July 10, 1928. 1,676,782

B. B. JACKSON

BRUSH MOUNTING FOR SUCTION CLEANERS

Filed April 15, 1922

Fig. 1

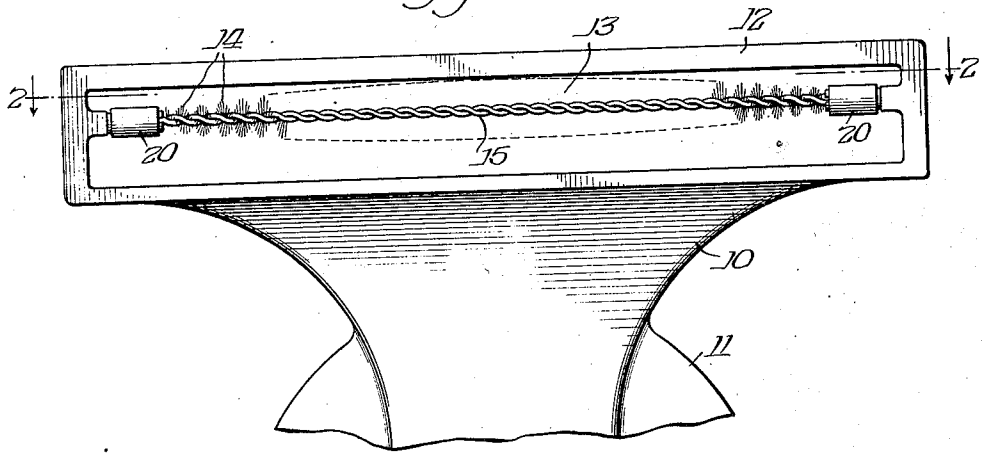


Fig. 2

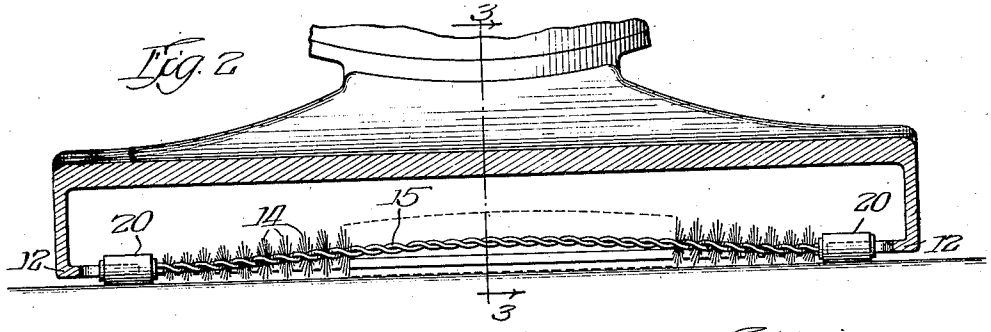


Fig. 3.

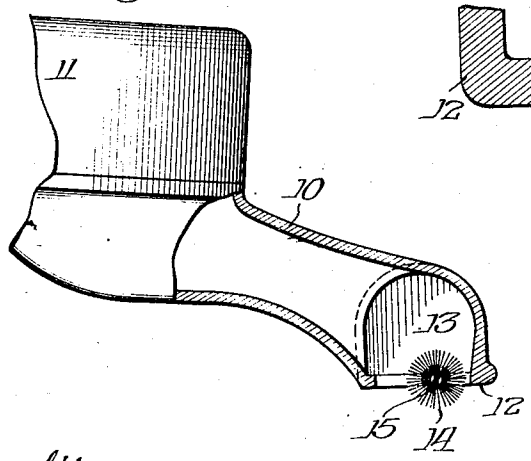
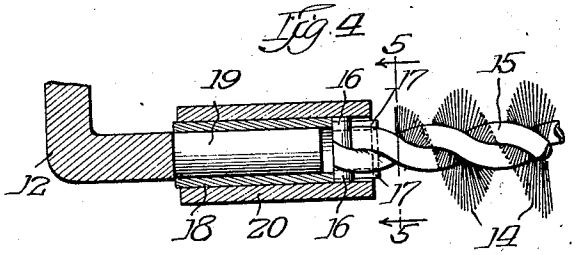


Fig. 4



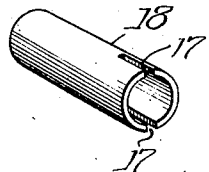
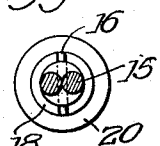


Fig 6.

Fig. 5.



Witness:

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UNITED STATES PATENT OFFICE.

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BRUSH MOUNTING FOR SUCTION CLEANERS.

Application filed April 15, 1922. Serial No. 552,909.

The present invention is designed to increase the efficiency of suction cleaners. It is primarily intended for incorporation in cleaners of the type wherein a rotating fan is employed for creating the requisite suction, although adapted for use with cleaners of other types. Suction cleaners of the fan type usually embody an electric motor for actuating the fan; in others, the fan is actuated through the medium of a gear train interposed between the bearing wheels and the fan. As an adjunct generally to such machines they embody also a rotating brush in association with the nozzle for loosening the dust or dirt in the fabric or surface being cleaned, whereby to perimt the fan more readily to lift the dust or dirt and convey it to the usual collecting receptacle included as a part of the machine equipment. The practical value of these brushes ordinarily is not fully attained. The loosening of the dust or dirt is dependent upon the proximity of the ends of the brush bristles to the fabric or surface on which the machine is operating. This proximity, in turn, is dependent upon the mounting of the brush in relation to the nozzle, or adjustment of the nozzle relatively to the fabric or surface. For this purpose means are provided whereby the nozzle may be elevated or lowered in relation to the fabric or surface, or adjustable supporting means, usually in the form of adjustable bearings for the brush, are provided. In the positioning of the nozzle with respect to the fabric or surface, or adjustment of the supporting means for the brush, the bristles engage the surface of the fabric relatively closely, and the cleaning action of the bristles is at the maximum at the time such adjustment is made. However, as the bristles wear down their contact with the surface becomes less close, and their cleaning power relatively is reduced. The maximum cleaning effect, therefore, only can be restored by manual adjustment of the nozzle or the brush supporting means to position the axis of the brush nearer to the surface, and thereby again bring the ends of the bristles into close engagement with the surface. But as wear continues on the bristles repeated manual adjustment is required; otherwise, the brush fails to function properly in loosening the dirt and dust, and the cleaning value of the machine materially is reduced.

Furthermore, machines such as above described and equipped have relatively little value in picking up lint, threads, and similar light particles. Moreover, these machines require driving connections between the fan motor or the bearing wheels and the brushes for operating the latter, thus entailing added expense of construction and maintenance, and increasing the number of operative parts susceptible to derangement and necessitating repair.

The primary object of the present invention is to overcome the objectionable features above outlined and to provide an improved brush for suction cleaners which is self-adjustable. This permits the brush to accommodate itself to inequalities or unevenness in the surface on which the machine is operating, whereby constantly to remain in contact with such surface, and to insure the maximum cleaning action of the brush in respect thereto.

A further object of the invention is to provide an improved form of brush and mounting therefor by which gearing intermediate of the same and the driving motor or bearing wheels is entirely eliminated, the brush serving to drive itself by direct contact with the surface rather than through the motor or bearing wheels.

The invention also aims to provide an improved form of brush and its mounting by which the brush is suspended resiliently in association with the machine nozzle to adapt it readily to yield, and at the same time to conform to the surface over which it is being moved in the operation of the machine.

Other objects and advantages will appear as the nature of the improvements is better understood, the invention consisting substantially in the novel construction, combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and finally pointed out in the appended claim.

The present disclosure is intended to delineate a practical embodiment of the invention, but the latter is not restricted to such

embodiment and is susceptible of incorporation in other forms within the inventive concept. Therefore, the form illustrated and described herein is to be considered only from an illustrative standpoint.

In the drawings,

Fig. 1 is an inverted plan view of the suction nozzle of a suction cleaner equipped with the present invention;

Fig. 2 is a sectional view on the line 2—2, Fig. 1;

Fig. 3 is a similar view on the line 3—3, Fig. 2;

Fig. 4 is a detail sectional view, on an enlarged scale, illustrating the connection of one end of the brush with one of the operating rollers thereof;

Fig. 5 is a transverse sectional view on the line 5—5, Fig. 4;

Fig. 6 is a detail perspective view of one of the roller bushings.

Referring in detail to the accompanying drawings, the numeral 10 designates the suction throat of a suction cleaning machine, preferably of the non-electric type; 11 the fan casing thereof, and 12 the elongated nozzle carried by the throat 10. These parts are of usual construction, and further description thereof need not be made.

The bottom of the suction nozzle 12 is open in order to form the mouth through which the dust and dirt are drawn into the throat 10 by the action of the rotating fan found in machines of this character, and within said mouth is arranged a rotating brush 13 provided with spirally disposed bristles 14. It will be observed that the greatest diameter of the brush 13 is at a point mid-way between its ends, from which point the brush 14 tapers in diameter to its extremities. The purpose of this presently will appear. The core of the brush 13 preferably is formed of wire of suitable gauge, a pair of strands 15 being twisted together, as illustrated in enlarged detail in Fig. 4, the bristles being held between the several twists of the strands 15. At the extremities of the core the ends of these strands are bent at right angles to the core, and in opposite directions to each other to provide engaging lugs 16, which lugs are received by oppositely disposed slots 17 formed in the inner ends of roller bushings 18. One of these bushings is mounted at each end of the brush 13, and each of said bushings is also rotatably mounted on an inwardly projecting stud 19, one of which is formed at each end of the nozzle 12. The bushings 18 are surrounded by elastic sleeves 20, formed preferably of rubber in order to frictionally engage the surface or fabric over which the machine is operating, and thereby establish the necessary traction with the surface or fabric for driving the brush 13.

The length of the core of the brush 13 is slightly greater than the distance between the inner extremities of the bushings 18 as assembled upon the studs 19. By reason of this, and due to the resilient character of the core, the brush must be slightly sprung when the same is inserted within the bushings 18, in order to introduce the ends of the core to the bushings.

The bushings 18 and the sleeves 20 thereof constitute the sole driving means for rotating the brush 13. It will be noted in this connection that the diameter of these driving rollers is less than the greatest diameter of the brush 13, and while the diameter of the brush gradually tapers from its mid-portion to its extremities, the tapering portions of the brush likewise are of greater diameter than the driving rollers. This results in increased peripheral speed in the brush over the peripheral speed of the rollers. It will be understood that when the machine is positioned on the surface to be cleaned the weight of the nozzle forces the driving rollers, made up of the bushings 18 and sleeves 20, into frictional engagement with such surface. By reason of the tapering form of the brush, and the forcing of the bristles at the lower side of the brush into engagement with the surface under weight of the nozzle, the core of the brush is sprung or bowed, as illustrated in Fig. 2, and this brings the extremities of the bristles at such lower side of the brush and throughout the length of the latter into horizontal alignment with the surface. As the nozzle moves over the surface the driving rollers are rotated, but due to the varying diameters of the driving rollers on the one hand, and the decreasing diameter of the brush from its mid-portion to its ends on the other, the rollers and brush rotating at the same number of revolutions, the turning effort of the driving rollers being greater than that of the brush, a slippage in the rotation of the brush takes place. In this slippage the bristles kick out individually, and in this movement they loosen the dust and dirt, exerting a sweeping action on the surface being cleaned. Furthermore, the brush is connected directly with its driving elements so that the use of a train of gears between the driving elements and the brush is entirely eliminated.

By reason of the resiliency of the brush core the brush is mounted yieldingly within the nozzle 12 so that the brush adjusts itself automatically to inequalities and unevenness in the surface being cleaned. Due to this resiliency of the brush core, there results a maintenance of close engagement of the bristles with the surface, increasing the cleaning power of the brush, so that lint, threads and similar light particles are picked up by the brush in a positive manner to be

conveyed by the suction of the fan into and through the throat 10.

The self-adjustment of the brush enables the latter always to be in proper close contact with the floor or surface on which the machine is mounted regardless of the height of the nozzle above said floor or surface, the resilient core of the brush forcing the bristles against the floor or surface under weight of the nozzle whether the nozzle be close to or relatively elevated above the floor or surface. A further result of the bowing of the brush under the yielding action of the resilient core thereof is to throw the center of the brush into eccentric relation with the driving rollers at the ends of the brush.

With a suction cleaner equipped with a brush constructed in accordance with the present invention, and resiliently mounted in the nozzle thereof as contemplated by the present invention, there is provided a self-adjusting element for loosening the dirt and dust as the machine is moved over the surface to be cleaned, and this element is driven by its own contact with the surface or floor through the rollers associated with the brush and constituting the driving elements thereof. This eliminates the interposition of driving gears between the brush and the suction fan or the bearing wheels of the machine, so that the working parts of the machine are thereby reduced in number, and impairment of such parts with necessary repair thereof is overcome. The close proximity of the brush bristles with the surface or floor, and the maintenance of this contact by reason of the resilient character of the core, enables the brush to pick up lint, threads and similar light particles notwithstanding the nozzle 12 may be relatively elevated thereabove.

In positioning the brush within the nozzle the core thereof is sprung sufficiently to permit the ends thereof to be inserted within the inner ends of the bushings 18, with the oppositely disposed lugs 16 fitted in the slots 17 of the bushings. The brush likewise may be removed by springing the same sufficiently to withdraw the ends thereof from the bushings, so that introduction of the brush to and removal of the same from the nozzle 12 is effected in a simple manner and without the use of any special tools.

While the core of the brush has been illustrated and described as formed of twisted wire, it will be understood, of course, that this may be radically changed, this form being merely one practical embodiment for the formation of the core, and its convenient adaptation to the purposes of the invention.

I claim:

In a suction cleaner, the combination with the nozzle thereof, of a rotatable brush extending over the length of said nozzle, said brush having a flexible axle supported in the nozzle only at its ends, whereby said brush is yieldingly supported in the nozzle for lateral movement between its ends to be pressed and maintained by the weight of the nozzle in operative engagement with the surface to be cleaned, said brush having its greatest diameter at its mid-portion and tapering from said mid-portion to its ends, and means for driving said brush.

In testimony whereof I have hereunto subscribed my name.

BENJAMIN B. JACKSON.