Nov. 4, 1958 F. W. KUPPERSMITH 2,858,561

RUG NOZZLE

Filed June 24, 1955 2 Sheets-Sheet 1

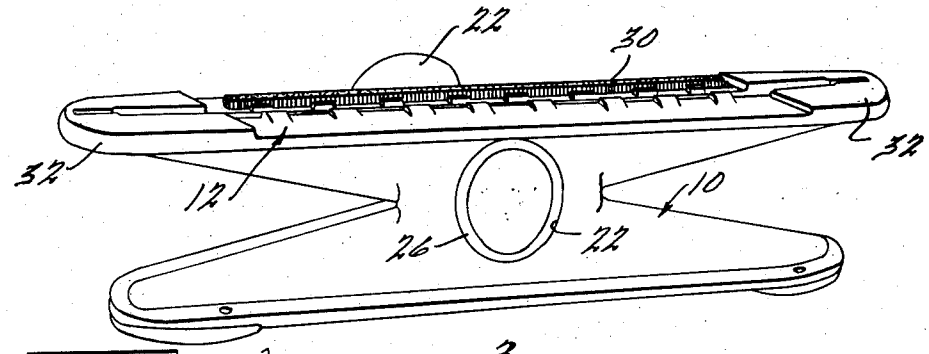

FIG. 1.

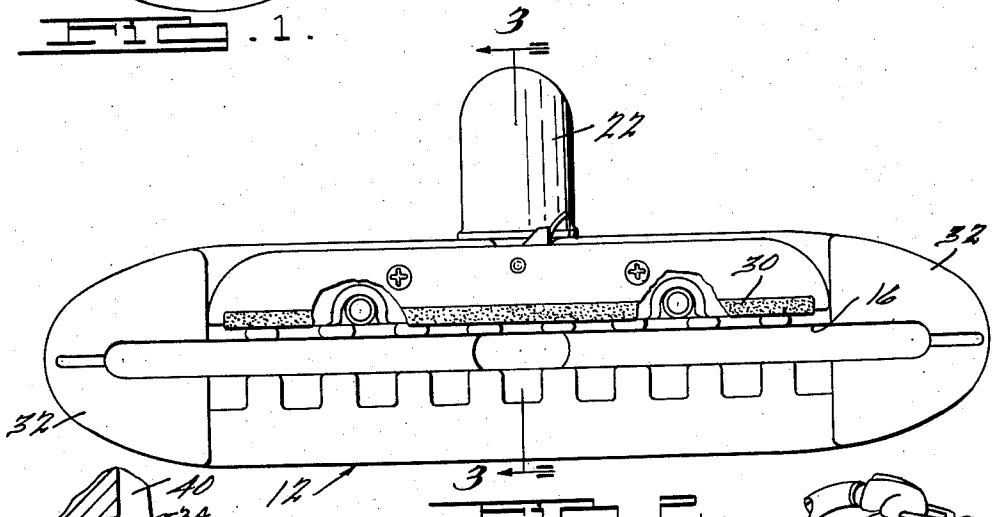

FIG. 2.

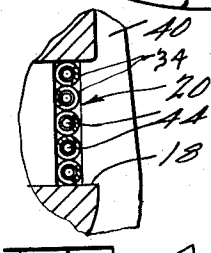

FIG. 4.

FIG. 5.

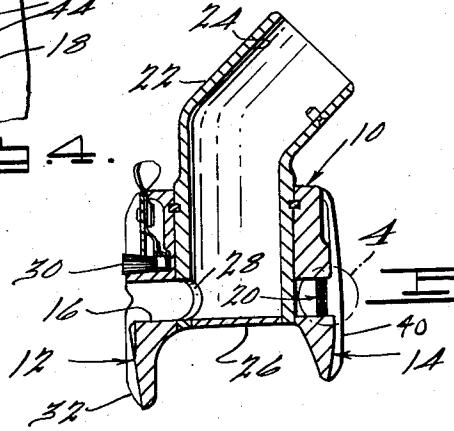

FIG. 3.

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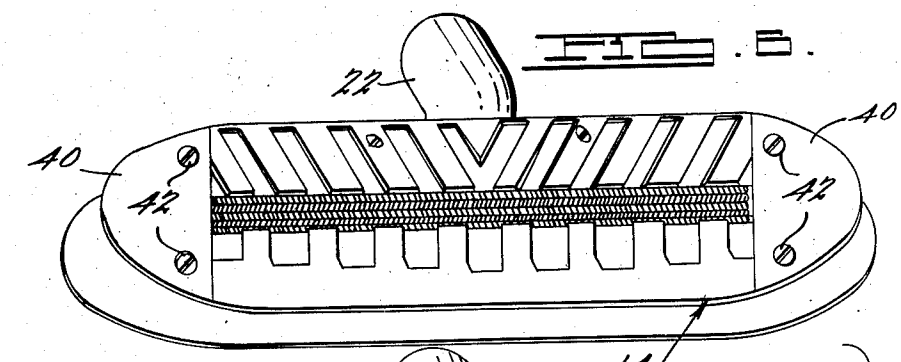
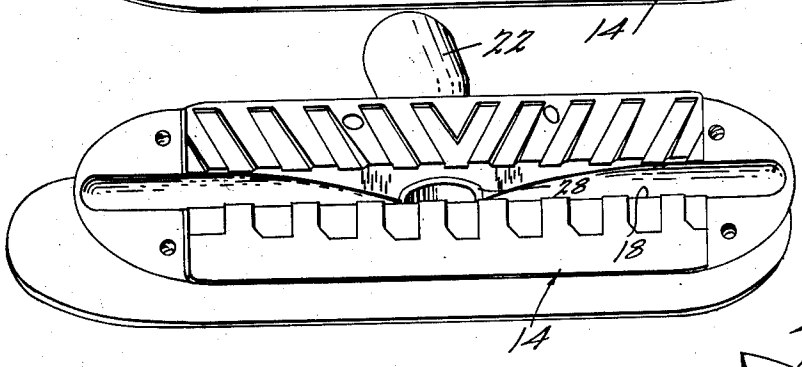


FIG. 8.



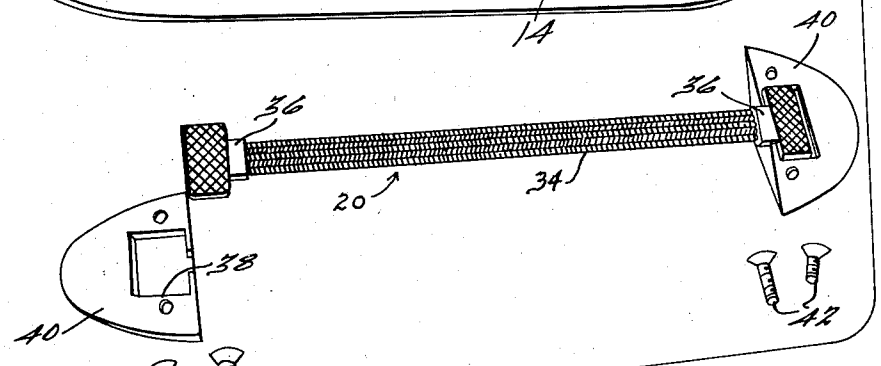


FIG. 7.

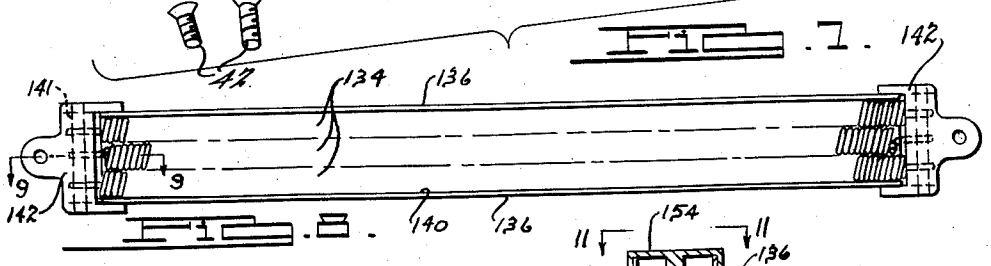


FIG. 6.

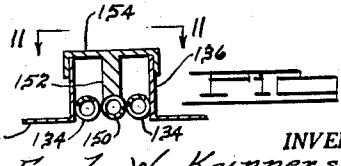


FIG. 10.

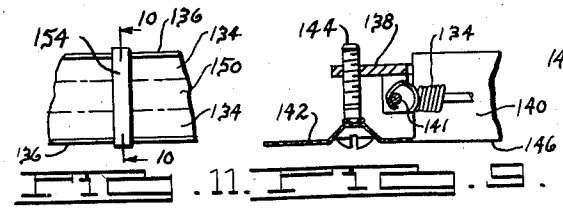


FIG. 11. FIG. 9.

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RUG NOZZLE

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Application June 24, 1955, Serial No. 517,758

10 Claims. (Cl. 15—382)

This invention relates to suction cleaning and has particular reference to a novel rug cleaning nozzle incorporating simple but efficient means actuated by the flow of air into the nozzle through the mouth thereof for agitating the rug.

While suction cleaners of the tank and canister type have been and are very popular, it is well known that the rug nozzles used therewith do not adequately clean rugs and carpets because they depend upon the flow of air alone and incorporate no means for beating or agitating the carpet. Many attempts have been made to devise an adequate rug nozzle for such types of cleaners and to incorporate in such nozzle rug agitating means, but so far as I am aware, there are no such rug nozzles for such types of cleaners commercially available today.

According to my invention, I incorporate in the mouth of a rug nozzle yieldable spring means which obstruct the nozzle mouth and which are disposed in the path of flow of air into the nozzle through the mouth thereof, such spring means being constructed and arranged to be vigorously vibrated or agitated in response to the flow of air inwardly through the nozzle mouth, and being so positioned in the mouth as to function as an agitating means for beating a rug presented to the nozzle mouth. Such agitating means is operable independently of translation of the rug nozzle with respect to the rug, and in addition requires no valves or other mechanism for controlling the operation thereof.

A principal object of the invention, therefore, is to provide a novel, efficient and simple suction cleaning apparatus.

Another object of the invention is to provide a novel, efficient and simple rug nozzle incorporating agitating means actuated by the flow of air into the nozzle through the mouth thereof for beating a rug presented to the mouth of the nozzle.

Another object of the invention is to provide a novel, efficient and simple duplex type of rug nozzle incorporating rug beating means actuated by the flow of air into such nozzle through the mouth thereof.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are two sheets, which by way of illustration show preferred embodiments of the invention and what I now consider to be the best mode in which I have contemplated applying the principles of my invention. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

Fig. 1 is a perspective view of a duplex type of rug nozzle embodying the invention;

Fig. 2 is an elevational view of one face of the nozzle;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary sectional view of the nozzle mouth having the carpet beating means associated therewith;

Fig. 5 is a view of a canister type suction cleaner with which the aforesaid rug nozzle may be associated in use;

Fig. 6 is an elevational view of the other face of the nozzle;

Fig. 7 is an exploded view of parts of the rug nozzle assembly shown in Fig. 6 but showing the shoes **40** reversed from their position as illustrated in Fig. 6;

Fig. 8 is a view illustrating a modified form of the invention;

Fig. 9 is a fragmentary sectional view taken along the line **9—9** of Fig. 8;

Fig. 10 is a sectional view taken along the line **10—10** of Fig. 11 and illustrating a modification of the arrangement shown in Fig. 8; and

Fig. 11 is a sectional view taken along the line **11—11** of Fig. 10.

As illustrated in the drawings, a rug nozzle embodying my invention consists of a hollow nozzle body **10** provided with opposed faces **12** and **14**, the face **12** being provided with an air inlet mouth **16** and the face **14** being provided with an air inlet mouth **18**, and the mouth **18** has associated therewith agitating means indicated generally at **20**.

As shown in Fig. 3, the body **10** is swivelled on an air conducting tubular coupling **22**, one end **24** of which forms a socket for accommodating the coupling end of a wand or hose (not shown), which in turn may be connected to a canister type cleaner as shown in Fig. 5. The cleaner as shown in Fig. 5 may be of the construction as illustrated in the patent to Ralph C. Osborn, No. 2,721,624, issued October 25, 1955, for "Suction Cleaner," and consists eseentially of a motor driven fan and a dirt collecting receptacle, the fan being operative to draw dirt-laden air into the cleaner, and the dirt collecting receptacle functioning to collect the dirt while permitting the discharge of the air from the cleaner.

The other end of the coupling **22** is closed by a disc **26** while the periphery of the coupling member adjacent the disc is provided with a slot **28** so that, depending upon the position of the coupling member **22** with respect to the body **10**, the interior of the coupling member may be connected to the nozzle mouth **16** or the nozzle mouth **18**, so that when the rug nozzle is connected with a source of suction, such as the canister cleaner shown in Fig. 5, air will flow into the nozzle mouth which is in communication with the interior of the coupling **22** through the slot **28**.

The face **12** in which the mouth **16** is formed may have a brush **30** associated therewith, the brush functioning when the face **12** is passed over the surface of the carpet to assist in dislodging surface litter, such as thread and lint, from the carpet undergoing cleaning. The ends of the nozzle face **12** are provided with shoes or skids **32** which assist in preventing the rug undergoing cleaning from sealing the nozzle mouth **16** against the flow of air thereinto.

The agitating means **20** associated with the nozzle mouth **18** as illustrated comprises a plurality of springs **34** of closed coil formation disposed in side by side relation and spanning the nozzle mouth **18** so as to obstruct and substantially block the flow of air into the nozzle through the mouth **18**. The springs **34** extend along the length of the nozzle mouth **18** and generally parallel to the plane of the surface **14**, the springs **34** however being disposed within the mouth **18** and in the path of flow of air into the nozzle through the mouth **18**.

As shown in Fig. 7, the ends of the springs **34** may be secured or embedded in blocks **36** which in turn are disposed in pockets **38** in the shoes **40**. The shoes **40**

are detachably secured as by screws **42** to the ends of the face **14** and form skids which position the lips of the nozzle **18** above the surface on which the shoes **40** slide so as to prevent the rug being cleaned from sealing the nozzle mouth **18**.

The springs **34** preferably are of such length so that when assembled as shown in Fig. 6 they will be under a slight tension. While I have shown five springs, I contemplate that a different number of springs may be employed. The number of springs will be determined by the width and length of the nozzle mouth, the characteristics and dimensions of the springs, the amount of air which it is desired to have flow inwardly through the nozzle mouth **18** when the nozzle is in operation, and the degree of carpet agitation desired.

In operation, when the nozzle mouth **18** is connected through the coupling **22** with a suitable source of suction, air will flow into the nozzle mouth **18** and in so doing will deflect the springs **34**. This will cause the springs **34** to vibrate vigorously. Preferably the springs **34** are made so that adjacent springs have a different frequency of vibration. In vibrating, the springs will deflect sufficiently so as to permit the flow of air into the nozzle, and the vibration of the springs set up by the flow of air into the nozzle mouth **18** will continue as long as such flow of air continues. In vibrating, the springs will vigorously beat the rug presented to the mouth of the nozzle and will permit the dirt dislodged from the rug by the beating action of the springs to be carried by the air which flows into the nozzle mouth.

With rug nozzles of the sizes conventionally used, excellent carpet agitating or beating has been achieved using three, four or five springs about 8 to 10 inches in length where the coils of the springs are of the order of 3/16 in. in diameter. The beating performance thus obtained closely approaches the beating and dirt removal performance of modern types of floor cleaners using rotary agitators which beat the carpet. As the frequency and the vigor of the beating action of the springs are determined by the characteristics of the springs and the flow of air through the nozzle mouth, it is evident that the quality and frequency of the agitation provided by the springs can be varied within wide limits and in accordance with the results desired.

In order to achieve different frequencies of vibration in adjoining springs there are many expedients which may be used. I have found that by inserting in each of the springs metal rods, such as the rods **44**, of different mass or size or length, it is possible to obtain different characteristics in adjacent coils, although other techniques might be used for this purpose.

It is to be understood that the springs **34** as illustrated are free except where they are secured at the ends to the blocks **36** and that when at rest they will assume a position as illustrated in Fig. 4 wherein they obstruct the flow of air into the nozzle.

While I prefer to make the coil springs of metal, I contemplate that they might be made of other suitable materials, such as plastic or rubber, and that they may be of other form than coil springs. For wearing and performance purposes, metal has been found to be the most suitable material for the springs.

While the faces **12** and **14** are shown as being provided with ribs and grooves, the use of these is not critical and any other desired surface may be provided on either of these faces.

The duplex nozzle illustrated thus provides one face **12** which is adapted to clean by straight suction without beating while the other face **14** provides cleaning with a combination of suction and agitation.

In the arrangement shown in Figs. 8 and 9, the vibrating springs **134**, of which there are three in number, are adjustably mounted with respect to the face **14** so that they may be set at different distances therefrom. This arrangement thus affords some control of the vigor with which the agitating springs will beat a carpet presented to the inlet mouth of the nozzle. In this arrangement the sides of the nozzle mouth are indicated at **136**. A bracket **138** is associated with each end of the nozzle mouth **140** which is defined by the sides **136**. The brackets **138** are provided with cross pins **141** to which the ends of the springs **136** are anchored, as shown in Figs. 8 and 9. The assembly as shown in Fig. 8 is associated with the face **14** of the nozzle so that the springs **134** would occupy the position of the springs **34** and so that the brackets **138** would be accommodated in recesses formed between the shoes **40** and the nozzle body. The sides **136** may be formed out of a piece of metal which is provided at the end thereof with a portion **142** which may be formed so as to be clamped between the shoes **40** and the nozzle body, or otherwise suitably secured so that the springs **134** will extend across the nozzle mouth **140**. A screw **144** rotatably mounted in the portion **142** is threaded through a threaded opening in the bracket **138** so that upon rotation of the screw **144** the bracket **138** will be moved along the screw **144**, thereby moving the springs **134** toward or away from the inlet end **146** of the nozzle mouth. To provide access to the slotted end of the screws **144**, the shoes **40** may each be provided with a hole. Thus, by rotating the screws **144** at each end of the nozzle, the position of the springs within the nozzle may be adjusted with respect to the face **14** of the nozzle.

The arrangement shown in Figs. 10 and 11 is a modification of that illustrated in Figs. 8 and 9 but differs therefrom in that the adjustable features for the springs **134** are omitted and, further, by the fact that the center spring **150** instead of being mounted at its ends as shown in Fig. 8 is carried by a post **152** which in turn is carried by a bridge **154** carried by the sides **136** of the nozzle mouth. The ends of the spring **150** are free. This thus provides an arrangement in which the two outer springs **134** would have their greatest range of vibration at the center lengthwise of the nozzle, while the spring **150** would have its greatest range of vibration at the ends of the nozzle mouth since such ends are not anchored to the cross pins **141**. The spring **150** may be secured to the post **152** in any suitable fashion.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations are fall within the purview of the following claims.

I claim:

1. A suction nozzle comprising a hollow body adapted to have suction applied to the interior thereof and having an elongated air inlet mouth in fluid flow communication with the interior of said hollow body, said mouth being adapted for presentation to the surface of a rug to be cleaned, said body and mouth being constructed so that the application of suction to the interior of said body will effect the unidirectional flow of air through said mouth into said body, a plurality of elongated vibratory springs disposed in and across said nozzle mouth and arranged when at rest so as to substantially block the flow of air into said body through said mouth and so that such springs must be displaced from their at rest position to permit substantial flow of air through said mouth into said body during operation of said nozzle, said springs being constructed and arranged to be vibrated solely and directly by and in response to such unidirectional flow of air through said mouth and into said body when suction is applied to the interior of said body, said springs being disposed so as when vibrated to mechanically beat a rug presented to the mouth of said nozzle and to permit dirt laden air dislodged from said rug by the beating action of said springs to flow into said body through said mouth, the frequency of the beating action being determined by the characteristics of said springs

and such unidirectional flow of air through said mouth into said nozzle body.

2. A suction nozzle according to claim 1 wherein said springs are coil springs with adjacent coils in contact with each other.

3. A suction nozzle according to claim 1 wherein said springs are disposed in side by side relation.

4. A suction nozzle according to claim 1 wherein said springs are secured at the ends thereof to said body.

5. A suction nozzle according to claim 1 wherein at least one of said springs is a coil spring secured at its ends to said body.

6. A suction nozzle comprising a hollow body having an air inlet mouth adapted for presentation to the surface of a rug to be cleaned, said body and mouth being constructed so that the application of suction to the interior of said body will effect the unidirection flow of air through said mouth into said body, yieldable spring means disposed in and completely across said nozzle mouth in the path of flow of air into said body through said mouth and so as to afford, when at rest, substantial resistance to the flow of air into said body through said mouth and so that such spring means must be displaced from their at rest position to permit substantial flow of air through said mouth into said body during operation of said nozzle, said spring means being constructed and arranged to be deflected and vibrated solely and directly by and in response to the flow of air through said mouth into said body and independently of the translation of said nozzle over a surface to be cleaned, said spring means being positioned in said nozzle mouth so as when vibrating to function as an agitating means for mechanically beating a rug presented to the mouth of said nozzle.

7. A suction nozzle according to claim 6 wherein said spring means comprise a plurality of coil springs.

8. A suction cleaning device comprising a hollow body having an air inlet mouth adapted for presentation to a surface to be cleaned, said body and mouth being constructed so that the application of suction to the interior of said body will effect the unidirectional flow of air through said mouth into said body, yieldable closed coil spring means disposed in and completely across said mouth in the path of flow of air into said body through said mouth and substantially obstructing the flow of air into said body through said mouth and so that such spring means must be displaced from their at rest position to permit substantial flow of air through said mouth into said body during operation of said nozzle, said spring means being constructed and arranged to be vigorously agitated directly and solely by and in response to the flow of air through said mouth into said body and being positioned in said mouth so as to function as an agitating means for beating a surface presented to said mouth, and means for continuously creating suction in said body so as to induce the unidirectional flow of air inwardly through said mouth thereby to actuate said agitating means.

9. A suction nozzle according to claim 6 wherein said spring means comprises an elongated spring which is mounted intermediate its ends so that the ends of such spring will be vibrated in response to the flow of air through the mouth of said nozzle.

10. A suction nozzle according to claim 1 wherein one of said springs is mounted at its ends so that the intermediate part of said spring is free to vibrate and wherein another of said springs is mounted at its center so that the ends of said other spring are free to vibrate.

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