G. A. BRACHHAUSEN.

VACUUM CLEANER.

APPLICATION FILED JULY 8, 1921.

1,405,095. Patented Jan. 31, 1922.

Fig. 2.

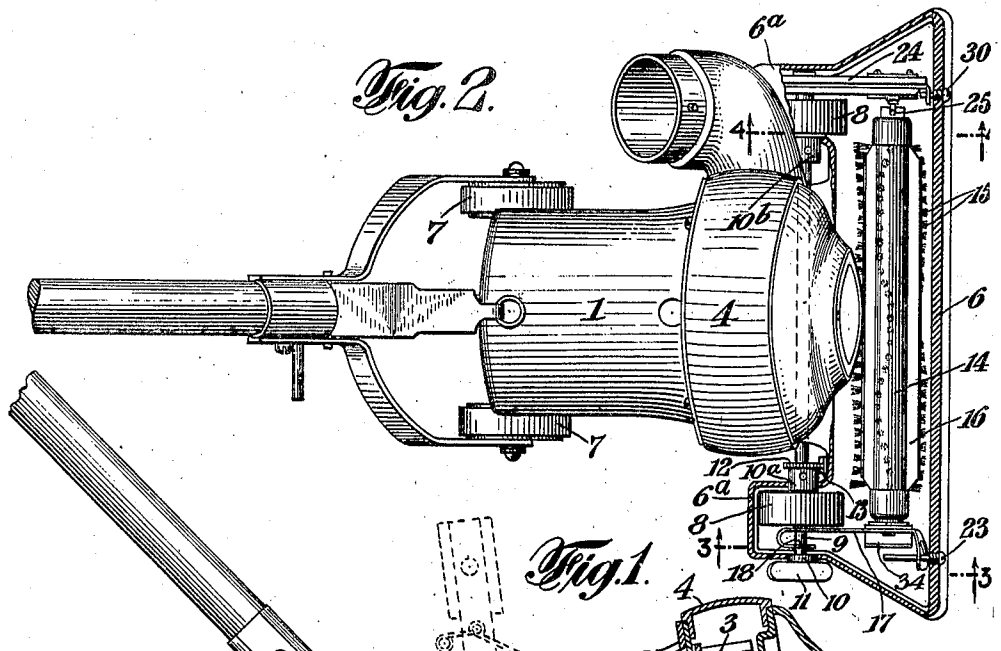


Fig. 1.

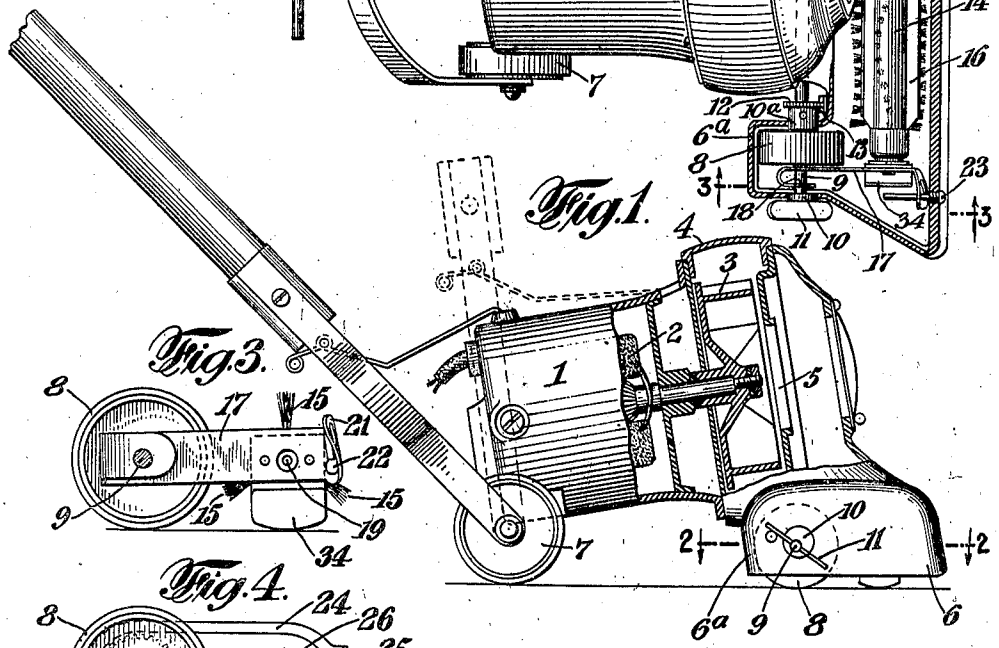


Fig. 3.

Fig. 4.

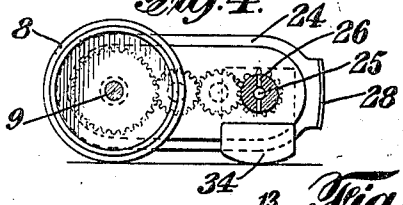
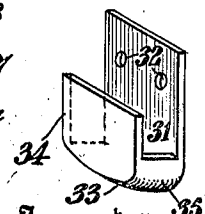


Fig. 5.

Fig. 6.



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VACUUM CLEANER.

1,405,095. Specification of Letters Patent. Patented Jan. 31, 1922.

Application filed July 8, 1921. Serial No. 483,208.

To all whom it may concern:

Be it known that I, GUSTAV A. BRACHHAUSEN, a citizen of the United States, residing at Rahway, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Vacuum Cleaners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawing, which represents one embodiment of the invention selected by me for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

My invention relates to vacuum or suction cleaners of the kind which are propelled over the floor, carpet, rug or other surface to be cleaned, in which a rotary brush is employed in the transverse mouth or vacuum nozzle of the machine for the purpose of loosening particles of dust, lint, threads, hairs and other foreign particles from the surface to be cleaned to enable them to be more readily drawn into and discharged from the machine into the usual dust collecting bag (not shown) by the current of air entering the mouth or nozzle. In apparatus of this kind it has been proposed to support the rotary brush by means of a freely movable roller at each end of the same. This construction, however, is open to serious objections. These brush supporting rollers readily collect lint, threads, hairs and the like, which become closely wound around their supporting shaft or shafts and between these rollers and the rotary brush, thereby retarding the supporting rollers, and in some cases causing them to stop altogether, which makes the machine difficult to push or propel over the floor, and at the same time retarding or stopping the brush and interfering with its efficiency. The rotary brush is ordinarily caused to rotate in a direction opposite to that in which the supporting rollers turn, so that the relative rotary movement between the brush and its supporting rollers increases the tendency to collect and wind threads, etc., between the oppositely rotating surfaces of the brush and rollers. Moreover where the brush is driven by means of a traction and driving wheel forming one of the supports of the vacuum cleaner, this retarding of the brush reacts upon the traction and driving roller or wheel and retards its rotation, thereby causing it to drag on the floor or surface traversed, and further increases the resistance of the machine in pushing it over the surface traversed. My invention consists in providing a rotary brush in an apparatus of the character described, with supporting means independent of the nozzle having a fixed relation with respect to the axis of the brush and provided with non-rotary portions for engaging the surface traversed to maintain the brush at a uniform height with respect to said surface, independently of the nozzle, and at the same time obviating the difficulties hereinbefore referred to.

In the accompanying drawings which illustrate the preferred embodiment of my invention, selected by me for purposes of illustration,

Fig. 1 is a side elevation of a vacuum cleaner embodying my invention, partly in section.

Fig. 2 is a top plan view of the machine, the vacuum nozzle being illustrated in section on the line 2—2 of Fig. 1.

Fig. 3 represents a vertical section through the vacuum nozzle on the line 3—3 of Fig. 2.

Fig. 4 is a similar section on the line 4—4 of Fig. 2.

Fig. 5 is a detail perspective view showing the parts for supporting and driving the brush, and the brush itself, detached.

Fig. 6 is a detail perspective view of one of the brush supporting devices.

Referring to the accompanying drawings, 1 represents the main housing of the machine containing an electric motor, indicated at 2, for operating the suction fan, indicated at 3, within a fan casing, indicated at 4, the fan casing being connected by a passage 5 with a transversely disposed suction nozzle, indicated at 6, open at its lower end and adapted to be held, as hereinafter described, adjustably at varying heights above the surface to be cleaned. The rear end of the casing 1 is provided with supporting rollers, indicated at 7, preferably provided with rubber treads, and the forward part of the apparatus is supported by rollers 8, also provided with rubber treads, said rollers 8 being located within rearwardly extending offset portions 6^a of the nozzle, and serving

to support the nozzle at the desired distance above the surface traversed. Suitable means are provided for varying the height of the nozzle with respect to the supporting rollers 8. In this instance the rollers 8 are loosely mounted upon a shaft 9, which extends transversely of the machine through the offset portions 6^a of the nozzle, the said shaft being vertically adjustable with respect to the nozzle. In the present instance I have shown the shaft 9 provided with a plurality of eccentrics 10, 10^a, 10^b, engaging suitable apertures in the walls of the offset portions 6^a, of the nozzle, and rigidly secured to the shaft 9 by means of set screws, or otherwise, so that by rotating the shaft 9 the said eccentrics will be turned in the apertures which they engage, and thereby raise or lower the nozzle with respect to the shaft 7 and rollers 8, so as to maintain the lower edges of the nozzle at the desired height above the surface traversed to afford the desired amount of opening for the admission of air into the nozzle to secure the best operation of the machine under varying conditions. The shaft 9 is provided with a thumb piece 11 by means of which it may be rotated, and the shaft 9 is also provided with a ratchet 11, which may be conveniently formed on one of the eccentrics, as the eccentric 10^a, and which is engaged by a stationary ratchet spring 13 to lock the shaft 9 in any position to which it may be adjusted.

14 represents a rotary brush of any desired construction which in this instance is shown as provided with bristles 15 and longitudinal blades 16. This brush is detachably supported at the forward ends of suitable pivotally mounted hangers, and is preferably arranged to be positively driven in the direction of the arrow in Fig. 5. In the present instance I have shown one of these hangers in the form of a spring arm 17 having its rear end bent upon itself, as indicated at 18, both portions 17 and 18 being provided with apertures through which the shaft 9 passes and which forms a pivotal connection for the hanger. The hanger 17 is provided near its outer end with a bearing aperture 19 to engage a trunnion 20, at one end of the brush, and the extreme outer end of the hanger is provided with a laterally bent portion 21 provided with an L-shaped slot 22 to receive a screw or stud 23, which extends through the front wall of the nozzle and normally engages the vertical portion of the slot to limit the vertical movement of the hanger. When the hanger 17 is reased to its highest position, the horizontal portion of the L-shaped slot permits it to be bent or sprung laterally to permit the insertion and removal of the brush. The opposite end of the shaft 9 is provided with a hanger 24 which in this instance is in the form of a gear case containing a series of gears as shown in Fig. 4 connecting the adjacent roller 8, which I term the traction and driving roller for the brush, with a spindle 25 in axial alignment with the aperture 19 of the hanger 17 for supporting the other end of the brush and imparting rotary motion thereto from the said roller 8. The spindle 25 is provided with a key 26 adapted to engage a notch 27 in one end of the brush shaft to permit of the ready engagement and disengagement of the brush and spindle. The gear case 24 is also provided at its forward end with a laterally bent portion 28 provided with a vertical slot 29 engaged by a screw 30 for limiting the vertical movement of the hanger at its pivotal connection with the shaft 9. In order to maintain the brush 14 at the desired height above the surface over which the apparatus is propelled and to prevent the brush from entering too far into the pile of the carpets, rugs, etc., I provide at the outer end of each of the hangers 17 and 24, a brush supporting device, one of which is shown in detail in Fig. 6, which is rigidly secured to the hanger and is provided at its lower end with a non-rotary floor engaging surface, preferably in the form of a shoe or runner. As indicated in Fig. 6, the brush supporting devices each comprise a vertically disposed plate 31, provided with suitable apertures 32, by means of which they may be rigidly secured to the hanger with which they are connected by screws or rivets. The plate 31 is provided at its lower edge with a horizontally disposed portion 33, forming a shoe or runner, which is curved so as to form a convex bearing surface to engage the floor or carpet, and a flange 34 parallel to the main portion of the plate 31, extends upwardly from the horizontal bearing or floor engaging portion 33 parallel with the main portion of the plate. The forward end of the brush supporting device is also turned upward, as indicated at 35 to form a curved front wall to prevent the shoe or runner from catching in the pile of the rug or carpet the shoe or runner being entirely open at the rear to prevent the accumulation therein of dust particles, threads, etc., which can readily pass out rearwardly and upwardly and be drawn with the current of air into the suction fan.

It will be seen that as the machine is propelled over the ground to be cleaned the rotary brush will always be maintained at the same height above the surface traversed, determined by the engagement of the shoes or runners therewith. The vertical adjustment of the nozzle does not in any way affect the height of the brush which, by gravity, is always supported by the smooth, polished, non-rotary surfaces 33 of the brush supporting devices. The advantages of supporting

the brush by non-rotary means as contrasted with supporting it by means of rollers, for example, will be at once apparent.

Where supporting rollers are employed the tread portions which engage the surface traversed are carried continuously around and over the axis of the brush in a direction opposite to the rotation of the brush, and this tends to carry threads, hairs, lint, etc., around the brush shaft and between it and the rollers, so as to impede the rotary movement of the brush supporting rollers, and the brush, and the driving means for the brush, and makes it difficult to push the machine over the floor and impairs the efficiency of the apparatus.

In my improved construction the non-rotary brush supporting devices extend below the brush and have no moving parts, and the end portions of the brush are left clear, so that if anything winds thereon it will not impede the rotation of the brush and its driving means, and will not interfere with the brush supporting devices, or impede the forward movement of the machine. In practice I prefer to provide the brush shaft with smooth cylindrical portions, indicated at 14a, at each end of the portion carrying the bristles and blades, or other projecting parts, and as a matter of fact there is little or no tendency for anything to wind on the end portions of the brush so as to interfere with its rotation or the proper and efficient operation of the machine.

What I claim and desire to secure by Letters Patent is:—

1. In a vacuum cleaner, the combination with a nozzle open at the bottom, means for creating a current of air through said nozzle, means for supporting the nozzle at a desired distance above the surface traversed, and a rotary brush movable vertically within and independently of said nozzle, of supporting means for said brush, independent of said nozzle, provided with non-rotary portions for engaging the surface traversed.

2. In a vacuum cleaner, the combination with a nozzle open at the bottom, means for creating a current of air through said nozzle, and means for supporting the nozzle at a desired distance above the surface traversed, of a rotary brush located within said nozzle, and movable vertically with respect thereto, pivoted hangers for supporting said brush, and brush supporting devices provided with non-rotary floor engaging portions rigidly secured to said hangers, independently of said nozzle.

3. In a vacuum cleaner, the combination with a nozzle open at the bottom, means for creating a current of air through said nozzle, adjustable means for supporting said nozzle at different distances above the surface traversed, of a rotary brush located within said nozzle and movable vertically therein, independently thereof, and means for driving the rotary brush, of supporting devices for regulating the height of the brush with respect to the surface traversed, having a fixed relation with the axis of the brush, and movable vertically therewith independently of the nozzle, said supporting devices being provided with non-rotary portions for engaging the surface traversed.

4. In a vacuum cleaner, the combination with a nozzle open at the bottom, means for creating a current of air through said nozzle, means for supporting said nozzle, including a traction and driving roller, a rotary brush located within said nozzle and movable vertically independently thereof, connections between said brush and said traction and driving roller, and brush supporting devices movable vertically with the brush independently of the nozzle, and provided with non-rotary surfaces for engaging the surface traversed.

5. In a vacuum cleaner, the combination with a nozzle open at the bottom, means for creating a current of air through said nozzle, means for supporting said nozzle, including a traction and driving roller, a rotary brush located within said nozzle and movable vertically independently thereof, connections between said brush and said traction and driving roller, and a brush supporting device at each end of the brush having a fixed relation to the axis of the brush, and movable vertically therewith independently of the nozzle, said devices being provided with parallel lateral walls, connected at their lower edges by a shoe or runner, and having an upwardly extending flange at the forward end of the runner portion, the space between said lateral walls being open at the rear end of the shoe or runner to facilitate the discharge of dirt, lint, etc.

In testimony whereof I affix my signature.

GUSTAV A. BRACHHAUSEN.