Jan. 13, 1959 J. E. DUFF 2,867,836

AIR ACTUATED CLEANING TOOL

Filed April 4, 1955

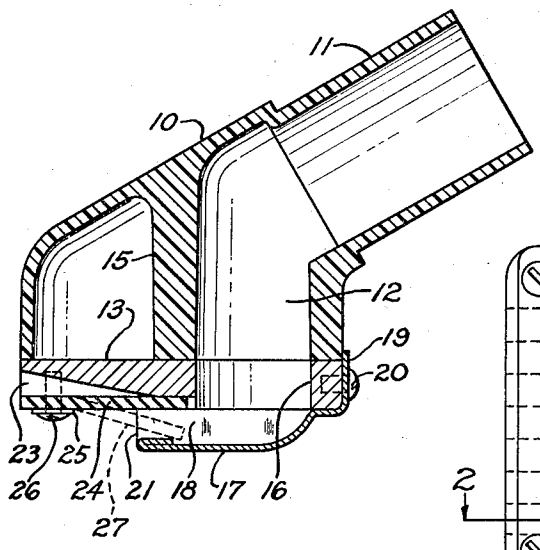


FIG. 2

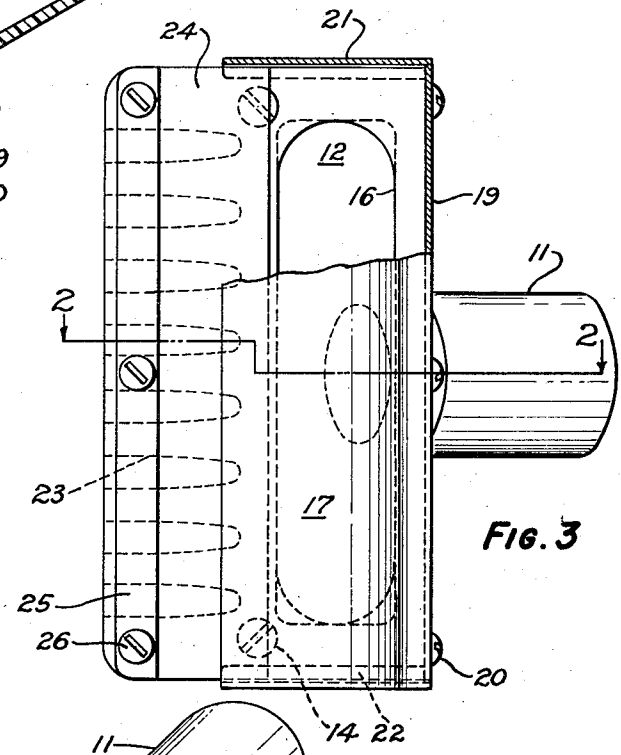


FIG. 3

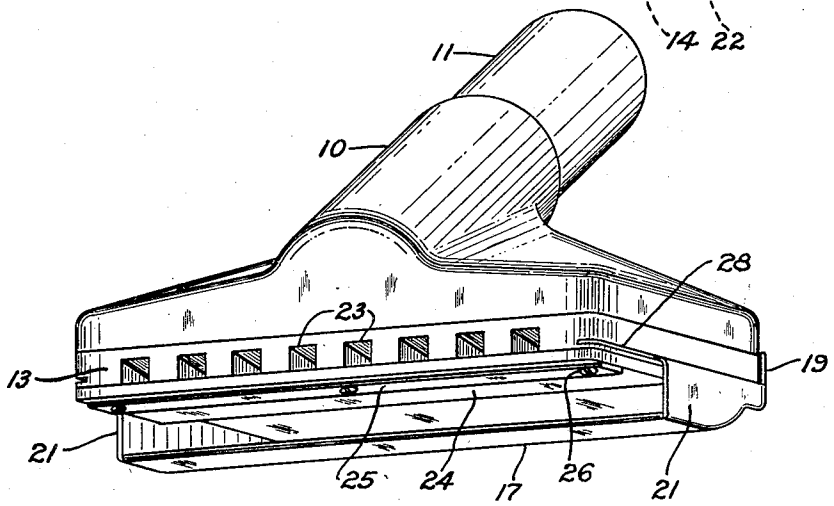


FIG. 1

United States Patent Office 2,867,836 Patented Jan. 13, 1959

2,867,836

AIR ACTUATED CLEANING TOOL

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Application April 4, 1955, Serial No. 499,036

2 Claims. (Cl. 15—404)

The instant invention relates to suction cleaning tools and more particularly to a novel cleaning tool in which there is provided pneumatic means for agitating the surface to be cleaned.

In cleaning upholstery, drapes and like materials by the use of suction cleaning means, it is customary to provide a cleaning tool comprising a suction nozzle and a brush element which is passed over the surface being cleaned for removing the dust and like litter from the surface by the suction flow of air entering the tool through the nozzle mouth. In use of the suction cleaning tool, it is passed over the surface in a series of forward and backward strokes with the brush sweeping the surface to dislodge the dust and like litter therefrom for removal of the dust and litter by the suction stream of air. Such a cleaning operation may be effective to remove substantially all of the dust and like litter from the surface being cleaned, if the cleaning tool is passed over the surface a sufficient number of times. However, the cleaning operation may be accelerated and may be made generally more efficient by providing some means for agitating the surface as the cleaning tool is passed thereover.

It is a customary practice in the art to provide a rotary agitator in a floor suction cleaner which beats and sweeps the floor covering as the cleaning machine is traversed thereover. The beating and sweeping action of the agitator, in combination with the suction flow of air through the floor covering, results in a cleaning action that is far more efficient than that which would be obtained with suction means alone. Floor coverings are made to withstand severe usage and will therefore stand up without any appreciable added wear or damage under the beating and sweeping action of a power-driven agitator. However, upholstery, drapes and like fabrics are not constructed with the same wear resistance as are floor coverings and, accordingly, cannot be subjected to the same type of beating and sweeping action or they will wear out in an unreasonably short time. Accordingly, it has been the practice in the art to provide cleaning tools for upholstery, drapes and the like which rely merely upon the suction flow of air to clean the same, suffering the disadvantages of not having a beating means to dislodge the dust and like litter from the surface being cleaned in favor of prolonging the life of the material.

In accordance with the instant invention, there is provided a cleaning tool for use with a suction producing and filtering device of a known form, which cleaning tool is particularly adapted to suction cleaning of upholstery, drapes and like materials, and in which there is provided a means for beating the surface of these materials as they are cleaned to dislodge the dust and like litter therefrom and to augment the cleaning action that is obtained by the use of a suction stream of air alone. The suction cleaning tool of the instant invention is constructed to be used in substantially the same manner as those cleaning tools heretofore known to the art. The novel cleaning tool may be secured to the

end of a hose connected to a known form of suction creating and filtering device, and the tool passed over the surface to be cleaned with forward and rearward strokes. The novel cleaning tool incorporates means for agitating the surface to be cleaned, which means is automatically operative merely upon operation of the suction creating means.

It is a prime object of the instant invention to provide a novel suction cleaning tool including vibrating means for agitating the surface to be cleaned.

It is a further object of the instant invention to provide a novel suction cleaning tool in which there is provided means for agitating the surface to be cleaned, which means is pneumatically operated by the suction flow of air entering the nozzle mouth.

It is a further object of the instant invention to provide a novel suction cleaning tool which is particularly adapted for cleaning operations on upholstery, drapes and like materials, for agitating the surface thereof to dislodge dust and like litter therefrom, for removal of the same by the suction stream of air entering the cleaning tool.

Further objects and advantages of the instant invention will appear to those skilled in the art upon consideration of the detailed description of a preferred embodiment of the invention which follows, reference being had to the drawings in which:

Figure 1 is a front view in perspective of a suction cleaning tool constructed in accordance with the instant invention,

Figure 2 is a sectional view in elevation of the invention taken on the line 2—2 in Fig. 3, and

Figure 3 is a bottom plan view of the novel suction cleaning tool.

Referring to the drawings, the novel suction cleaning tool of the instant invention comprises a nozzle body **10** formed with a rearwardly extending dirty air stream discharge conduit **11**. The discharge conduit **11** may include any conventional means for securing it to the end of a suction hose which in turn is connected to a suction producing and filtering device of a known form. The discharge conduit **11** and the adjacent end of the suction hose constitute a hand grip for holding the cleaning tool and manipulating the same. The interior of the nozzle body **10** is formed with an elongated passage **12** which communicates with the dirty air stream discharge conduit **11**. A bottom plate **13** is secured to the underside of the nozzle body **10** by bolts **14**, or the like, which anchor in the wall **15** of the nozzle body **10**. The bottom plate **13** includes an elongated nozzle mouth **16** which forms a continuation of the air passage **12** and leads to the latter.

While the nozzle body **10** and the bottom plate **13** are illustrated as being distinct elements in the suction cleaning tool, these may be formed as a single integral unit without departing from the spirit of the invention. In the preferred construction of the novel cleaning tool, the nozzle body **10** may be formed as a plastic molding and the bottom plate **13** made of metal machined to the illustrated form, or alternatively the nozzle body **10** and the bottom plate **13** may be formed from the same materials, either plastic or metal, cast or otherwise formed to the desired configuration.

A surface contacting shoe **17** underlies the nozzle mouth **16** in spaced relation thereto to define a suction air passage **18** leading to the nozzle mouth **16**. The surface contacting shoe **17** is preferably formed from sheet metal, and it includes a rearwardly disposed vertical flange **19** which abuts the rear of the bottom plate **13**. Bolts **20**, or the like, threaded into the bottom plate **13** through the flange **19** secure the surface contacting shoe **17** to the nozzle body **10**. The surface contacting shoe

17 also includes opposite side walls 21, each formed with an inturned flange 22 which is received within a slot 28 formed on each side of the bottom plate 13, to maintain the shoe 17 in fixed vertical position relative to the nozzle mouth 16.

The entrance to the suction air passage 18 is disposed a substantial distance rearwardly of the front of the bottom plate 13. Extending rearwardly from the front of the bottom plate 13, there is provided a plurality of auxiliary air passages 23 of a tapering cross-section directed towards the suction air passage 18, and each extending laterally of the nozzle mouth 16. The auxiliary air passages 23 are spaced along the width of the nozzle mouth 16 and are formed by grooves in the surface of the bottom plate 13, which grooves are open to the atmosphere at the front of the bottom plate 13. The auxiliary air passages 23 are covered by a flexible vane 24 abutting the underside of the bottom plate 13 and extending the width of the latter. The vane 24 may be made of plastic, rubber or the like. A strap 25 which is co-extensive with the width of the flexible vane 24 overlies the vane and secures it to the bottom plate 13 by means of a plurality of bolts 26, or the like. The strap 25 is disposed adjacent the front edge of the bottom plate 13 in order that the vane 24 may flex downwardly away from the ends of the auxiliary air passages 23 for a purpose to be described hereinafter. In the normal position of the flexible vane 24, as illustrated in Fig. 2, it abuts the bottom plate 13 sealing the ends of the auxiliary passages 23. The flexible vane 24 extends rearwardly from the front of the cleaning tool and terminates closely adjacent the nozzle mouth 16 so that a rear portion thereof overlies the surface contacting shoe 17 and is disposed in the suction air passage 18.

In using the novel suction cleaning tool of this invention, the dirty air stream discharge conduit 11 is connected to a source of suction, and the tool placed against the surface to be cleaned with the surface contacting shoe 17 disposed in contact therewith, whereby the suction will be applied to the surface through the suction air passage 18. The suction flow of air through the suction air passage 18 will reduce the pressure on the underside of the flexible vane 24 causing it to flex downwardly to the position illustrated in broken lines 27 in Fig. 2. Flexure of the vane 24 opens the ends of the auxiliary air passages 23 so that there will now be a suction flow of air therethrough, reducing the pressure on the upper side of the vane 24. The difference in pressures on the opposite sides of the vane 24 will cause it to drop back against the bottom plate 13 again sealing the auxiliary air passages 23, whereby the suction flow of air is again through the suction air passage 18. This process will repeat itself as long as there is a suction flow of air through the cleaning tool. It is thus seen that the flexible vane 24 will vibrate in the region of the entrance to the suction air passage 18. The continual vibration of the vane 24 in the manner described will produce pulsations of the air

in the vicinity of the surface being cleaned, agitating the same to beat the dust and like litter out of the surface for removal thereof by the suction stream of air flowing over that surface. The surface contacting shoe 17 maintains the vane 24 in spaced relation to the surface so that the vibrations thereof will not be dampened.

The novel suction cleaning tool described herein is a preferred embodiment of the instant invention, and it is to be understood that it is illustrative only and not intended to limit the scope of the invention. Modifications thereof falling within the spirit of the invention will occur to those skilled in the art, and accordingly, it is not intended that the scope of the invention be limited except as set forth in the claims which follow.

I claim:

1. A suction cleaning tool comprising: a body having an air discharge conduit adapted to be connected to a source of suction, means on said body defining an air inlet normal to the surface being cleaned for passage therethrough of ambient and dirt laden air to said discharge conduit, means including a flexible vane forming an auxiliary air passageway in said body connected to ambient air and having an outlet arranged to discharge into said air inlet and communicating therethrough with said air discharge conduit, said vane normally closing said ambient air outlet and being movable between two extreme positions in one of which it closes said ambient air outlet and in the other of which it prevents passage of dirt laden air through said air inlet, said vane having a portion arranged in said air inlet and subjected to the air pressures passing through said air inlet and auxiliary ambient air passageway for vibrating said vane between said extreme positions to alternately interrupt flow of ambient and dirt laden air through said air inlet into said discharge conduit, said vane having a portion extending forwardly from said air inlet and disposed exteriorly of said body in spaced relation to the surface being cleaned to impart pulsations to the air therebetween for agitating the surface to remove dirt therefrom as said vane vibrates to interrupt said flow of ambient and dirt laden air through said inlet.

2. A suction cleaning tool as described in claim 1, in which said means defining said air inlet also provides a surface engaging shoe.

References Cited in the file of this patent

UNITED STATES PATENTS

791,567	Moorhead	June 6, 1905
1,034,260	Lichtenberg	July 30, 1912
2,031,957	Karlstrom	Feb. 25, 1936
2,200,769	Bjorkman	May 14, 1940
2,326,311	Taylor	Aug. 10, 1943

FOREIGN PATENTS

38,169	Denmark	Nov. 21, 1927
215,662	Germany	Oct. 29, 1909
520,107	Great Britain	Apr. 15, 1940