

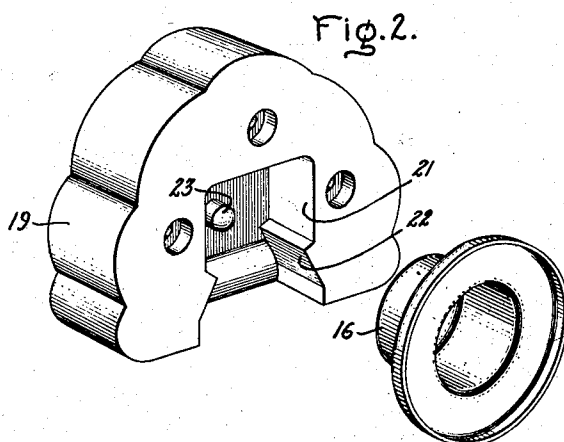
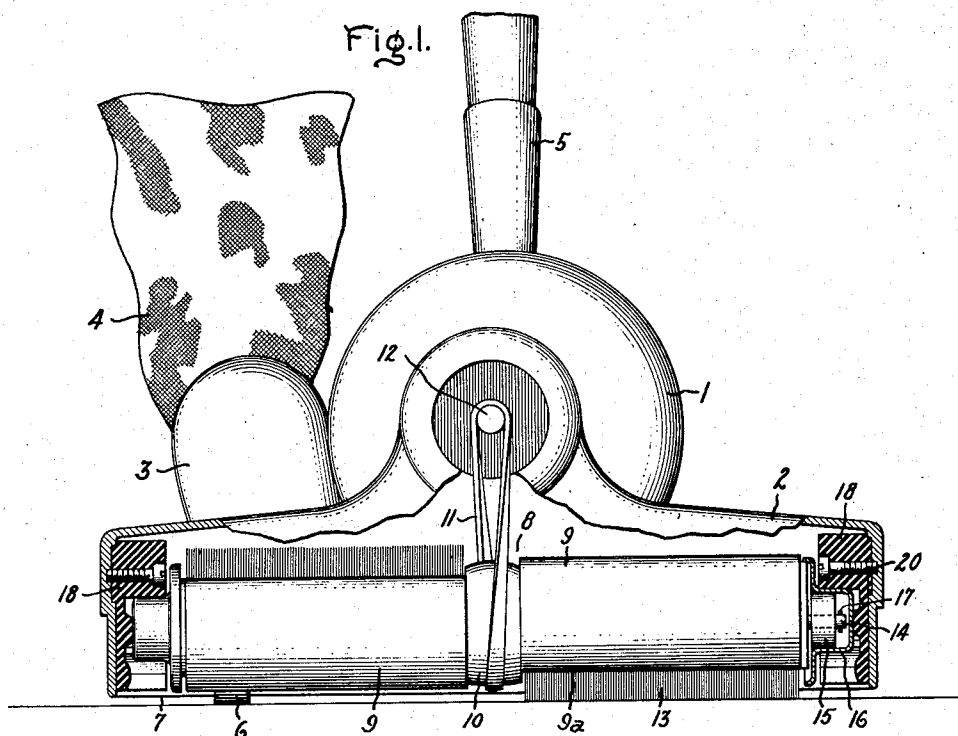
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VACUUM CLEANER

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VACUUM CLEANER

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My invention relates to vacuum cleaners of the type in which the floor covering or other material being cleaned is drawn toward the suction nozzle and subjected to a beating or sweeping action by a rotating agitating element arranged in the suction nozzle.

The object of my invention is to provide an improved arrangement for resiliently supporting the agitating element in the suction nozzle of a vacuum cleaner, and for a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a front elevation partly in section of a vacuum cleaner embodying my invention; and Fig. 2 is an exploded view of the support for one end of the agitating element.

Referring to the drawing, I have shown my invention in connection with a vacuum cleaner having an outer casing 1 which is provided with a suction nozzle 2 and a discharge conduit 3. A bag 4 for receiving dirt is attached to the discharge conduit. A motor-driven fan, housed within the casing, creates a suction at the nozzle 2 which draws dirt from the surface being cleaned through the suction nozzle and discharges the dirt through the discharge conduit 3 into the bag 4. A handle 5 is provided at the rear of the casing for moving the cleaner. One of the wheels which supports the cleaner is shown at 6.

The suction at the suction nozzle 2 raises the floor covering or other material being cleaned against the bottom edges 7 of the suction nozzle. While held in this position, the floor covering is subjected to a beating and sweeping action by rotatable agitating element 8 arranged in the suction nozzle. The body of the agitating element may be made from wood and has two cylindrical sections 9 at either end and an intermediate rounded section 10. The rounded section 10 provides a pulley by means of which the agitating element is rotated by a belt 11 driven from the end of the motor shaft 12. The body of the agitating element fills the greater part of the suction nozzle so that the air speed through the nozzle is increased. Each of the cylindrical sections 9 is cut away at 9a to provide a flattened surface from which a longitudinally extending brush 13 projects. Each of the brushes 13 moves the floor covering under half of the suction nozzle away from the suction nozzle once during each revolution of the agitating element and subjects the floor covering to a combined beat-

ing and sweeping action. I find that the straight brushes which contact the floor simultaneously throughout their entire length and move a large part of the floor covering away from the suction nozzle at one time produce better cleaning action and cause less wear than helically arranged brushes of the same stiffness. This may be due to the fact that with straight brushes a greater suction is produced at the nozzle when the brushes are out of contact with the floor covering and consequently the initial impact of the brush with the floor covering produces more effective beating. Also, when the straight brushes move the floor covering away from the suction nozzle, there is a greater reduction in suction and consequently less wear due to the dragging of the brush across the floor covering. By spacing the brushes 13 around the periphery of the agitating element, the power required to drive the agitating element is more uniform and at the same time the advantage of the improved beating action of straight agitating members is retained. The agitating element has a shaft 14 projecting from each end of the cylindrical portion 9 which is rotatably carried in a porous bronze bearing 15 secured within a cup-shaped bearing housing 16. The agitating element is assembled into the bearing housing 16 by inserting the shaft 14 through the bearing 15 and securing a pin 17 to the projecting end of the shaft to prevent removal of the shaft. The bearing 15 is then pressed into place in the bearing housing 16 and frictionally held therein. Oil soaked waste may be placed in the space between the end of the bearing and the bearing housing.

The agitating element is resiliently supported in the suction nozzle by supporting members 18 of rubber or other resilient material fixed to the end walls of the suction nozzle. The outer edge 19 of the supporting members 18 conforms roughly to the inner surface of the suction nozzle. The supporting members are secured to the suction nozzle by screws 20 which are threaded into the end walls of the suction nozzle. In the inner face of the supporting members is a rectangular recess 21 open at its lower end and having inwardly extending projections 22 in its side walls. Extending within the recess is a projection 23 integral with the supporting member. The recess is proportioned so that the bearing housings 16 of the agitating member can be inserted therein through the open lower end and when in place will be frictionally held therein. The walls of the recesses deform to permit insertion and removal of the bearing housings. When the

agitator element is in place in the suction nozzle, the projections 23 engage the ends of the bearing housings 16 providing a resilient support which cushions any endwise or longitudinal vibration of the agitating element. The projections 22 serve as stops which assist in holding the bearing housings 16 in the recesses 21.

The supports 18 cushion the vibration of the agitating element thereby decreasing the noise and vibration. The resilient supports also decrease the wear on the material being cleaned. This has been thoroughly shown by tests.

In the operation of the cleaner, the suction at the suction nozzle 2 draws the floor covering toward the lower edges 7 of the suction nozzle. The belt 11 rotates the agitating member 8 which is arranged in the suction nozzle. The cylindrical portions 9 of the body of the agitating element prevent the floor covering from being drawn within the suction nozzle. At the instant of impact of the brush 13 with the floor covering, the floor covering is in contact with the cylindrical portion 9 of the body of the agitating element adjacent the flattened surface 9a. The initial impact of the brush with the floor covering jars the dirt loose from the floor covering. Since at this instant the suction at the nozzle is at its highest value, the dirt which is loosened by the jarring or beating is quickly drawn through the suction nozzle. Also the initial impact causes more effective jarring or beating of the floor covering. The rubber supports 18 are in effect substantially rigid at the instant of impact so there is no decrease in the effectiveness of the beating action. Continued rotation of the agitating element after the instant of impact pushes the floor covering away from the suction nozzle and the dragging of the brush 13 across the surface of the floor covering subjects the floor covering to a brushing action. The rubber supports 18 permit the agitating element to yield upwardly reducing the pressure between the brushes and the floor covering and therefore reducing the wear caused by the brushing action. Since a large portion of the floor covering is simultaneously pushed away from the suction nozzle, due to the straight brushes, there is a considerable drop in suction pressure which further decreases the wear on the floor covering caused by the brushing action.

During the rotation of the agitating element, the rubber supporting members 18 resiliently cushion the agitating element. This cushioning action does not decrease the effectiveness of the beating action caused by the initial impact of one of the brushes 13 with the floor covering. The cushioning does, however, decrease the wear on the floor covering during the subsequent brushing action and also permits the agitating element to align itself with the floor covering so that uneven wear is prevented. The cushioning is particularly effective when used with agitating elements having straight agitating members.

Due to the arrangement of the brushes 13, the

agitator element is dynamically unbalanced. The axis of rotation of the agitating element will therefore tend to tilt about its center causing the outer ends to travel in orbits. The resilient supports 18 permit this displacement of the axis of rotation of the agitating element, the result being a decrease in vibration to the casing due to the cushioning action of the supports 18 and an increase in the beating action caused by the movement of the agitating element.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a vacuum cleaner, a suction chamber, a motor driven rotary agitator therein, means supporting said agitator for rotation, said means including projecting stationary portions at the respective ends of the agitator, and vibration absorbing cushions comprising blocks of rubber secured to the vertical end walls of the chamber, said cushions each having an inwardly and downwardly opening recess formed in the inner face thereof and in which a corresponding projecting portion is releasably received and supported, said cushions each being formed with a portion interposed between a corresponding projecting portion and an end wall of the cleaner.

2. In a suction cleaner, a suction nozzle, a motor driven rotatable agitating element in said nozzle, said element including a stationary projecting portion at one end, and a vibration absorbing supporting member of rubber-like material secured in the suction nozzle and having walls defining a recess in which said projecting portion is received and supported, the walls of said recess being deformable whereby the projecting portion may be removed therefrom without removing the supporting member.

3. In a suction cleaner, a suction nozzle, a motor driven rotatable agitating element in said nozzle, said element including a stationary projecting portion at one end, and a vibration absorbing supporting member of rubber-like material secured in the suction nozzle and having walls defining a recess in which said projecting portion is received and supported, the walls of said recess being deformable whereby the projecting portion may be removed therefrom without removing the supporting member, said supporting member being formed with a portion interposed between the projecting portion of the agitating element and an end wall of the cleaner.

4. In a suction cleaner, a suction nozzle, a motor driven rotatable agitating element in said nozzle, said element including a stationary projecting portion at one end, and a vibration absorbing supporting member of rubber-like material secured in the suction nozzle and having walls defining a downwardly opening recess in which said projection is received and supported, said walls being deformable whereby the projecting portion may be removed therefrom without removing the supporting member.

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