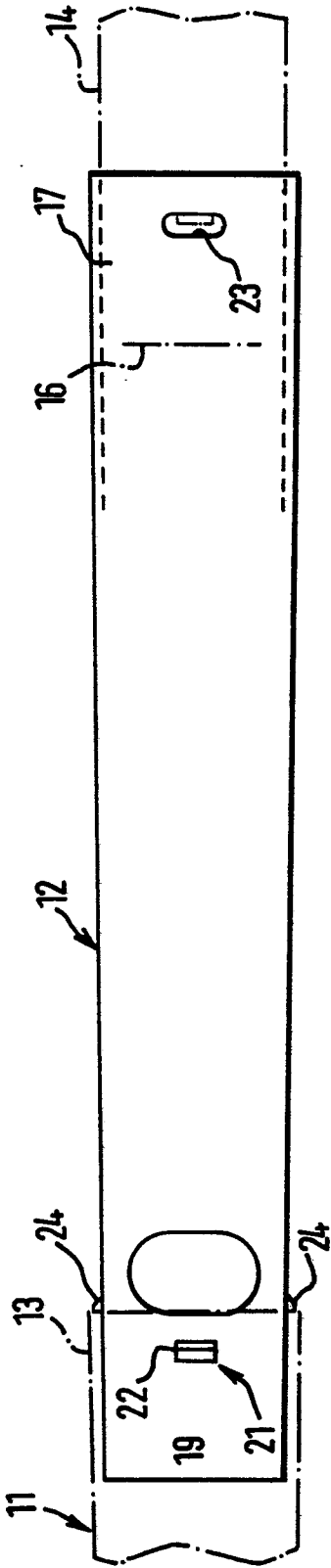


FIG. 2.

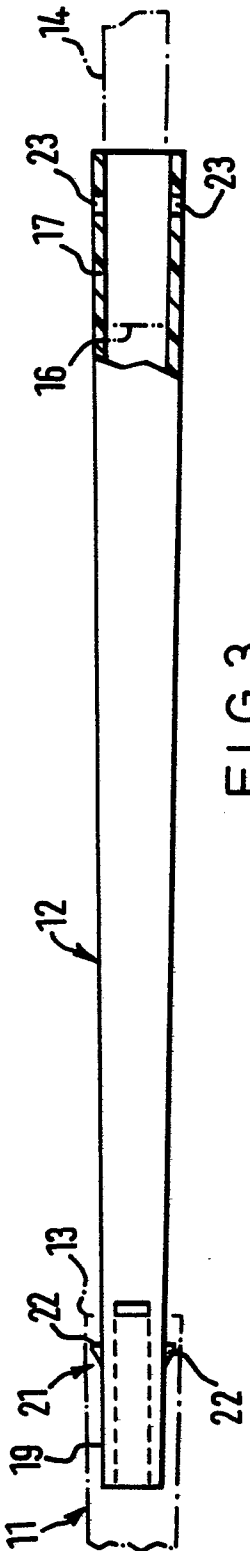


FIG. 3.

