June 28, 1927. 1,633,598

S. McCLATCHIE

VACUUM CLEANER DEVICE

Filed April 7, 1921

Fig. 1.

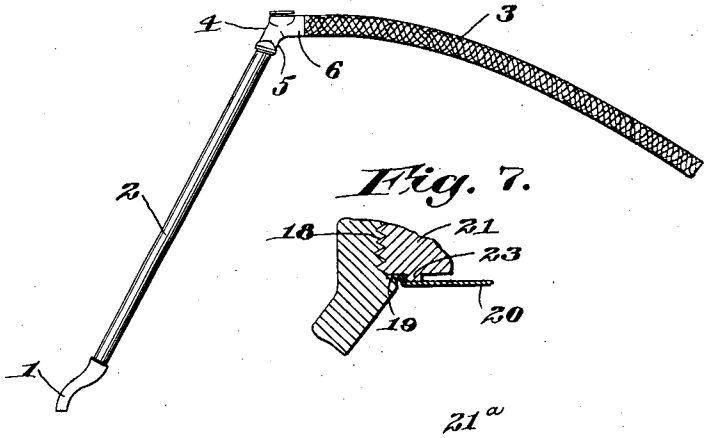


Fig. 7.

Fig. 2.

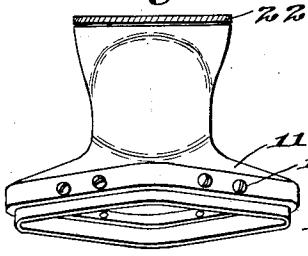


Fig. 6

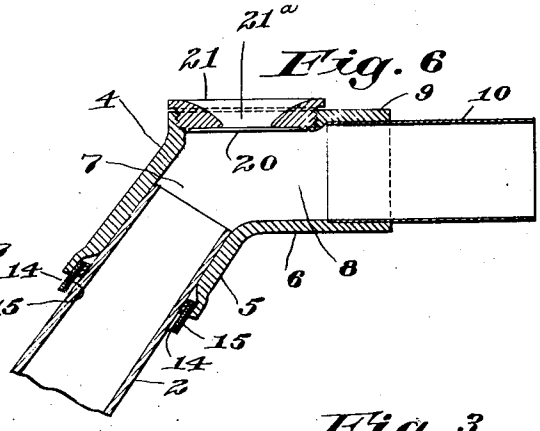


Fig. 5.

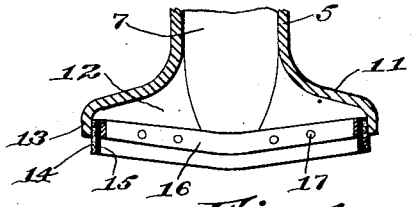


Fig. 3

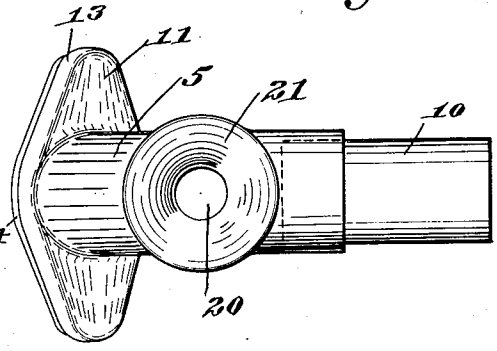
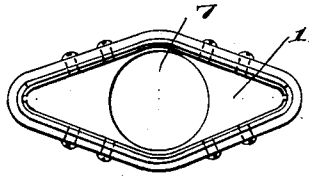


Fig. 4



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Attorneys

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UNITED STATES PATENT OFFICE.

STANLEY McCLATCHIE, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE APEX ELECTRICAL MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

VACUUM-CLEANER DEVICE.

Application filed April 7, 1921. Serial No. 459,394.

This invention relates to vacuum cleaners and is more particularly concerned with that type of cleaner wherein a length of flexible hose or conduit is interposed between the portable suction nozzle and the vacuum producing apparatus.

When devices of this character are employed for cleaning the floor, the nozzle proper is commonly mounted at the extremity of a rigid extension tube of a length such as to permit it to be readily grasped by the hand of the operator. This tube is provided at its upper end with means for connecting the end of the flexible hose. When the device is in use, the angle of inclination of the tubular rod is such as to make necessary some special provision for preventing the formation of a sharp bend in the hose adjacent the point of connection of the latter, and one object of the present invention is to furnish improved means for connecting the hose to the rigid tube. To this end there may be provided a rigid elbow to one branch of which the end of the hose may be secured, and the other branch of which may be provided with a socket for engaging the upper end of the extension tube.

Devices of this character are employed, not only for cleaning the floor, but also for cleaning tables, bookcases and articles of furniture, and particularly upholstered articles. For use in this manner, however, it is common to employ a suction nozzle device attached substantially directly to the end of the flexible conduit, such nozzle being provided with a grip or holding element whereby the operator is enabled to grasp the same for manipulating it. It is evident that with this construction it is necessary for the operator in turning from one class of work to the other to change the nozzles employed. This is a frequent source of annoyance and delay, as it is necessary for the operator first to remove the extension tube and then, after securing a nozzle of the type adapted for use in cleaning upholstery and the like, to attach the latter in position at the end of the hose. It is a further object of the present invention to obviate in large measure such difficulty and annoyance and to this end it is proposed to provide a connector device, preferably such as above referred to, with a permanently attached nozzle element which may be employed directly for cleaning upholstery and the like. In a preferred arrangement, this nozzle may be combined with the socket, above referred to, whereby the extension tube is secured to the connector device, so that by merely removing the tube therefrom, the nozzle is made operative for the purpose desired.

It is a well recognized fact in the cleaner art that it is more difficult to push the cleaner nozzle away from the operator than to draw it toward him, this being in a large measure due to the tendency of the edge of the cleaner nozzle to dig into the material being cleaned on the pushing stroke while gliding easily over the material on the pulling stroke. It has heretofore been proposed to provide the edge of the nozzle opening with an apron or curtain of a more or less flexible material in order to provide a soft surface for contact with the material to be cleaned, as well as to provide for the stirring up of the dust or dirt which may be embedded to some extent in the substance of the material being cleaned. A further object of the present invention is to provide means whereby the amount of force exerted by the operator on both the pushing and pulling stroke may be substantially equalized, and to this end advantage has been taken of the provision of such a flexible apron or curtain by forming the same of a material whose forward portions have a lesser coefficient of friction than the rear portions thereof, and as conducive to the desired function and as illustrative of means proper for carrying out the same, it is proposed to employ a curtain whose forward surfaces, that is to say, those which engage the article to be cleaned during the pushing stroke, are of material such as smooth finished leather having a relatively small coefficient of friction, while the rear surfaces thereof are formed of soft rubber or similar material having a high coefficient of friction.

In the employment of pneumatic cleaner apparatus, it is desirable that the operator be able to ascertain the relative quantity of dirt or dust passing through the discharge conduit, or in other words as to the extent to which the cleaning operation has proceeded. While it has been proposed to employ visual indicating means for the purpose, in most instances such devices have proven inadequate for the purpose for which they are designed as the glass or other transparent medium employed becomes

clouded so quickly as to render it useless. A further object of the present invention is to devise and provide efficient means for indicating the passage of dust or dirt through the cleaner duct of such a character that its indications shall be reliable even after long use, and which shall be capable of indicating the passage of even the most minute particles of solid matter. To this end it is proposed to provide an indicator of a character such that the passage of dust or dirt through the suction conduit will produce audible sounds. In accordance with one arrangement the connector device above referred to may be provided with a thin diaphragm of highly resonant material such for example as spring steel. This diaphragm consists of a very thin sheet of the proper material secured in the connector device in such a position that the air current and the particles of dust or dirt carried thereby will be caused to impinge upon the inner surface of such diaphragm. Means may be provided for tensioning the diaphragm if desired whereby to enhance its resonant qualities. The means for mounting the diaphragm may be so constructed as to permit the ready replacement thereof if the diaphragm should become ruptured or worn in use. Moreover, while preferably arranged in association with the connector device, it is clear that it might well be placed at any desired point in the suction passage.

As a preferred embodiment of means for carrying the invention into effect, that disclosed in the accompanying drawings may be employed, and in which drawings—

Fig. 1 is a side elevation illustrating the device of the present invention as employed for connecting a floor cleaning nozzle with a flexible suction hose.

Fig. 2 is a front end elevation of the device of the present invention with the floor cleaning attachment removed.

Fig. 3 is a top plan view of the device of Fig. 2, the suction hose also being removed.

Fig. 4 is a bottom plan view of the nozzle opening of the device of Fig. 2.

Fig. 5 is a transverse vertical cross section of the device illustrated in Fig. 2.

Fig. 6 is a longitudinal vertical cross section of the device as shown in Fig. 3; and

Fig. 7 is a fragmentary detail view to enlarged scale illustrating the means for tensioning the diaphragm.

Referring to Fig. 1, a floor cleaning nozzle of usual type is indicated at 1, such nozzle being carried at the end of an extension tube 2, this tube being substantially rigid and serving conveniently as a handle for manipulating the nozzle 1. A suction hose is indicated at 3, such suction hose leading from any suitable suction producing device such as a pump or the like and being secured to the tube 2 by means of the connector device 4. By the employment of such connector device it is clear that a short bend in the flexible hose 3 at the point where it is connected to the tube 2 is avoided.

The connector device 4 comprises a pair of angularly disposed and divergent members 5, 6, such members being tubular and thus providing a passage having angularly disposed portions 7, 8, respectively. The outer end of the member 6 of the connector device and designated by the numeral 9, may be referred to as a handle member and secured therein and forming a portion thereof is a nipple or short length of tube 10 adapted for insertion within the end of the hose 3 whereby to secure the hose to the connector device. The outer end of the member 5 is provided with a transverse elongated nozzle casing 11 providing a chamber 12 hereinafter referred to as the nozzle chamber and having an elongated opening at its lower side, such chamber forming substantially a continuation of the portion 7 of the passage through the connector device and into which such passage merges.

The nozzle casing is preferably of substantially "diamond" shape in horizontal section, thus providing a central portion of substantial width where it merges into the connector element 5, while at the same time, and without unduly increasing the area of the nozzle opening, providing flat side faces which permit of the movement of its nozzle into corners or into close proximity to flat surfaces.

The lower edge 13 of the casing 11 is provided with flexible depending aprons or curtains preferably consisting of superposed layers 14, 15 of unlike materials. These materials are so chosen that one has a substantially higher coefficient of friction than the other and as desirable for this purpose the layer indicated at 14 may be formed of a polished leather, while the layer indicated at 15 may be of soft rubber or a material having similar qualities. As indicated in Fig. 6, that portion of the curtain which lies along the forward edge of the chamber 12, as respects the direction of movement of the device away from the user, has the material of the lower coefficient of friction in engagement with the surface of the member 11, while the member having the higher coefficient of friction is disposed inwardly. At the opposite side however, of the chamber 12, the arrangement of materials is reversed, that is, the material having the higher coefficient of friction lies against the surface 11 while the member having the lesser coefficient of friction is presented toward the interior of the chamber 12. With this arrangement it is evident that the members 14 are both disposed in front of the members 15. For holding the aprons in proper position, strips

or plates of metal or other suitable material, indicated at 16, may be employed, such strips being secured along the inner side of the aprons by means of screws 17 or other suitable devices, such screws passing through suitable openings in the edges 13 of the casing 11 and engaging threaded openings in the strips 16. While this arrangement is regarded as desirable, it is to be understood that any other suitable means may be employed for retaining the aprons in position.

The portion 7 of the passage through the connector which lies within the member 5 thereof is preferably tapered inwardly and away from the chamber 12, such tapered portion serving for the reception of the upper end of the nozzle supporting extension tube 2. Such tube may thus be inserted within the connector device 4 and held securely therein by friction, while at the same time it is readily removable when it is desired to employ the nozzle comprising the member 11 for cleaning elevated objects such as upholstered furniture and the like.

At the upper portion of the connector device 4 and preferably in the top of the member 6 adjacent the junction of the latter with the member 5, that is to say, at a point at the outer side of the angle formed between the members 5 and 6 there is provided an opening which is internally screw threaded as at 18. This opening provides an annular flange 19 for supporting the edges of a circular diaphragm 20. This diaphragm is preferably of some thin and resonant material, such for example as spring steel. For retaining the diaphragm in position upon the flange 19, a ring 21 is provided, such ring being screw threaded upon its peripheral surface for engagement with the screw threads 18 and being knurled at its edge as indicated at 22 for ease of manipulation. This ring is provided with a central opening 21^a giving access to the upper surface of the diaphragm and is preferably provided at a point inwardly of the edge of flange 19 with an upstanding rib or bead 23. When the ring 21 is screwed down into engagement with the upper surface of the diaphragm, the rib 23 engages the diaphragm and serves to tension the latter inwardly of the seat formed by the flange 19. The resonant qualities of the diaphragm may thus be substantially increased.

In the normal operation of the device when being employed for cleaning the floor, the extension tube 2 is inserted within the tapered socket provided within the member 5, and the operator, grasping the handle portion of the connector, may manipulate the nozzle 1 in the usual manner. If now it be desired to clean elevated surfaces such as upholstered articles, tables, and the like, the operator merely removes the tube 2 from the connector device, whereupon the member 11 with its depending curtain may be employed as a suction nozzle, the user grasping the connector device by means of the handle portion 9, it being understood that such handle portion may be considered to comprise also the portion 10. When in use, the portion 10 is covered by the end of the hose 3 and the operator's hand thus grasps the portion 9 and also engages the outer surfaces of the hose 3.

By reason of the special arrangement of the curtain whereby the rubber portion thereof is at the rear and the smooth portion at the front, the operator is enabled to push and pull the device over the surface to be cleaned by the exertion of substantially equal force, whereas with the arrangements commonly employed, the force required for pushing the device forward is excessive.

During the operation of the device whether with the extension tube 2 or without the same, the current of air flowing through the passage in the connector device is caused to impinge upon the inner surface of the diaphragm 20, such action being accentuated by reason of the location of such diaphragm at the outer side of the angle formed in the passage. Any particles of dust or dirt carried by the air current and which strikes the diaphragm 20 produce an audible sound whereby the operator is able to determine as to the passage of such particles and with a little practice to estimate very nearly as to the relative quantity of such particles passing. He is thus enabled to determine as to whether the suction apparatus is functioning properly and also as to whether the dirt has been removed to the desired extent from the article being cleaned. The device thus produced not only serves as a connector for securing together the extension tube and the flexible hose without producing a short bend in the latter but also provides an auxiliary nozzle for the cleaning of upholstery and the like and an indicating device for showing the passage of dirt through the conduit.

While as hereinabove described the diaphragm is indicated as mounted in the connector device and at an angle thereof, it is clear that it might well be mounted at any desired point in a suction conduit and while certain materials have been mentioned as desirable and useful in the formation of the apron for the nozzle, it is to be understood that such materials have been named merely as illustrative of materials suitable for this purpose and that other materials might well be employed having the desired characteristics.

It is also to be understood that while the elements of the connector device have been disclosed as intersecting each other at a certain angle, the invention is not in any manner limited to this exact arrangement but

that such parts might be arranged at other angles as circumstances might direct. It is furthermore clear that while the extension tube 2 has been indicated as engaging the connector device by means of a tapered socket, other and equivalent means might be employed and also that nozzles or other shapes or arrangement might well be substituted for that herein shown without departing from the spirit of the present invention.

Having thus described the invention in a preferred embodiment of the same, together with a preferred mode of use thereof, what I claim and desire to secure by Letters Patent of the United States is:

1. In vacuum cleaning apparatus, a hand nozzle formed for attachment to a hose and having an oblong inlet mouth for direct application to articles to be cleaned, in combination with a rigid hollow extension tube adapted to be secured to said first nozzle in non-leaking relation, and a suction tool carried by said extension tube, said hand nozzle constituting a handle for said tube and tool.

2. In vacuum cleaning apparatus, a hollow handle having one end formed for attachment to a hose and the other end formed with a flaring inlet mouth for direct application to articles to be cleaned, in combination with a hollow extension handle having a shank adapted to extend freely through said mouth and engaged tightly inside said first handle, said extension handle having a suction tool at its opposite end.

3. In vacuum cleaning apparatus, a hollow handle adapted for attachment to the end of a flexible suction hose and having a laterally facing inlet mouth adapted for cleaning upholstery and the like, in combination with a hollow extension handle having an elongated shank, and means for securing said shank to said first handle in non-leaking relation, said extension handle having at its other end a nozzle adapted for cleaning floors and walls, said first inlet mouth being of substantially greater width than said shank.

4. A hand nozzle adapted for attachment to a hose and having a rounding throat and an oblong mouth, in combination with an extension tube having a round shank adapted to pass freely through said mouth and be secured in said throat, said tube having a suction tool at its end and said hand nozzle constituting a handle for said extension tube and tool when the latter is in place and also being adapted for independent use when said extension tube is not attached.

5. A connecting elbow for suction cleaning apparatus having one end formed for connection to a flexible hose and the other end flared laterally constituting a hand nozzle having an oblong inlet mouth and also having a tapered throat adapted to receive an extension tube.

6. A combined cleaning tool and connector for the purpose described comprising a hollow handle provided at one end with hose attachment means and at the other end with a laterally elongated inlet mouth adapted to be applied directly to a surface to be cleaned, the interior of said mouth being formed with a socket constructed and arranged for the reception of an extension tube.

7. Vacuum cleaning apparatus comprising a suction hose, an elbow-shaped fitting secured to the end thereof and having at one end a broadened inlet mouth adapted to be applied to the surface to be cleaned, in combination with an elongated shank having a collecting nozzle at one end and means for securing the other end of said shank to said fitting in non-leaking relation.

8. A nozzle device for use in pneumatic cleaning systems comprising an elbowed member to which the end of a flexible conduit may be attached, said member having an intake opening of substantially diamond shape, and also having a throat registering with the wider portion of said opening for receiving the end of an extension tube.

9. A nozzle device comprising means for attachment to the end of a flexible conduit, said device having a passage therethrough, a flaring portion providing an enlarged intake opening normally communicating with said passage, and an extension tube adapted to be connected to said device for delivering air into said passage, said tube when so connected serving automatically to close communication between said passage and intake opening.

10. A nozzle device for suction cleaning apparatus comprising an elbowed casing having a passage therethrough, one end of said casing being formed about said passage with a substantially diamond-shaped mouth, and means whereby air may be drawn into said passage through said mouth, said passage constituting a socket adapted to receive an extension tube and the portion of said mouth in line with said socket being free from obstructions, said casing constituting a handle for said tube when the latter is attached thereto, and said mouth being adapted for independent use when said extension tube is not attached.

Signed by me at Boston, Massachusetts, this 6th day of April, 1921.

STANLEY McCLATCHIE.