June 7, 1955 L. J. FAITH-ELL 2,710,204

ADJUSTABLE ANGLE SWIVEL ELBOW

Filed April 19, 1950

Fig. 1.

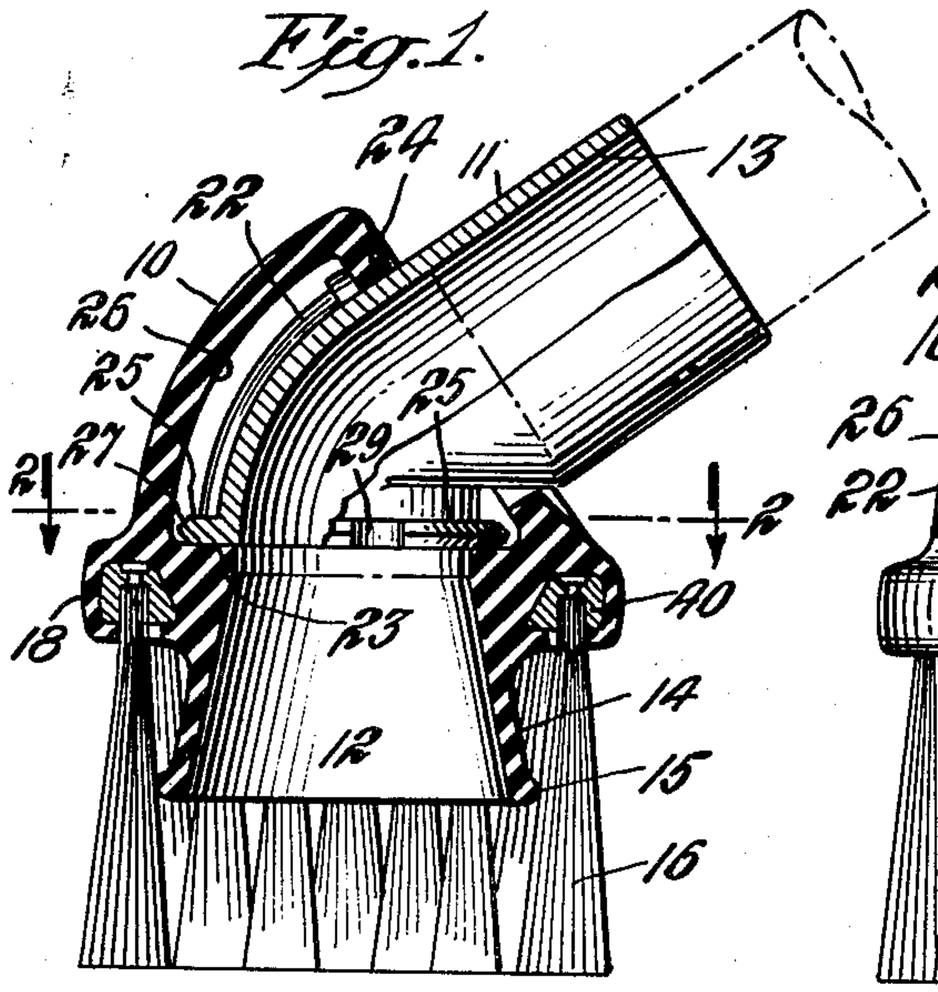


Fig. 3.

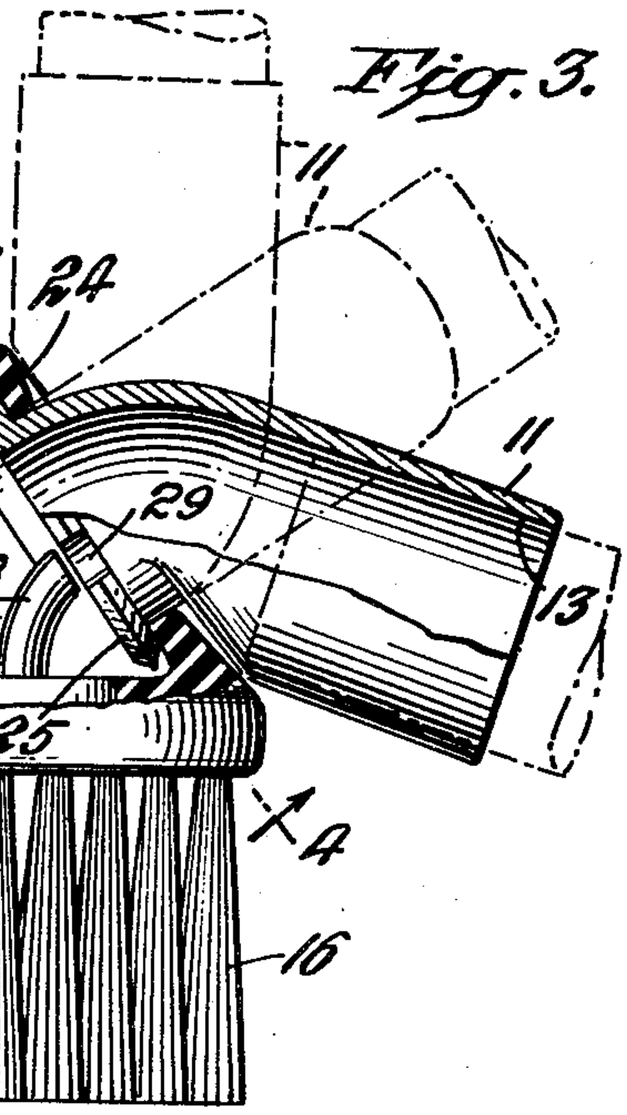


Fig. 2.

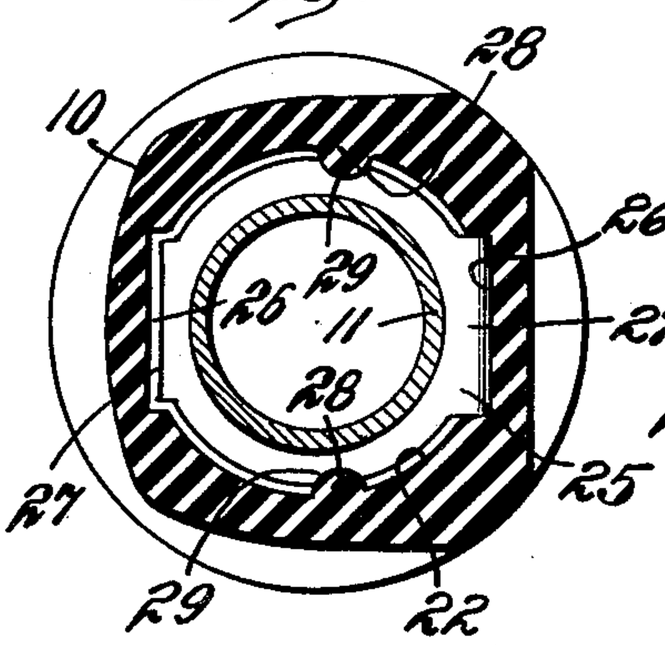
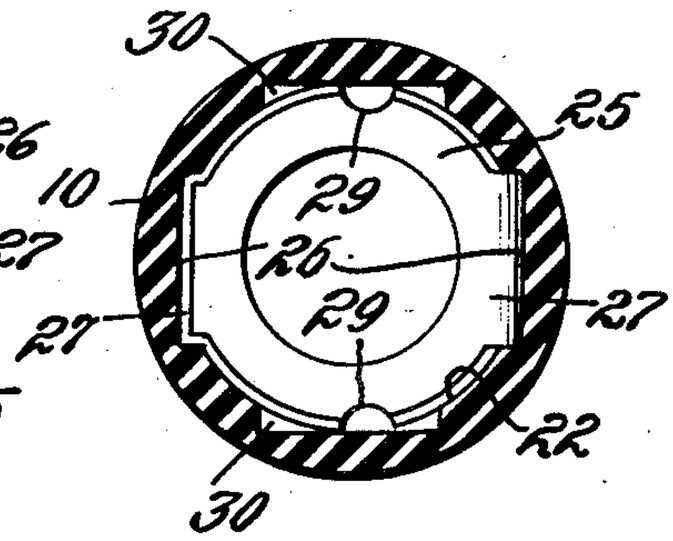


Fig. 4.



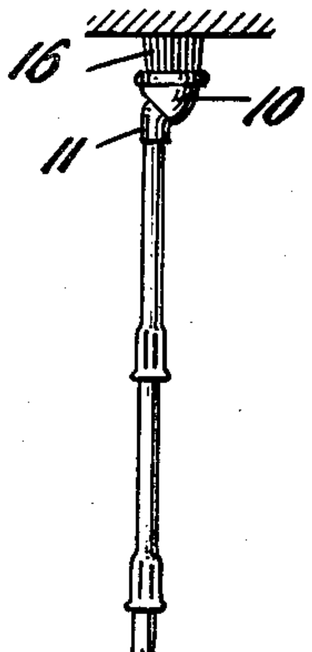
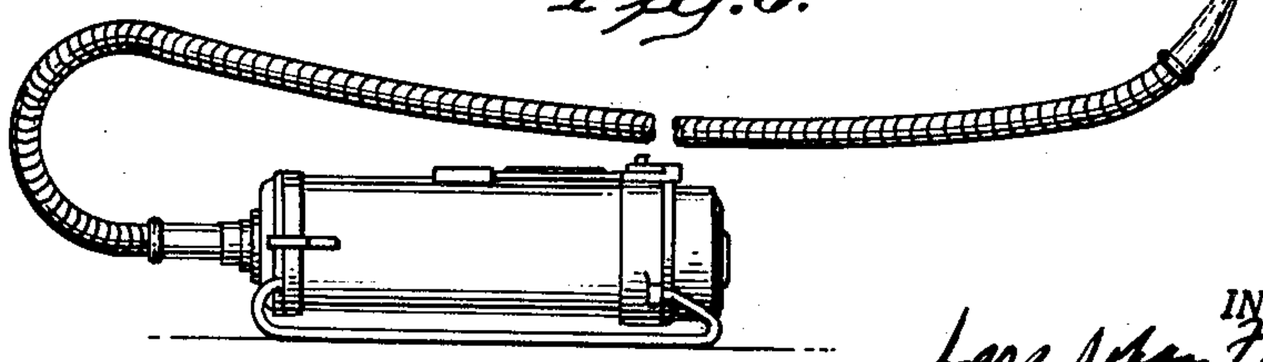


Fig. 5.



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ADJUSTABLE ANGLE SWIVEL ELBOW

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13 Claims. (Cl. 285—97.5)

This invention relates to vacuum cleaner nozzles and particularly to the type which includes an opening or mouth through which the dirt and dust passes, and a brush arranged around such mouth, and includes also an attachment member pivotal in several directions and to which the suction or blower tube of the cleaner is adapted to be detachably connected.

It has been heretofore proposed to provide nozzles with a rubber mouth or body member on which a brush is mounted and to pivotally secure an attachment member thereto. In such arrangements, the attachment member is usually guided by bearing journals which limit its movement to a plane disposed at right angles to the axis of rotation of the journals.

An object of the present invention is to provide a nozzle in which the body or so-called mouth portion thereof is provided with an arcuate channel or passage in which the end of the attachment member is fitted and is movably confined. This results in simplicity of construction and assembly, and, since the attachment member is adjustable in several planes with respect to the mouth portion, a great flexibility in use results.

With this and other objects to be hereinafter set forth in view, I have devised the particular arrangement of parts to be described below and more particularly pointed out in the claims appended hereto.

In the accompanying drawing, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a vertical sectional view through a nozzle constructed in accordance with the invention, the attachment member of the nozzle being shown in its normal operating position or the position in which the nozzle appears when cleaning the floor or other articles or surfaces readily accessible from above;

Fig. 2 is a sectional view taken on the line **2—2** of Fig. 1, looking in the direction of the arrows;

Fig. 3 shows the nozzle in partial section from the side, the attachment member being shown in its upper position or the position which it assumes when the nozzle is used when cleaning elevated surfaces such as molding, panels or other elevated parts or surfaces;

Fig. 4 is a sectional view taken on the line **4—4** of Fig. 3, looking in the direction of the arrows; and

Fig. 5 shows a vacuum cleaner of the type which has an air tube or conduit to which a so-called brush nozzle made according to the present invention is adapted to be attached.

In the embodiment of the invention disclosed in the drawing, the vacuum cleaner nozzle is made of two main sections, namely, an elastic body member or mouthpiece section **10** preferably composed of rubber or other equivalent elastic material, and an attachment member **11** which is composed of metal or it might possibly be made of plastic. The body member **10** is provided with a lower flared end portion forming a suction opening **12**, and the attachment member **11** movably fitted within the body member **10** is provided with a conical sleeve portion **13** to which a suction or air blast tube, shown in dotted lines in Fig. 1, can be connected.

The body member **10** of the nozzle is provided with a flared end **14** having the lower end thereof reinforced by a circumferential bead **15**. About the suction opening **12** is disposed an annular wall of bristles **16** forming a brush. The top ends of the bristles **16** are secured

in a head **40** inserted in an annular groove formed within the part **18** of the body member **10**, as clearly shown in Fig. 1. The head **40** of the brush is thus enclosed and the part **18** of the body member extending about the head **40** constitutes a protective covering to protect furniture against which the nozzle is likely to contact during a cleaning operation.

In the upper portion of the body member **10** is provided an elongated channel **22** in which the attachment member **11** can be moved in a pivotal and rotative manner. The cross-sectional shape of the channel **22** is essentially circular, as best seen in Fig. 2. In vertical section, as shown in Fig. 1, the channel **22** appears as a sector of a circle and thus defines an arcuate passage having an elongated surface portion in which the surface portion of an end of the attachment member **11** is movable. The inner end of the passage **22** is provided with an end wall **23**, while the opposite or outer end of the passage is provided with a second end wall **24**. The inner end wall **23** acts to limit the inward swing of the attachment member **11**, the limit of which is the position shown in Fig. 1; and the outer end wall **24** serves to limit the outward swing of the member **11**, the limit of which is the position shown in Fig. 3. When the end of the attachment member **11** rests in contact with either of the walls **23** and **24**, a sealing effect against air loss is attained.

It will now be understood that the attachment member **11** and body member **10** are telescopically connected to one another with a section of the attachment member **11** confined and enveloped within the body member. When the attachment member **11** is moved axially with respect to the body member **10**, all parts of the attachment member enveloped in the body member move simultaneously in the same direction lengthwise of the axes of the members.

The attachment member **11** is arranged coaxially with respect to the channel **22**, is swingable from the position shown in Fig. 1 to that shown in Fig. 3, and at its inner end within the body member **10** is formed with a radially extending flange **25** which confines the inner end of the attachment member within the channel **22**. The flange **25** engages and abuts the end walls **23** and **24** when the attachment member is in the positions of Figs. 1 and 3, respectively. For the purpose of guiding the attachment member **11** in its swinging movement between the end walls **23** and **24**, the elongated surface portion or wall of the channel **22** is formed with two shallow plane recesses **26** at diametrically opposed regions thereof, whereby the channel **22** deviates from its essentially circular cross-sectional shape. Opposing projecting parts **27** are formed at diametrically opposed regions of the flange **25** of the attachment member **11** which correspond in shape with and extend into the recesses **26**, such projecting and recessed regions **27** and **26**, respectively, providing cooperating tongue and groove parts for guiding the attachment member **11** when it is bodily moved between the end walls **23** and **24** of the body member **10**. Regions of the elongated surface portion or wall of the channel **22** are also formed with a pair of diametrically opposed inwardly extending curved ribs **28**, and regions of the flange **25** are formed with recesses or notches **29** corresponding in shape to the ribs **28** and received by the latter, such regions **28** and **29** also providing cooperating tongue and groove parts for guiding the attachment member **11** and body member **10** and preventing relative angular movement of the members about their axes when they are axially moved toward and from one another and the recessed portions **29** of the flange **25** move over the ribs **28** and are in engagement therewith. The ribs **28** begin at the lower end wall **23** of the channel **22** and terminate short of and below the upper

end wall 24, the distance between the upper ends of the ribs 28 and the upper end wall 24 being slightly greater than the thickness of flange 25, as best seen in Fig. 3.

The purpose of interrupting the ribs 28 in the manner just described is to permit the attachment member 11 to be rotated such as, for example, to the several positions indicated in dotted lines in Fig. 3. It will be noted that, in addition to the plane recesses 26, the wall of the body member 10 is also provided with two additional similar recesses 30 adjacent to the upper end wall 24, which recesses obviously have the same depth as the thickness of flange 25 and cooperate with the latter to provide additional cooperating tongue and groove parts, as will be explained presently. It will be clear from the foregoing that, when the attachment member 11 is located in the position shown in Fig. 3, wherein the flange 25 abuts the upper end wall 24 and the notches or recesses 29 are out of engagement with the ribs 28, the attachment member 11 can then be rotated in a plane at right angles to the plane of the pivotal movement of the attachment member from the position of Fig. 1 to that of Fig. 3. Such rotation imparted to the attachment member will cause the protruding parts 27 of flange 25 to move out of the recesses 26 and engage the recesses 30 according to the direction in which the attachment member is rotated. This engagement of the parts 27 with the recesses 26 or 30 serves as a stop for locating and holding the attachment member in any selected position to which it is rotated, and it will so hold that position until manually shifted. This pivotal movement of the attachment member 11 enables it to be positioned at various angles. For example, the position shown in dotted lines at the top in Fig. 3 is suitable for cleaning ceilings or other downwardly-directed surfaces, as shown in Fig. 5, while the position shown in full lines, forming more than a 90° angle with the first mentioned position is suitable for cleaning above doors or other elevated upwardly directed surfaces. The intermediate position shown in dotted lines in Fig. 3 is, for example, suitable for cleaning surfaces which are accessible only from the side.

While I have shown and described one embodiment of the invention, I do not wish to be restricted thereto since various modifications may be made without departing from the spirit of the invention. For example, while it is herein stated it is desirable to make the body member 10 of rubber or elastic material, the member 10 may be rigid and formed of metal, for example, and the flange 25 of the attachment member may be formed of rubber. Also, the locking provisions to prevent rotation of the attachment member may consist of projections in the wall of the channel 22 which are received by recesses formed in the flange of the attaching member. These and other variations in structure are considered as within the scope of the invention and the following claims.

What I claim is:

1. A suction nozzle comprising a body member having a suction passage extending therethrough including an arcuate-shaped portion, grooves and ribs formed lengthwise of the wall of the passage in the arcuate-shaped portion thereof, an attachment member having a flange at an end thereof formed with projections and recesses which fit in the grooves and ribs, respectively, in the arcuate-shaped portion of the passage, said flange being slidable axially of the passage having the grooves and ribs formed lengthwise of the wall thereof, the ribs terminating at a region removed from one end of the passage, the recesses of said flange, when the latter is in the gap between said one end of the passage and said region, being disengaged from the ribs in the passage for turning one of the members about its axis with respect to the other member responsive to rotating movement imparted thereto, said flange and the wall of the

passage at the vicinity of the gap constituting cooperating parts of which at least one is yieldable with respect to the other when one of said members is turned or rotated with respect to the other.

2. A suction nozzle comprising a body member having a suction passage extending therethrough including an arcuate-shaped portion, projections formed lengthwise of the wall of the passage in the arcuate-shaped portion thereof, an attachment member having a flange at an end thereof formed with recesses which receive the projections in the passage, said flange being slidable axially of the passage having the projections formed lengthwise of the wall thereof, the body member having stops or abutments at opposite ends of the arcuate-shaped portion of the passage in the path of movement of said flange, the projections at one end of the passage terminating at a region removed from one of the stops, the recesses of said flange, when the latter is in the gap between said one stop and said region, being disengaged from the projections in the passage for turning one of the members about its axis with respect to the other member responsive to rotating movement imparted thereto, and the members including complementary parts at said flange and inside wall of the arcuate-shaped portion of the passage at the vicinity of said gap for locating the attachment member at different positions when turned with respect to the body member, at least one of the cooperating parts being yieldable to allow turning movement of one member with respect to the other member.

3. A suction nozzle comprising a body member having a curved passage extending therethrough which includes an arcuate-shaped portion, an attachment member having a flange at an end thereof, means for telescopically connecting the attachment member within the body member to enable all enveloped parts of the attachment member, when the latter is moved axially with respect to the body member, to be moved simultaneously in the same direction lengthwise of the axes of the members, the wall of the passage of the body member in the lengthwise direction thereof and said flange having cooperating parts for guiding the attachment member during axial sliding movement thereof in the passage and preventing turning movement of the attachment member about its axis during such axial sliding movement, the body member having stops at opposite ends of the arcuate-shaped portion of the passage in the path of movement of said flange, the part of the wall at one end of the passage terminating at a region removed from one of the stops, the part of said flange, when the latter is in the gap between said one stop and said region, being disengaged from the cooperating part on the wall of the passage for turning one of the members about its axis with respect to the other member responsive to rotating movement imparted thereto.

4. A suction nozzle as set forth in claim 3 in which said flange and the wall of the arcuate-shaped portion of the passage at the vicinity of said gap include additional cooperating parts for holding and locating the attachment member at different positions when turned or rotated with respect to the body member, at least one of the additional cooperating parts being yieldable with respect to the other additional cooperating parts to allow turning movement of one member with respect to the other member from one holding position to another holding position.

5. A suction nozzle comprising a body member having a passage extending therethrough including an arcuate-shaped portion, an attachment member having a flange disposed within the passage which is movable lengthwise of the arcuate-shaped portion thereof, the wall of the passage in a lengthwise direction thereof and the flange having cooperating parts to guide the flange during axial movement thereof lengthwise of the passage and prevent free turning or rotation of the flange during such axial movement, stop means on the body member at opposite

ends of the arcuate-shaped passage which are in the path of movement of the flange, the part of the wall at one end of the passage terminating at a region removed from one of the stops, the part of the flange, when the latter is in the gap between said one stop and said region, being disengaged from the cooperating part of the wall of the passage for turning one of the members about its axis with respect to the other member responsive to rotating movement imparted thereto, and projections on the flange and recesses in the wall of the passage at the vicinity of the gap for halting the attachment member at different positions in its turning or rotating movement with respect to the body member, at least the region of the body member having the recesses being formed of a material which yields to movement of said projections toward and from said halting positions.

6. In a suction nozzle, a first member having a passage including a portion which is arcuate-shaped or curved in an axial direction, a second member having a passage, means for telescopically connecting said second member within the curved portion of the passage of said first member to enable all enveloped parts of said second member, when the latter is moved axially with respect to said first member, to be moved simultaneously in the same direction lengthwise of the axes of said members, means associated with said members for confining said second member in the curved portion of the passage of said first member between axially spaced apart positions of the latter, said members having cooperating parts which in a first engaged relation enables all parts of said second member to be moved simultaneously in the same direction lengthwise of the axes of said members in a particular path of movement between said spaced apart positions while preventing rotating movement being imparted to said second member with respect to said first member during such axial movement therebetween, said cooperating parts being in a second disengaged relation and free from one another when said second member is substantially at one of said spaced apart positions of the passage of said first member for turning one of said members about its axis with respect to said other member responsive to rotating movement imparted thereto.

7. In a suction nozzle, an attachment member having an air passage adapted to be connected to a source of suction, a body member having an air passage communicating with a nozzle opening, one of said members having an elongated surface portion which is arcuate-shaped in the direction of its length and the other of said members having a surface portion cooperating therewith, and means for connecting said members to establish communication between the air passages therein, said connecting means including regions of the cooperating surface portions of said members which provide cooperating tongue and groove parts which, in a first position of engagement, guides said members with respect to one another so that one of said members can be bodily moved in its entiretly in only an axial direction with respect to the other of said members in a curved path of movement, said cooperating tongue and groove parts, when one of said members is in a definite axial position with respect to the other of said members, being in a second disengaged position and free from one another to enable one of said members to be turned about its axis with respect to said other member responsive to rotating movement imparted thereto.

8. In a suction nozzle as set forth in claim 7 including means to limit the axial movement of said members toward and from one another between first and second end positions and in which said surface portions are in said second disengaged position and free from one another at the vicinity of one of said end positions of said members.

9. In a suction nozzle as set forth in claim 7 in which said attachment member is formed of rigid material and said body member is formed of elastic material, said

members having additional cooperating surface portions which serve to guide said members when axially moved with respect to one another while tending to prevent relative rotating movement therebetween, the additional surface portion provided on said elastic body member yielding to allow the cooperating additional surface portion on said rigid attachment member to move out of engagement therewith when said members are in said definite axial position with respect to one another to enable said members to be rotated with respect to one another.

10. In a suction nozzle as set forth in claim 7 in which said attachment member is formed of rigid material and said body member is formed of elastic material, said members having additional cooperating surface portions which provide cooperating tongue and groove parts to hold and locate said members against angular movement about their axes in a first position of said members when the latter are in said definite axial position with respect to one another and also to hold and locate said members against angular movement about their axes in a second position after rotating movement has been imparted to one of said members about its axis with respect to the other of said members for a definite angular distance from said first position, the elastic material of said body member yielding to enable said members to be moved from said first holding and locating position to said second holding and locating position.

11. In a suction nozzle, an attachment member having a passage adapted to be connected to a source of suction, a body member having an air passage communicating with a nozzle opening, the air passage of said body member including a curved section having a curved longitudinal axis, means for telescopically connecting said members to provide a sleeve-like connection therebetween in which one of the members receives and envelops a successively greater axially extending part of the other member when said members are moved axially toward one another, said connecting means including structure which enables said attachment member to be moved lengthwise with respect to the curved section of said air passage to vary the angular position of said members with respect to one another, and said connecting means including additional structure to enable each member to be relatively turned or rotated about its axis with respect to the other member when said attachment member is located at a first predetermined zone of the curved section of said air passage but to prevent such relative turning or rotation at other zones.

12. In a suction nozzle as set forth in claim 11 in which one of the members is provided with stops or abutments which are axially removed from one another and limit lengthwise movement of said attachment member with respect to the curved section of said air passage, and said additional structure includes provisions to enable each member to be relatively turned or rotated with respect to the other member when one of said stops or abutments is at the immediate vicinity at which it functions to limit lengthwise movement of the members.

13. In a suction nozzle as set forth in claim 11 in which said additional structure, when said attachment member is located at the first predetermined zone of the curved section of said air passage, provides a sliding fit for holding said members in a plurality of set positions with respect to each other while enabling each member to be turned or rotated about its axis between such set positions with respect to the other member.

References Cited in the file of this patent

UNITED STATES PATENTS

791,397	Asbury	May 30, 1905
1,869,645	Anderson	Aug. 2, 1932
2,074,042	Bank	Mar. 16, 1937

FOREIGN PATENTS

825,104	France	Nov. 27, 1937