

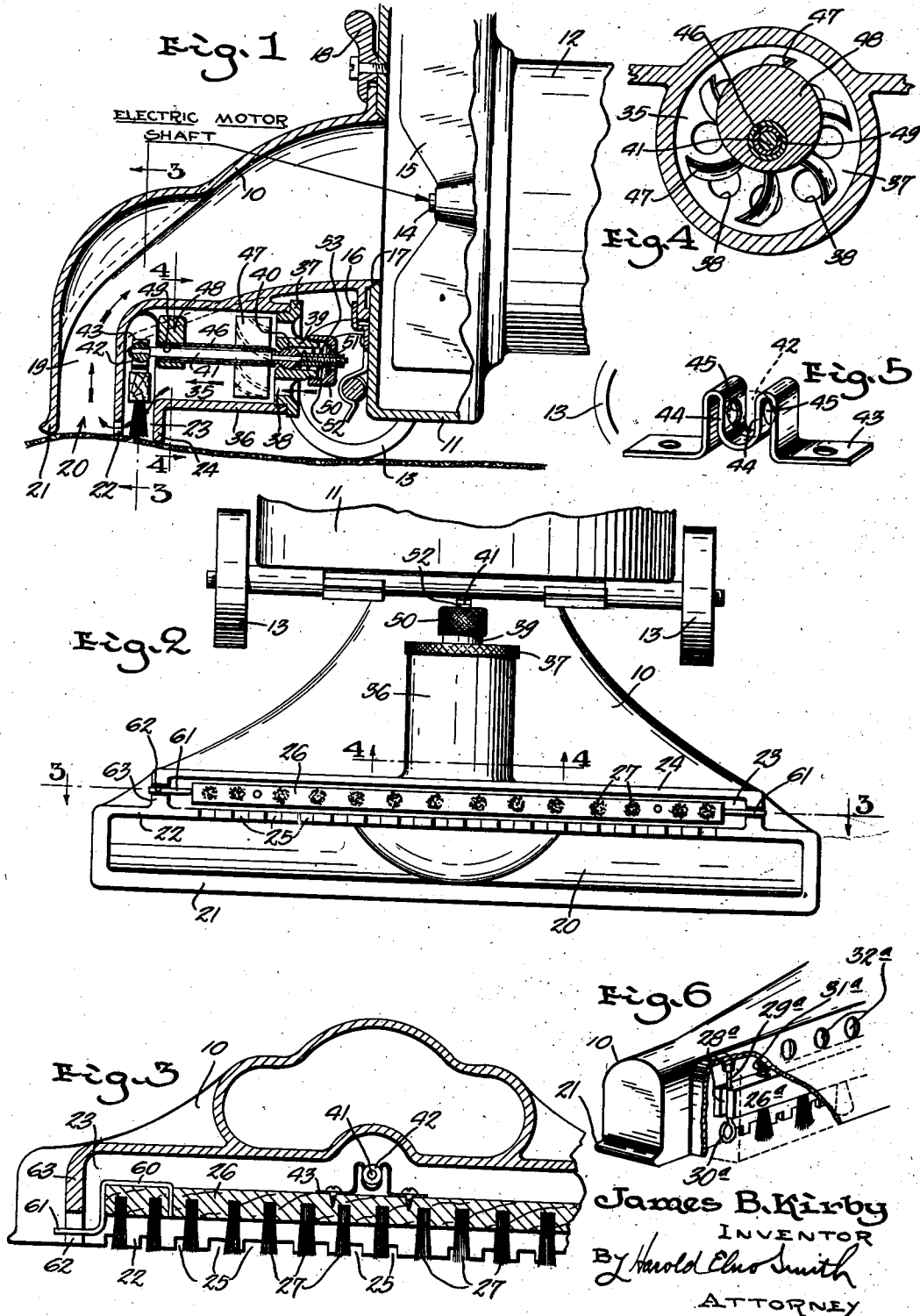
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SUCTION CLEANER

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SUCTION CLEANER

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This invention relates to suction cleaners and has for its object the provision of a new, simplified and improved brush mechanism for the collecting nozzles of such devices characterized chiefly by new and improved provisions for keeping the brush clean, and (if desired) for imparting such movement to said brush as will dislodge lint and litter without at the same time injuring the floor coverings on which it is used. A subsidiary object of the invention is the provision of an air turbine for driving the brush, said turbine being so arranged relative to the rest of the cleaner that the air which operates the same shall be available for the cleaning operation; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawing accompanying and forming a part of this application I have illustrated my improvements as applied to a well-known type of portable electric cleaner, though it will be understood that my improvements are not limited either to this type of machine or to any of the particular designs shown, these being illustrative of the principles of my invention rather than limiting in respect of their application.

Fig. 1 is a vertical, longitudinal, sectional view through the center of the collecting nozzle and fan chamber of a specimen cleaner; Fig. 2 is a bottom plan view of the machine shown in Fig. 1; Figs. 3 and 4 are transverse sectional views corresponding to the lines 3-3 and 4-4 respectively of Figs. 1 and 2; Fig. 5 is a perspective view of the brush connection; and Fig. 6 is a perspective view partly broken away showing a modified form of brush and brush-mounting.

The particular suction cleaner here chosen for purposes of illustration comprises a collecting-nozzle 10, fan-casing 11 and motor-housing 12, connected rigidly together in the order named from front to rear, and supported by suitable floor-wheels 13 with the motor-shaft 14 substantially horizontal, and the inlet-mouth of the nozzle properly presented to the floor. The motor-shaft is provided inside the fan-casing with a centrifugal-fan 15 which sucks air in through the nozzle and delivers it, together with dust and litter, to a bag (not shown). So far as the present invention is concerned the mode of producing the suction, the location of the suction-pump, and the mode of separating the air and dust are entirely immaterial. I have shown the nozzle as detachably secured to the fan-casing by means of a catch 16 at one side of the inlet port 17 and a latch 18 on the opposite side of that inlet port. The nozzle is formed with a narrow elongated

suction chamber 19 having a downwardly-facing inlet-mouth 20 arranged transversely and defined between front and rear horizontal lips 21 and 22, respectively, which are located substantially on the same level so as to define a substantially horizontal plane. This suction chamber communicates directly and freely with the port 17 and thence with the suction-producing apparatus; and formed directly in the rear of this suction-chamber and extending throughout at least the greater part of the length of the same is a transversely elongated brush-chamber 23, also formed with a downwardly-facing mouth which is defined between the lip 22 already mentioned and a third lip 24 which is parallel thereto. The inlet-mouth and brush-mouth are thus located side by side so as to be applicable simultaneously to one and the same working surface, although preferably (but this is not important) the rear lip of the brush-mouth extends to a slightly lower level than the lip 22 thus constituting a support for the nozzle in the absence or extreme adjustment of the wheels 13. The lip 22 is preferably located at a slightly higher level than the lip 24 although to assure a constant restricted communication between the two chambers substantially at floor level the lip 22 is preferably notched or apertured along its lower margin as shown at 25.

Suitably supported inside the brush chamber is a brush, preferably of simple construction and here illustrated as comprising merely an elongated wooden back-strip 26, having secured in its lower face a plurality of bristle-tufts 27 which project into contacting relation with the supporting surface. Provision being made for the admission of air into the chamber 23 at a higher level than these bristle-tufts, as by the apertures 32^a, it will be seen that the air stream induced through the slots 25 by suction inside the chamber 19 will cause a flow of air down along these bristle-tufts in a direction to remove adherent lint and litter therefrom.

A particularly simple mode of supporting this brush is that shown in Fig. 6 wherein the strip 26^a is provided at each end with a vertical slot 28^a, while the chamber 23 is provided at each end with a spring wire 29^a depending from its roof and terminating at its lower end in an enlargement or eye 30^a which is located slightly above the plane of the lip 24. Due to the resilience of these wires the brush can readily be introduced and removed, while the enlargement 30^a prevents its accidental falling out despite its weight and

the pressure of the springs 31^a employed to produce working pressure on the carpet.

A preferred mode of supporting and at the same time imparting motion to the brush is illustrated in Figs. 1 to 5 inclusive, wherein the rear wall of the nozzle is illustrated as formed with a horizontal hollow pocket 35 formed in an enlargement 36. This pocket communicates freely with the chamber 23, and screwed in its mouth is a supporting-ring 37 formed with a circular row of air-inlet apertures 38, surrounding a central socket-member 39. The inner end of this socket member is constricted to form a seat for a ball 40 to which is secured the rod 41 which projects into the brush-chamber where it is provided with a second ball 42 operatively secured to the brush-strip 26 in any suitable way, as by the flexible metal clip 43 shown in Fig. 5 and having a pair of spaced resilient side walls 44 formed with apertures 45 in which the sides of the ball 42 are loosely received. Loosely journaled on the exterior of the rod 41 between the two balls is a hollow sleeve 46 having secured to the end nearest the apertures 38 a rotor having curved blades 47 shaped and located to receive the air currents entering through the apertures 38 and to be set thereby in rapid rotation. Secured to the opposite end of the sleeve 46 is an eccentric weight 48 which, as a result of this rotation, causes a vigorous vibration of the rod 41 and with it the brush. Suitable anti-friction bearing bushings 49 are preferably employed inside this shaft.

In order to hold the rod 41 yieldingly in place, while allowing a limited degree of movement to the brush, I have shown a hollow cap 50 threaded to the socket member 39 and having in its end an aperture 51 through which this rod extends. Screwed on the exterior of this rod so as to hold the ball 40 in place is a hollow sleeve 52, and the size of aperture 51 is so chosen as to afford to the brush the desired degree of movement. A volute spring 53 engages this ball and sleeve and cap inside the socket member, to hold the ball yieldingly to its seat and the rod yieldingly in its central position, while permitting the rod to gyrate under the influence of the rapidly revolving eccentric weight 48.

In order to guide the movements of the brush I have shown the same as having each of its ends provided with a wire clip 60 terminating in a horizontally projecting finger 61 which is loosely received in a vertical slot 62 formed in the end wall 63 of the brush chamber 23. The ends of the brush strip are spaced from these end walls by a sufficient amount to permit the desired freedom of brush movement, for example three-sixteenths of an inch at each end more or less. It is also, of course, necessary to restrict the size of the weight 48 sufficiently to prevent its margin from coming into contact with the walls of the pocket in which it revolves.

No motion of this brush is produced excepting when the nozzle is applied to a floor or other working surface so as substantially to seal the inlet mouth and compel the ingress of air through the apertures 38. When this is done the brush is vibrated in its own plane with a rapid scratching movement, very effective in loosening dust and adherent litter but without any such abrasion of a floor- or wall-covering as to injure the same. At the same time the direction of air flow past the bristles is such as to tend to keep the bristles clean. When the inlet mouth is supported horizontally above the floor as by the wheel arrangement shown in Fig. 1, the carpet is often

or generally (depending upon the suction) elevated into contact with the lips 21 and 24, and sometimes also into contact with the lip 22. In the absence or extreme adjustment of such wheels the nozzle may sometimes be supported by the lip 24, but in any case without changing the mode of operation of the brush. Due to the yielding mounting of the brush, its engagement with the working surface is very gentle, and the plane of such engagement varies with the amount by which the fabric is sucked against the mouth 20.

When the air inlet openings 32^a or 38 are large and the brush body is made of a size largely to fill the brush chamber the air pressure tends, in operation, to force the brush downwardly against the floor.

It will be understood that a great many changes in detail, construction, appearance and design can be made without departing from the scope of my invention, and that I do not limit myself in any wise except as specifically recited in my several claims which I desire may be construed each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. In a suction cleaner, a suction chamber and a brush chamber having narrow elongated inlet mouths located side by side for application to one and the same working surface and communicating with each other across and adjacent to said working surface, suction means communicating with said suction chamber, a brush in said brush chamber, and means for imparting to said brush a vibratory motion, one wall of said brush-chamber having an air-inlet therein spaced from the working surface.

2. In a suction cleaner, a suction chamber and a brush chamber having narrow elongated inlet mouths located side by side for application to one and the same working surface and communicating with each other across and adjacent to said working surface, a brush located in said brush chamber, means yieldingly supporting said brush to enable it to move vertically in accordance with inequalities in the working surface, and means for imparting to said brush an operative movement independent of and additional to the movement of the cleaner.

3. In a suction cleaner, a nozzle containing a suction chamber and a brush chamber having narrow elongated inlet mouths located side by side for application to one and the same working surface, said mouths having a common lip which is not sealed to such surface and other lips which are sealed to such surface, air suction producing means communicating with said nozzle, a brush in said brush chamber, and an air turbine exhausting into said brush chamber and operatively connected to said brush, one wall of said brush chamber having an air passage there-through leading from the outer air to said turbine whereby there is provided a substantially downward movement of air over said brush.

4. In a suction cleaner, a nozzle having therein a suction chamber and a brush chamber, said chambers being separate from each other and having independent inlet mouths located adjacent to each other and facing in the same direction, means for sucking air out of the suction chamber, a brush located in said brush chamber, and means vibrating said brush relative to the working surface while maintaining its bristles substantially normal to said surface, the outer

lips of both mouths extending into close proximity to such working surface, said brush chamber having an opening for the ingress of air to replace that which passes from one mouth to the other.

5 5. In a suction cleaner, a nozzle having two separate chambers therein, said chambers having narrow elongated inlet mouths located side by side for application to one and the same working surface, and communicating with each other across their common lip, means for sucking air and dust out of one of said chambers, the other chamber having an air inlet passageway in one wall, an air turbine operatively mounted in said passageway and exhausting into the other of said chambers, a brush carried by said nozzle, and operative connections between said brush and turbine, the outer lips of said mouths extending into close proximity to the working surface and the two mouths communicating with each other near the working surface whereby there is provided a substantially downward movement of air over said brush.

25 6. In a suction cleaner, a nozzle having therein a pair of separate chambers having separate narrow elongated inlet mouths located side by side for application to one and the same working surface, said mouths having a common lip, part of which at least is spaced inwardly of the plane defined by the remaining lips, means for sucking air and dust from one of said chambers, means for admitting air to the other of said chambers,

an air turbine operatively associated with said air admitting means, and a brush in the last named chamber operatively connected to said turbine, said turbine exhausting into the last named chamber whereby there is provided a substantially downward movement of air over said brush.

7. In a suction cleaner nozzle, a chamber having a horizontally projecting hollow pocket, a supporting member located inside said pocket and having a socket and a plurality of apertures surrounding said socket, a rod yieldingly mounted in said socket for gyratory movement, a brush in said chamber supported by and articulated to the free end of said rod, a sleeve rotatably mounted on said rod, turbine blades carried by one end of said sleeve adjacent to said apertures, and an eccentric weight carried by the opposite end of said sleeve.

8. In a suction cleaner, a nozzle having a brush chamber therein, a brush in said chamber, a supporting rod having one end articulated to said brush and the other yieldingly secured to a part of said nozzle spaced from said brush, said rod being substantially horizontal whereby said brush may have a yielding movement to enable it to follow the inequalities of the working surface, an eccentrically unbalanced rotatable member journaled upon said rod, and means for imparting rotation to said member to superimpose upon said supporting rod a movement of vibration.

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