

Oct. 23, 1928.

1,689,089

A. C. TEVES

VACUUM CLEANER

Filed July 3, 1923

3 Sheets-Sheet 1

Fig. 1.

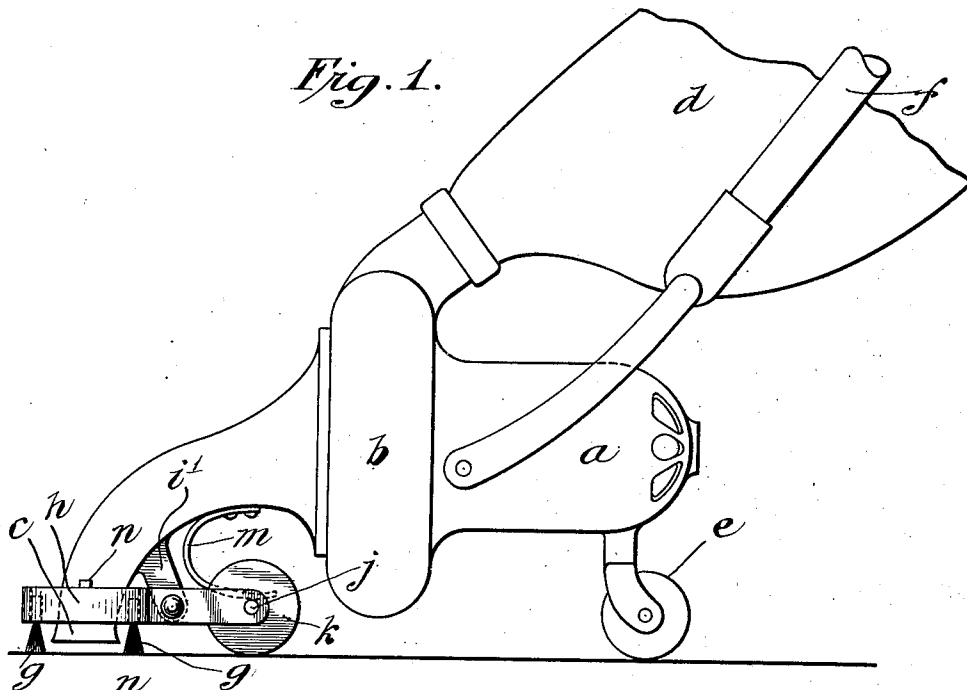
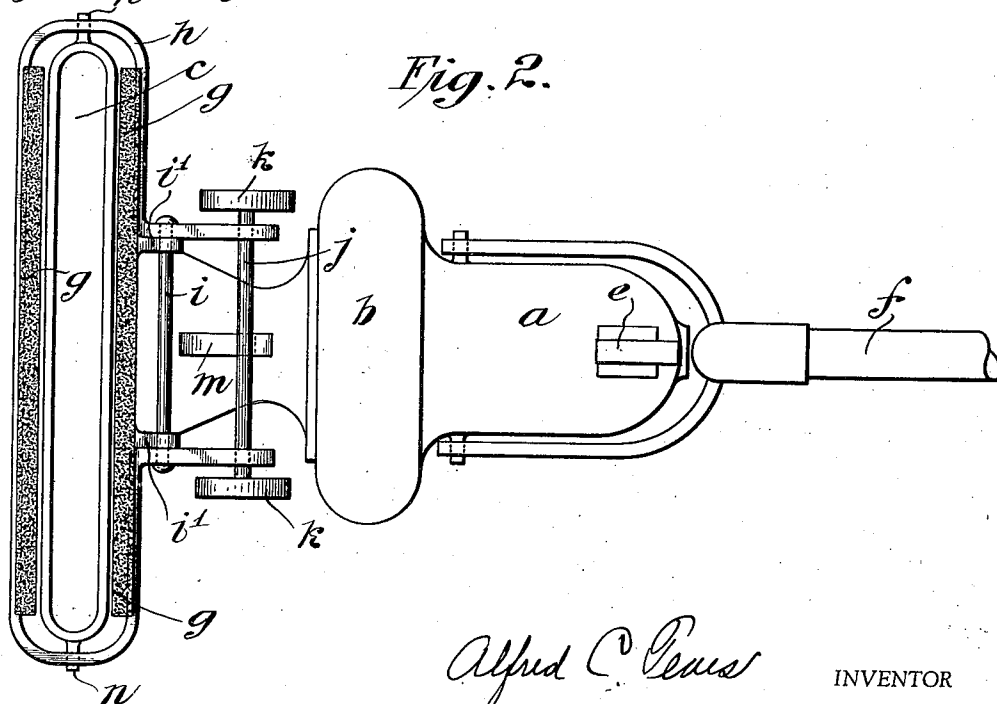


Fig. 2.



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Fig. 3.

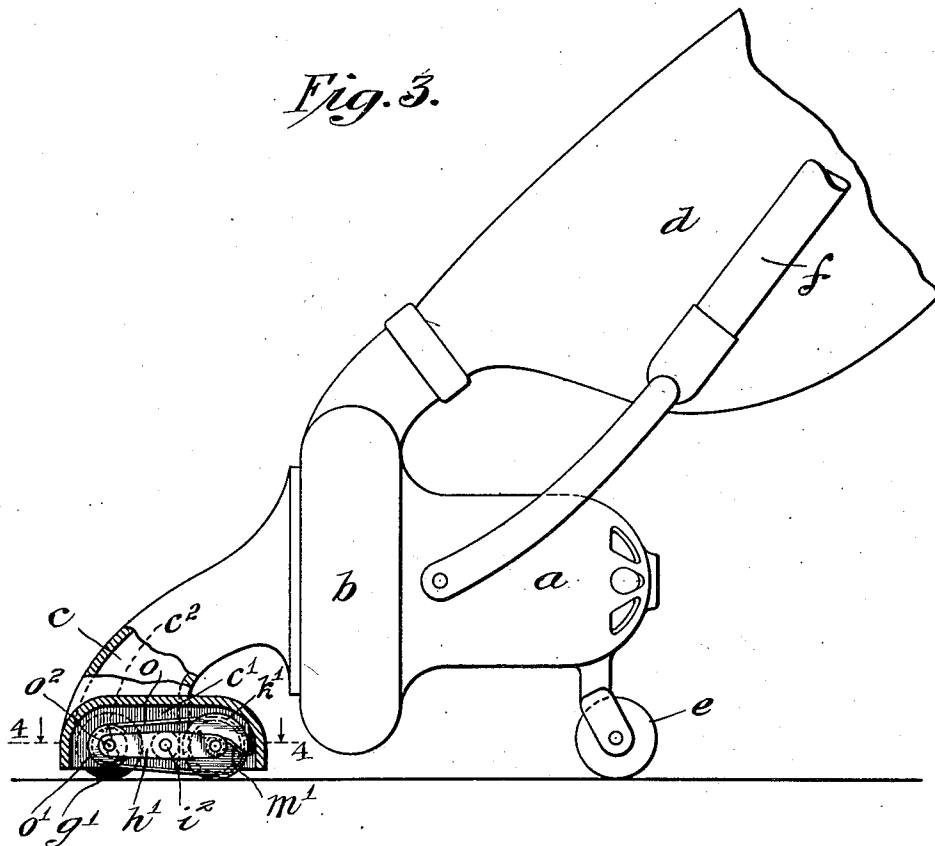
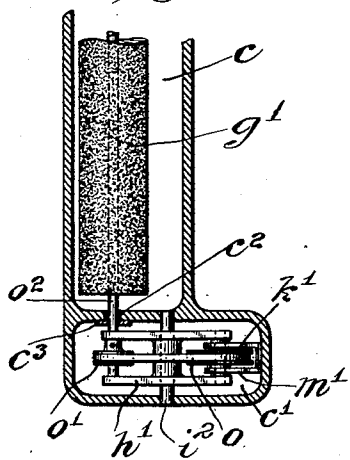


Fig. 4.



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Fig. 5.

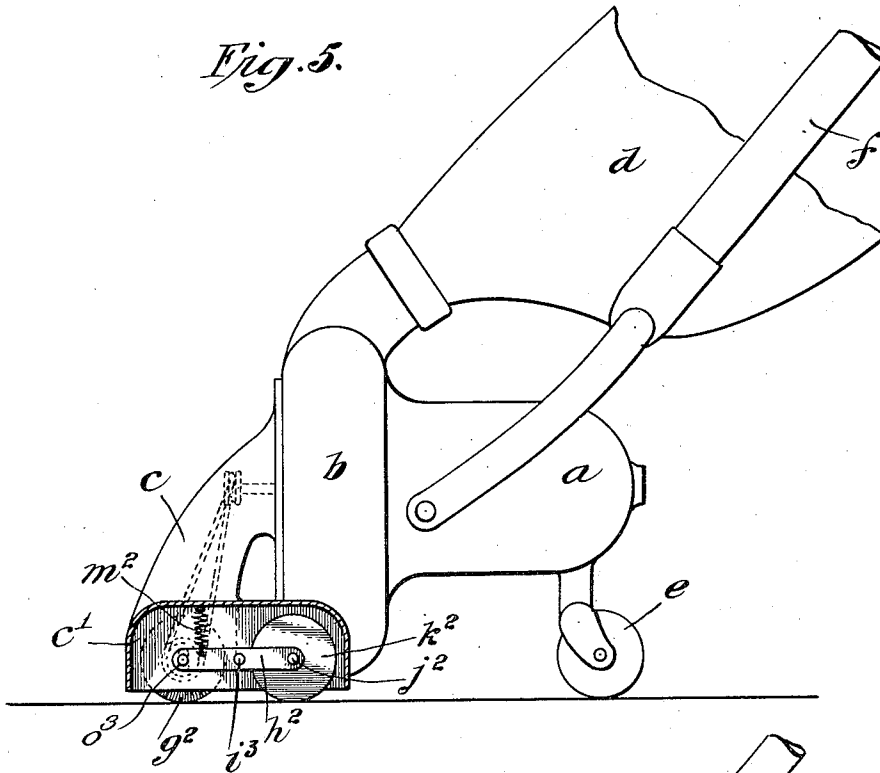
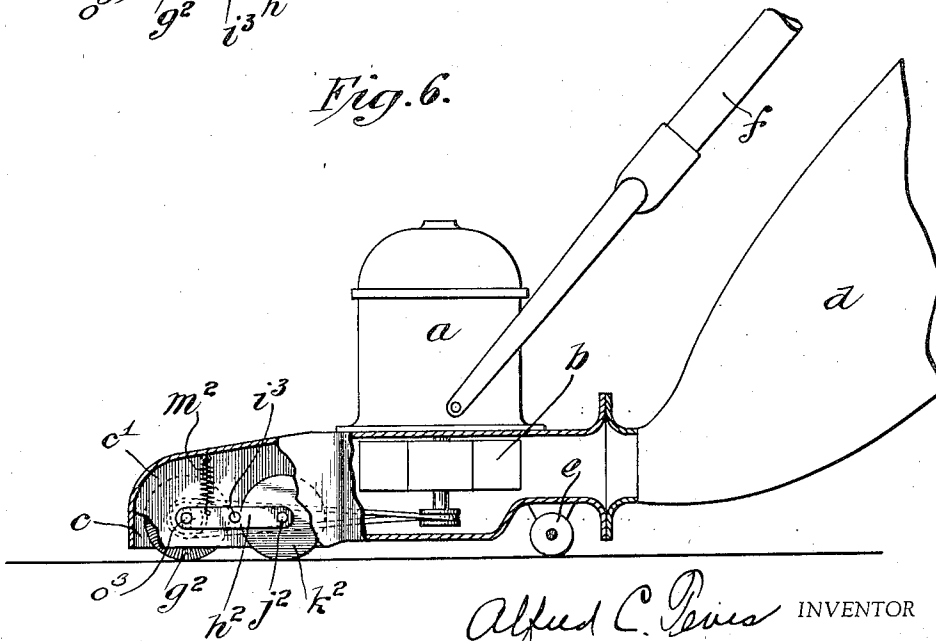


Fig. 6.



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VACUUM CLEANER.

Application filed July 3, 1923. Serial No. 649,192.

My invention relates to vacuum cleaners, and more particularly to cleaners of this type in which the action of the subatmospheric pressure at the suction nozzle is supplemented by the bristles of a brush.

At the present time three types of combined suction and brush vacuum cleaners are in general use. In one of these types the bristles are arranged in parallel, substantially straight lines forwardly and rearwardly of the suction nozzle, extending to below the base of the nozzle a fixed distance so as to be constantly engaged with uniform pressure with the surface to be cleaned. In another type a rotary brush driven from the motor is mounted within the nozzle, this brush being so set as to have bristles project below the nozzle to a fixed extent. In this type the brush is driven by the motor at high speed. In the third type a rotary brush is mounted in the nozzle as in the second type above referred to, and is rotated through the medium of traction wheels serving to support the forward portion of the cleaner adjacent the nozzle, and a belt and pulley construction connecting the shaft of said traction wheels with the brush. In this type, as in the second type above referred to, the bristles of the brush extend to a fixed extent beyond the nozzle and constantly engage the surface to be cleaned with uniform pressure.

In the combined suction and brush type of vacuum cleaners, the bristles of the brush are used for displacing threads, small particles of paper and other small articles which have a tendency to cohere with the nap of a carpet with sufficient tenacity to resist the action of the suction at the nozzle, the bristles of the brush, however, serving to displace such articles so as to loosen them in relation to the carpet and bring them within the effective range of the suction and cause them to be removed to the dust receiving bag, or be conveyed from the surface being cleaned as a result of the suction at the nozzle of the cleaner. Such brushes have proven highly effective in use, but have been subject to the criticism that they operate constantly and to the same extent upon all surfaces being cleaned, whether or not the con-

dition of the surface is such as to require utilization of the brushes in order to remove heavier articles, or articles cohering to the nap of the carpet, and thus causing unnecessary wear upon the carpet. In fact with power driven brushes, the action of the bristles of the brush and their relation to the nozzle is such that if through inadvertence the cleaner be allowed to remain stationary for any considerable time while power is being applied thereto, the nap of the carpet will be removed to an extent to prove injurious to the carpet.

With the above conditions in mind, the object of my invention is to provide a vacuum cleaner of the brush type wherein the bristles of the brush under normal conditions may either be maintained out of engaging relation with the carpet being cleaned, or have such light engagement therewith as to not be operative to an extent to materially modify the action of the suction, but which bristles, when it is desired to loosen or displace objects which resist the action of the suction at the nozzle, may be brought into the desired pressure exerting relation to the carpet or other surface being cleaned, to be momentarily effective for displacing such objects.

The construction and arrangement of a cleaner embodying my invention is such that the desired pressure engaging relation between the bristles of the brush and the surface being cleaned, will result from the instinctive tendency of the housewife to exert greater pressure upon the handle of the cleaner when it is seen that a more thorough cleaning action is required than is normally the case, this construction at the same time being such that immediately when the pressure against the handle is released, the bristles of the brush will automatically assume their normal position out of, or in only light, engaging relation with the surface of the carpet or other material.

My invention is equally applicable to types of vacuum cleaners in which the bristles of the brush are arranged forwardly and rearwardly of the nozzle, and have no movement except travel coincident with the movements

of the cleaner itself, and in which rotary brushes are mounted within the nozzle itself, whether the same be motor driven or driven from traction wheels, the essential characteristics and operative effect being the same irrespective of the type of brush used, or to the method of imparting movement thereto, the adaptation of the invention to these different types requiring merely changes in the structure of the head of the vacuum cleaner adjacent the nozzle by reason of varying structural conditions in these different types of heads.

The invention consists primarily in a vacuum cleaner embodying therein a casing, suction creating means therein, a nozzle communicating therewith and normally positioned above the surface to be cleaned, a handle attached to said casing, a roller support for said casing rearwardly of said handle, oscillatory frame means pivotally supported on said casing with the front portion thereof adjacent said nozzle and the rear portion thereof adjacent said handle, a brush carried by the front portion of said frame means, a roller carried by the rear portion of said frame means, and a spring acting normally to raise the front portion of said frame means carrying said brush and cause said rollers to support the cleaner adjacent said nozzle, whereby the bristles of said brush are normally held away from said surface and increased pressure applied through said handle will impart movement to said oscillatory frame means to ensure a desired pressure engagement of the bristles of said brush with said surface; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a side view of a vacuum cleaner embodying one embodiment of the invention;

Fig. 2 is a bottom plan view thereof;

Fig. 3 is a side view of a different embodiment of the invention, with portions thereof adjacent the nozzle shown in section;

Fig. 4 is a bottom plan view thereof adjacent one end of the suction nozzle;

Fig. 5 is a side elevation of still another embodiment of the invention, with a portion of the casing adjacent the nozzle shown in section; and

Fig. 6 is a view of still another embodiment with a portion of the casing adjacent the nozzle and the suction creating device broken away.

Like letters refer to like parts throughout the several views.

In the embodiments of my invention shown in the various views of the drawings, I have illustrated it as applied to different well known forms of vacuum cleaners in each of which *a* indicates an electric motor for ac-

tuating a suction creating device *b*, the casing of which has a forwardly and downwardly presented suction nozzle *c*. The discharge of said casing communicates with the usual dust bag *d*. The main load of the motor *a*, fan or suction creating device *b*, and nozzle *c*, is supported by a wheel *e*.

The nozzle *c* is reciprocated with relation to the carpet or other surface, through the medium of a handle *f* of the usual form.

The mechanisms heretofore described are all old and well known in this art, and may take a wide diversity of different forms, my invention relating more particularly to the combination with the essential parts of vacuum cleaners having the above characteristics, of a particular brush construction co-operating with the nozzle *c* for loosening dirt, threads, or other similar articles which may cohere to the nap of the carpet, so that the suction at said nozzle will be effective in removing them to the dust bag *d*.

This brush, while varying in its details of construction, and in its relation to the nozzle, has the characteristic common to all embodiments of the invention shown, of being so supported that under normal conditions the bristles thereof will either just escape contact with the nap of the carpet, or come only into light engagement therewith, so as to be inoperative in a large measure when the suction at the nozzle will ordinarily raise dust and other matter from the carpet or other surface, but which may be brought into a desired pressure engagement with said surface so as to effectively disturb or loosen such matter when required.

The manner of mounting the brush is such that while its actuation may slightly vary the position of the nozzle with relation to the surface being cleaned, this variance will be entirely disproportionate to the movement of the brush, and in fact will not be appreciable so far as the operation of the suction nozzle is concerned. The manner of mounting the brush is also such that when the conditions are such as to not require pressure engagement between the bristles and the surface being cleaned, the brush will automatically be lifted to its normal position where it is practically inoperative with relation to said surface without requiring the change of any adjustments in the machine.

Referring more particularly to Figs. 1 and 2 of the drawings, I have illustrated the invention as applied to a type of vacuum cleaner in which a brush *g* is used, which has parallel rows of bristles positioned one forwardly, and the other rearwardly, of the nozzle *c* and extending substantially for the full length of this nozzle. The bristles of the brush *g* are carried by a frame *h* which is pivoted by means of the shaft *i* and lugs *i'* rearwardly of the nozzle *c*.

Mounted between the nozzle *c* and the suc-

tion creating device *b* in suitable bearings in said frame, is a shaft *j* carrying rollers *k*.

Acting upon the frame *h* is a spring *m* having a normal tendency to force the traction rollers *k* downwardly, thus oscillating the frame *h* about its point of pivotal support, to slightly elevate the portion of said frame carrying the brush *g*, the upward movement of said frame adjacent said brush being limited by a stop or stops *n*. While the spring *m* is shown as acting directly against the shaft *j*, it is apparent that the normal elevation of the brush *g* may be secured by the application of the lift of said spring to said brush in any other desired manner than through said shaft.

Referring now to the form of the invention shown in Figs. 3 and 4, the brush is shown as being a rotary, power driven brush *g'*, the opposite ends of which are mounted in oscillatory frames *h'*, one positioned on each side of the nozzle. In this form of the invention, each frame has a roller *k'* connected by a belt *o* to the pulley *o'* upon the shaft *o''* of said brush *g'*. The shafts of said rollers *k'* are acted upon by springs *m'* with the same operative effect as to the brush, as described in connection with the form of the invention shown in Figs. 1 and 2.

To prevent a material loss of the effective suction at the nozzle, and at the same time protect the frames *h'* and their appurtenances from possible injury, I provide an extension *c'* at one side of the nozzle *c* communicating therewith only through a segmental slot indicated at *c''*, which slot, if desired, may be closed by means of the plate or washer *c'''* carried by and movable with the shaft *o''* of the brush *g'*. The constant engagement of the rollers *k'* and the surface being cleaned, will result in the rotation of the brush in accordance with, and as a result of, the reciprocatory movement of the cleaner in its entirety. In this form of the invention, the shafts upon which the frame *h'* oscillate, are indicated at *i''*, and the axle for the traction wheels *k'*, at *j'*.

In the embodiment of the invention shown in Fig. 5 the construction is practically the same as that shown in Figs. 3 and 4, with the exception that the rollers *k''* corresponding with the wheel *k'*, serve merely as rollers and not as a source of power for rotating the brush, as shown in Figs. 3 and 4. A different form of spring *m''*, differently applied, is also used in this form of the invention, a coiled spring being employed, which acts upon the pivotal frame *h''* adjacent the brush, instead of adjacent the traction wheel *k''*. In this form of the invention, the brush is driven from the motor *a* by a pulley upon an extension of the shaft of the fan or other suction device *b* acting directly on the brush through a belt. This construction is indicated in

dotted lines in Fig. 5. Reference letters are not applied to these parts, as the specific means for applying power for rotating the fan used, forms no part of the present invention. In this form of the invention the frame is indicated at *h''*, the point of pivotal support of the frame at *i''*, the shaft of the traction wheel *k''* at *j''*, the shaft for the brush *g''* at *o'''*, and the extension or housing at each side of the nozzle at *c'*.

In the embodiment of the invention shown in Fig. 6, the construction of the brush and its appurtenances are the same as shown in Fig. 5, and are hence indicated by corresponding reference letters. This form of the invention differs from the form shown in Fig. 5 merely in the detailed arrangement of the motor *a*, the fan or other suction device *b* and the resultant change of the application of power from said motor to the rotating brush *g*.

In the forms of the invention shown in both Figs. 5 and 6, each frame *h''* is mounted in an extension *c'* corresponding in construction and arrangement with the extensions *c'* shown in Figs. 3 and 4, and the same segmental slots, and closure plates or washers *c''* and *c'''* are employed for the same purpose, being indicated, however, only in dotted lines in these figures.

The operation of the herein described mechanism is substantially as follows:— Under normal conditions the brush *g*, *g'* or *g''* will, while the cleaner is in use, have, at the most, only a light sweeping engagement with the nap of the carpet or other surface being cleaned, so as to have little or no tendency toward the removal of the nap, or a material wear thereof.

Since the suction nozzle *c* will be effective to remove all dust, dirt, or other matter which does not cohere to the surface being cleaned sufficiently to resist lifting power of this suction, the action of the bristles is not required under normal conditions.

The conditions above specified, that is the substantially inoperative, or only slightly operative, relation of the bristles of the brush to the surface being cleaned, results from the oscillation of the frame carrying the brush by the spring acting thereon, or by the use of an equivalent construction having a normal tendency to engage the rollers *k*—*k'*—*k''* carried by said frame, with the surface being cleaned.

When, however, it is found that the action at the nozzle *c* alone, or the suction nozzle and the action of the brush, under normal conditions will not suffice to remove threads, particles of dirt or other substances from the nap of the carpet or other surface, the housewife will instinctively apply greater pressure downwardly of the handle *f*, which downward pressure will have the effect of increasing the pressure at the rollers carried by

the oscillatory frame, with a resultant upward movement of said rollers and the end of the frame adjacent thereto, and downward movement of the opposite end of the frame, carrying the brush, thus bringing the bristles of the brush in relatively heavy pressure engagement with the carpet or other surface, and causing them to act to effectively loosen such particles, so that the suction at the nozzle will become effective with relation thereto. Immediately upon the release of this additional pressure exerted through the handle, the rollers will, through their tendency to move downwardly, impart a return oscillatory movement to the frame with a resultant elevation of the brush to its substantially inoperative, or slightly operative, normal position.

While the oscillation of the brush and roller oscillatory frame, may in its operation result in movement of the nozzle toward and from the surface being cleaned, the leverage of this frame is such that the brush will have relatively much greater movement than the nozzle, the maximum movement of the brush being but a fraction of an inch, even when wear has occurred upon the bristles. This movement of the nozzle, however, would probably not be sufficiently great to have any appreciable modifying effect of the suction applied about same, but if there were any such effect, it would be to bring the nozzle into close relation to the surface being cleaned, while the brush was active, which would be an advantageous result. This condition probably exists to a certain extent in the cleaner embodying my invention.

In the form of the invention shown in Figs. 1 and 2, the use of parallel rows of bristles in the brush, will result in the row positioned rearwardly of the nozzle throwing the loosened dust or other material toward or below the nozzle upon the forward movement of the cleaner, the forward row of bristles having the same effect upon the return or rearward movement of the cleaner.

Where a rotary brush is used, as in Figs. 3 to 6 of the drawings, the operative conditions will be as above described, with the exception that the brush always acts within the nozzle, in said figures. The side extensions *c'* in the forms of the invention shown, are employed so as to conceal and protect the oscillatory frames, since the length of the lever arms of such frames and the width of the frames, would preclude their being brought within the nozzle in their entirety. These side extensions would also permit a better control, or less likelihood of a loss, of the effective suction at the nozzle.

I believe it to be broadly new to employ in a vacuum cleaner, a brush mounted upon an oscillatory frame, which frame is acted upon by means having a normal tendency to sup-

port the brush in the desired relation to the suction nozzle and the surface being cleaned, whereby an operative relation of the bristles of the brush to the surface being cleaned may be controlled by the varying pressure exerted upon the handle.

It is apparent that when a power driven brush is used, even if through neglect the cleaner is allowed to remain in one spot without interrupting the power to the motor *a*, no wear will occur upon the nap of the carpet as a result of the continued action of the bristles of the brush thereon, and yet while in use said brush may at any time, and in fact will almost automatically, be brought into the desired pressure engagement with the surface whenever the conditions of said surface require.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention as described in the following claims.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A vacuum cleaner embodying therein a casing, suction creating means therein, a nozzle communicating therewith and normally positioned above the surface to be cleaned, a handle attached to said casing, a roller support for said casing rearwardly of said handle, oscillatory frame means pivotally supported on said nozzle with the front portion thereof adjacent said nozzle, and the rear portion thereof adjacent said handle, a brush carried by the front portion of said frame means, rollers carried by the rear portion of said frame means, and a spring acting normally to raise the portion of said frame means carrying said brush and cause said rollers to support the cleaner adjacent said nozzle, whereby the bristles of said brush are normally held away from said surface, and increased pressure applied through said handle will impart movement to said oscillatory frame means to ensure a desired pressure engagement of the bristles of said brush with said surface.

2. A vacuum cleaner embodying therein a casing, suction creating means therein, a nozzle communicating therewith and normally positioned above the surface to be cleaned, a handle attached to said casing, a roller support for said casing rearwardly of said handle, an oscillatory frame pivotally supported on said nozzle with the forward portion thereof inclosing said nozzle, and the rear portion thereof adjacent said handle, brushes consisting of parallel rows of bristles carried by the forward portion of said frame and arranged respectively forwardly and rearwardly of said nozzle, rollers carried by the

end of said frame adjacent said handle, and a spring acting normally to raise the forward portion of said frame carrying said brushes and cause said rollers to support the cleaner adjacent said nozzle, whereby the
5 bristles of said brushes are normally held away from said surface, and increased pressure applied through said handle will impart movement to said frame to ensure a desired pressure engagement of the bristles of
10 said brushes with said surface.

In witness whereof I have hereunto affixed my signature this 30th day of June, 1923.

ALFRED C. TEVES.