Dec. 22, 1936. F. RIEBEL, JR., ET AL 2,064,855

VACUUM CLEANER

Filed Aug. 2, 1935

Fig. 1

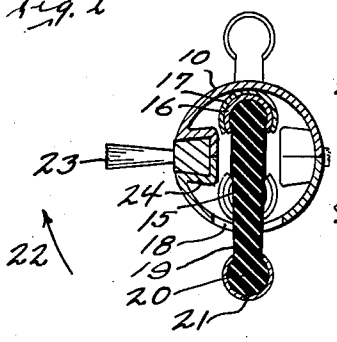


Fig. 2

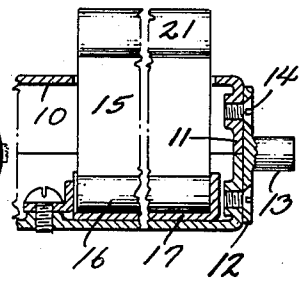


Fig. 3

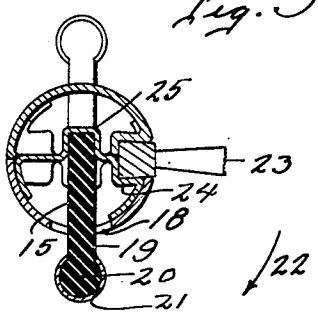


Fig. 4

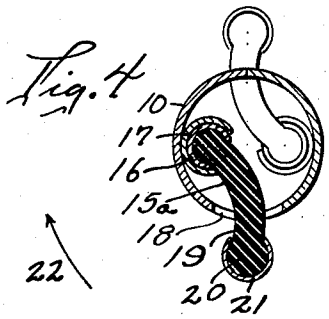


Fig. 5

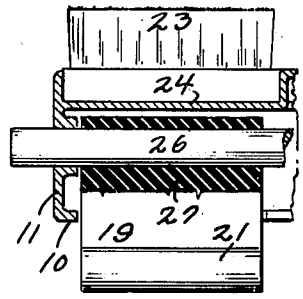


Fig. 6

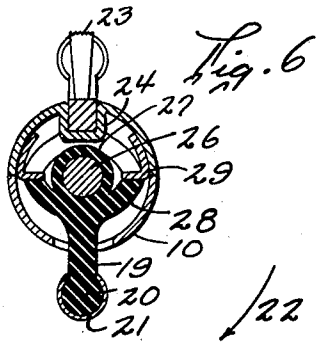


Fig. 7

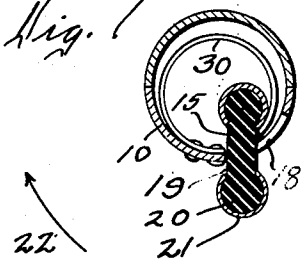


Fig. 8

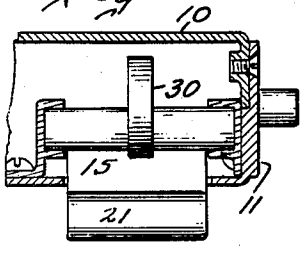
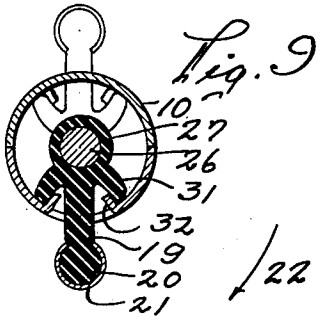


Fig. 9



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UNITED STATES PATENT OFFICE

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VACUUM CLEANER

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Application August 2, 1935, Serial No. 34,400

8 Claims. (Cl. 15—13)

This invention relates to vacuum cleaners of the type which agitates an air cushion suspended carpet by means of a high speed motor driven rotary agitator including flexibly mounted beaters, such as that covered in pending application Serial No. 752,270, filed November 9, 1934, of which the present application constitutes a continuation in part.

The object of this invention is to provide a rotary agitator which reduces carpet injury to a minimum while preserving a maximum of dirt loosening efficiency. The invention achieves this aim by providing an agitator with a beater element so mounted as to have a high circumferential yieldability.

To this end, the invention contemplates the employment of an agitator spindle in the form of a hollow cylinder or shell, and a beater including a rigid smooth surfaced carpet contacting member and a resilient link connecting said member to the spindle, great flexibility being achieved by increasing the length of the flexing region of the link beyond that which would be possible if it were fixed at the periphery of the spindle. To this end, the link is attached to the spindle at a point well within the periphery thereof and providing suitable space for the link to flex both inside and outside the spindle.

The invention also contemplates an arrangement wherein the blow struck by the beater against the carpet, will increase in intensity during carpet contact, being relatively mild initially. This is achieved in one instance by arranging for the link to stiffen during carpet contact, by impingement of its middle region against the edge of the spindle. In another form of the invention it is achieved by arranging for the effective radius of the carpet contacting surface from the center of revolution to increase during contact.

With these and other objects in view the invention consists in the combination and construction and arrangement of the various parts thereof, whereby the objects contemplated are attained, as more fully set forth in the accompanying specifications, pointed out in the claims, and illustrated in the accompanying drawing, in which:

Fig. 1 is a cross sectional view through a rotary agitator embodying the invention.

Fig. 2 is a longitudinal sectional view of the same.

Fig. 3 is a view similar to Fig. 1 of a modification of the invention.

Fig. 4 is a similar view of another modification.

Fig. 5 is a longitudinal sectional view of the form shown in Fig. 4.

Fig. 6 is a view similar to Fig. 1 of another modification of the invention.

Fig. 7 is a similar view of another modification.

Fig. 8 is a longitudinal sectional view of the form shown in Fig. 7.

Fig. 9 is a view similar to Fig. 1 of another modification of the invention.

The present invention provides a rotary agitator having brushing and beating elements on its periphery, for use in a vacuum cleaner wherein such agitator is driven by an electric motor and revolves within a suction nozzle adapted to lift a carpet into contact with its rotating beaters and brushes.

In the present invention, the beating and brushing elements are mounted on the inside of a spindle which comprises a hollow cylindrical shell 10, which may be formed as a length of tubing or in complementary halves of stamped sheet metal. The latter form is shown, in the drawing, the respective sections having end walls 11 which are secured to the face plates 12 forming part of the stub shafts 13 by means of which the spindle is revolubly mounted in a suction cleaner floor tool. The screws 14 which secure the end walls 11 to the face plate 12 serve to secure the respective halves of the spindle together.

The beater element, which is installed while the halves of the spindle are separated, comprises, in Fig. 1, an elongated strip of rubber 15 bonded at one end into a portion of a cylindrical tube 16 of metal, the latter being oscillatably mounted in a socket 17 secured to the inner face of the periphery wall of one of the shell sections.

Thus swingably mounted, the rubber strip 15 extends through a peripheral aperture 18 in the other spindle section and is spaced from the edge of the wall defining said aperture, particularly that edge toward which the beater is deflected under carpet contact.

The beater strip 15 has a portion 19 projecting a substantial distance beyond the periphery of the spindle which terminates in a head 20 embraced by a metal beater channel 21 secured thereto.

The brush element 23 may be attached in any convenient manner to the spindle as by securing in the socket 24 formed between respective sections of the shell.

As the spindle rotates in the direction indicated by the arrow 22, successive beaters will successively contact the suspended carpet and each beater will initially swing around the axis of the socket 17, the channel 16 turning therein, until the intermediate region of the beater strikes the edge of the spindle wall defining the opening 18. From this point, the beater will continue to flex to a certain extent but with greatly increased resistance. Thus the blow delivered to the carpet will be initially light and will increase in intensity during the duration thereof.

In the form shown in Fig. 3, the beater 15 is fixed in a socket 25 secured to one section of the spindle, and projects through the opening 18 with plenty of play for flexing movement. In this case, the beater 15 will initially flex during its entire length and will upon contact with the edge of the shell wall, flex with increased resistance.

The opening 18 may, if desired, be made wide enough so that the beater goes through its entire flexing movement without being stopped by the edge of the wall of the spindle. The invention in this respect provides greatly increased flexibility over what is possible where the beater is mounted in the periphery of the spindle, for the reason that the effective flexing length is greatly increased.

In the form of the invention shown in Fig. 4 the beater 15*a* is attached directly to the spindle at a position substantially ninety degrees from the opening 18. As a result, the beater as it recedes under carpet impact will not only swing circumferentially but will also move towards the axis of rotation. This particular form gives a maximum of lightness and resiliency of blow and may be used in connection with the finest and most delicate of fabrics.

In the form shown in Fig. 6, the beater is hinged upon the shaft 26 of the spindle, by means of a central sleeve 27 formed integrally with the neck 19. A pair of wings 28 also formed integrally with the neck 19 are engaged against the brackets 29 secured to the spindle, and offer resilient resistance to hinging movement around the shaft 26. This resiliency is supplemented by the resiliency of the neck 19 thus giving a high degree of flexibility and yet offering more than mere contrifugal inertia as the initial means of resisting carpet contact.

In the form shown in Fig. 7, the beater is hinged to the spindle to one side of the axis of rotation thereof, the hinge axis being so located relative to the direction of rotation that as the beater is deflected rearwardly under carpet contact, its carpet engaging face 21 will during the initial stage of deflection move away from the center of rotation thus increasing the downward component of the blow. A spiral spring 30 engages the rear side of the beater to resist the hinging movement.

In the form shown in Fig. 9 the construction is similar to that of Fig. 6, the beater being hinged by a sleeve 27 on the shaft 26 of the spindle and having integral wings 31 engaging lugs 32 bent inwardly from the spindle wall. This form of the invention operates in the same manner as that of Fig. 6.

We claim as our invention:

1. In a vacuum cleaner, a rotary agitator including a spindle having a hollow region forming a peripheral aperture and a beater, comprising a body of readily flexing resilient material attached at one extremity to the spindle at a point well within said spindle, and projecting freely through said aperture so that its intermediate region is spaced from that side of the aperture toward which it is deflected during carpet contact, said beater being adapted to recede circumferentially during carpet contact.

2. A rotary agitator as set forth in claim 1, including a carpet contacting channel of rigid smooth surfaced material embracing and secured to the outer extremity of said body.

3. A rotary agitator as set forth in claim 1, wherein resistance to recession of the beater is provided by contact of the beater with an edge of the spindle defining said aperture.

4. A rotary agitator as set forth in claim 1, wherein the beater is hinged to the inside of the spindle, and has means resiliently opposing hinging movement.

5. A rotary agitator as set forth in claim 1, wherein the axis of recession is located, relative to the direction of rotation, rearwardly of a radius passing through the center of the spindle and carpet contacting tip respectively, whereby the path of movement of the carpet contacting region of said beater increases its radial distance from the axis of rotation of the spindle during the initial stage of recession.

6. A rotary agitator as claimed in claim 1, wherein the beater is hinged to the inside of the spindle and wherein resistance to recession of the beater is provided by contact of the beater with an edge of the spindle defining said aperture.

7. In a vacuum cleaner, a rotary agitator including a spindle having a hollow region forming a peripheral aperture and a beater comprising a body of readily flexing resilient material attached at one extremity to the spindle at a point well within said spindle, and projecting freely through said aperture so that its intermediate region is spaced from that side of the aperture toward which it is deflected during carpet contact, said beater being adapted to recede circumferentially during carpet contact.

8. In a vacuum cleaner, a rotatable spindle having a hollow region communicating with an apertude at the periphery of the spindle, a beater comprising a body of readily flexing resilient material, and a shaft projecting through one extremity of said body and securing the same in said hollow region, the body projecting through said aperture and beyond the periphery and being adapted to flex under carpet contact.

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