June 15, 1943. J. WINKLER 2,321,784

BEATER MECHANISM

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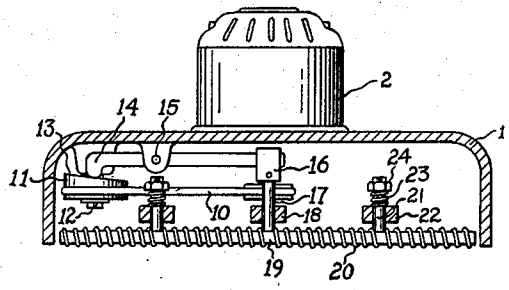


Fig. 1

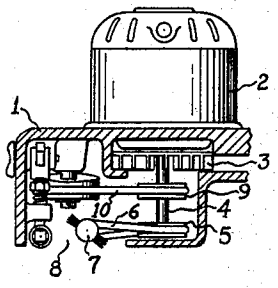


Fig. 2

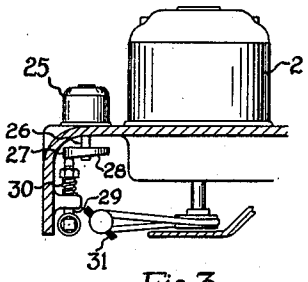


Fig. 3

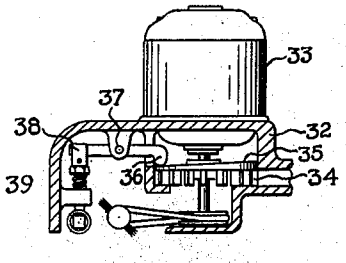


Fig. 4

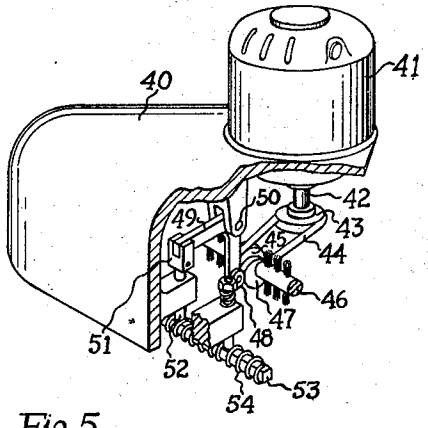


Fig. 5

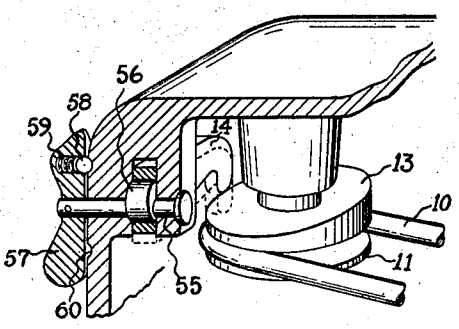


Fig. 7

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BEATER MECHANISM

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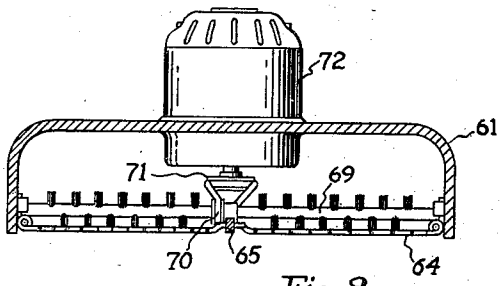


Fig. 8

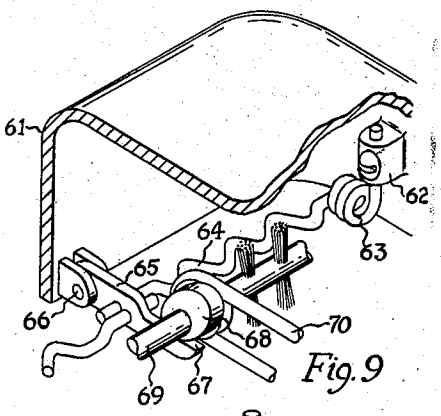


Fig. 9

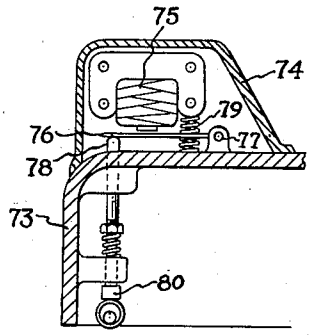


Fig. 10

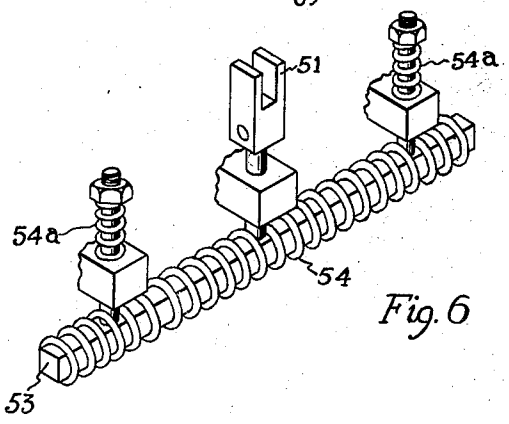


Fig. 6

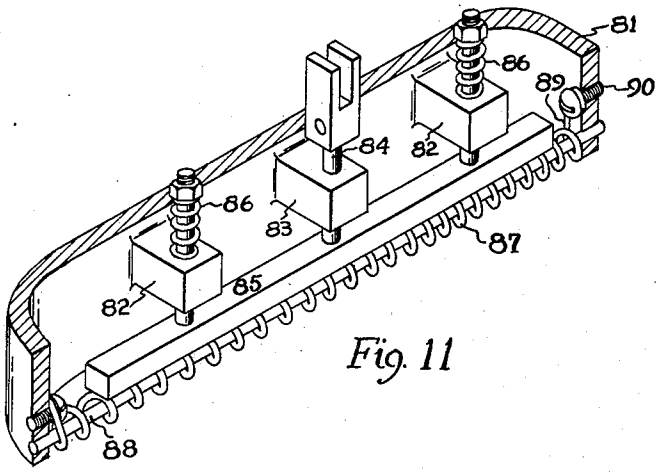


Fig. 11

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UNITED STATES PATENT OFFICE

2,321,784

BEATER MECHANISM

John Winkler, Cleveland, Ohio

Application July 5, 1941, Serial No. 401,059

2 Claims. (Cl. 15—6)

My invention pertains to beater mechanisms and more particularly to an appliance comprising an element or elements adapted successively to impinge against a surface being traversed while carried by a suction cleaner.

Objects of my invention are:

To provide an appliance which will repeatedly tap a surface to be cleaned, with a coil spring which is inherently resilient and which is so mounted as to be capable of bodily movement relative to its carrying element whereby the beating impingements are slaps in rapid succession, but with minimized abrasive action, correspondingly less friction and consequently lessened power requirement.

Selectable provision of connectable and disconnectable actuating means for the beater mechanism as a unit, apart from the standard suction-fan and brush drives. Either a separate switch-controlled motor or an electric vibrator is contemplated. Provision of means for readily making the beater mechanism inoperative is desirable because some fabrics require less beating and others none at all.

Employment of a reacting, reciprocal, oscillatory or rotary carrying structure for the beater, in line with a bottom opening in a suitable casing and provision at the bottom or free end of the beater-carrying structure, so as to occupy that opening when the structure is stationary or to swing or vibrate beyond its outer margin, of a coiled spring either connected to the structure only at its two ends or spacedly enveloping a bar of the structure, depending upon the severity of the duty it is required to perform.

Installation of a guard suitably positioned to delimit bodily movement of the beater spring in a certain direction, for instance, to prevent its entry into the path of movement of the customary brush or brushes.

Incorporation of adjustable connections to accomplish precision and to control speed of operation respectively.

Alternative, conveniently disconnectable slower drive of the beater mechanism through the agency of a cam on the fan itself, with inclusion of a slidable sleeve for effecting connection or disconnection.

Variation in the beater contrivance by provision of a plurality of fabric-impinging elements which are simultaneously operable while also vibratory independently of the actuating mechanism.

Design of a compact and durable construction, readily assembled and with accessibility to its connections.

Adverting to the drawings:

Figure 1 is a view of a conventional type of domestic suction cleaner being a vertical cross section through the front of its casing and forwardly of the sur-mounted electric motor, the movable parts which embody one form of my invention being shown in front elevation.

Figure 2 is a relatively transverse section, through the middle of the casing, of the form shown in Figure 1.

Figure 3 is a fragmentary, front-to-rear vertical section through a casing illustrating a modified drive for the beater mechanism.

Figure 4 is a view corresponding to Figure 3 of a further modification of the power connection to the beater mechanism.

Figure 5 is a perspective view looking obliquely downward upon a suction cleaner casing which has been partly broken away to disclose a fourth modification of both the beater mechanism and common type of cooperating brush shaft.

Figure 6 is a somewhat enlarged perspective view of the beater mechanism including an inherently resilient member shown to be employed in Figure 1, together with its triple guides.

Fig. 7 is a part section and part perspective view of the driving connections to the beater mechanism illustrated in Fig. 1, but additionally including an optional manually adjustable control outside of the casing whereby the beater mechanism may be conveniently connected with or disconnected from the source of power.

Figure 8 is a view corresponding to Figure 1 of still another modification alike of the design of beater mechanism and of the means for accomplishing its rapid oscillatory movements.

Figure 9 is an enlarged view of one lateral half of the driving means employed in Figure 8 and also more clearly revealing the horizontally-zigzag shape of the composite beating element.

Figure 10 is a fragmentary vertical section through the front of a modified casing enclosing an independently operated electric vibrator for effecting reciprocation of beater mechanism and for providing an independent control of the action or inaction of the beater mechanism.

Figure 11 is an obliquely downward view of beater mechanism similar to that shown in Figure 1, but differing in principle of actuation and showing additional connections of normally separated parts thereof with the sides of the casing.

A casing 1 supports an electric motor 2 which comprises interiorly of the casing a fan or blower

3 which is mounted on a depending shaft 4 and to the lower end of which is fixed a sheave 5 connected by means of a belt 6 with a conventional brush-shaft 7 which is appropriately mounted across the front of the casing (not necessary to be exemplified because old practice in this art) and in such proximity to the plane of an elongated crosswise slot 8 in the bottom of the casing as to permit the extremities of the brushes to sweep fabric over which the appliance is being moved. The shaft 4 also carries between its ends a pulley 9 which is connected by a belt 10 with a cam-pulley 11 which is mounted to turn on a pin 12 depending from the top of the casing. The upper cam surface 13 of the pulley 11 is ridden by the free end 14 of a lever which is pivoted intermediately of its ends at 15 and which at its other end is pivoted to a clevis 16 carried on the upper end of a beater mechanism actuating rod 17 which is vertically reciprocable through a guide 18, which may be an ear integral with the middle of the front wall of the casing. The bottom of the rod 17 is fixed to the middle of a crosswise rod 19 enveloped by a helically wound wire 20 and constituting one supposedly novel feature of my invention. It is calculated to make more effective though less injurious and less noisy the tapping impingements for loosening of sediment preparatory to brushing-release and continuous suction removal. The rod 19 has attached to it near its opposite ends respectively a pair of upstanding studs 21 reciprocable in guides 22 similar to the guide 18, but subject to upward return movement in response to the action of compression springs 23 which are coiled around the studs 21 between the guides 22 and adjusting nuts 24. The limits of vertical reciprocal movement of the rod 19 and wire 20 are slightly above and below the bottom of the casing respectively, as indicated by the near-middle elevation of the place of contact of the end 14 with the surface 13 as disclosed in Figure 1.

Though the operation is probably readily apparent, it is traced by adding that energization of the motor 2 rotates the cam surface 13 to move the end 14 up and down or to rock the lever and to rapidly reciprocate the beater mechanism, a slight independent vibration of the wire 20 relative to the rod 19 being created whereby to "ease" yet improve the tapping performance.

The modification of Figure 3 provides an independent auxiliary, optionally energizable motor 25 the shaft 26 of which extends through the casing top and carries at its extremity a disc 27 fashioned with a cam surface 28 on its lower side and serving to cause vertical reciprocation by engagement with the top of a beater mechanism actuating rod similarly guided as the rod 17 and regularly restored to its uppermost position by lateral guide rods 29 being urged upwardly by springs 30. Meanwhile the co-operating brushes 31 will be revolved through a belt and pulley drive from the other motor 2.

In Figure 4 a casing 32 similarly surmounts a motor 33, but the fan 34 which is driven thereby is located somewhat lower and itself directly carries the upwardly presented cam surface 35 which rocks the lever 36 which is pivoted at 37 while the opposite end of the lever 36 articulates with a clevis 38 whereby the beater mechanism, designated in its entirety by the numeral 39, is adapted for reciprocation in a vertical plane.

The modification portrayed in Figure 5 comprises a somewhat higher-dimensioned casing 40 on which is secured a motor 41 having a shaft 42 inside of the casing. The shaft 42 carries a sheave 43 from which a twisted belt 44 transmits rotation to a sheave 45 on a brush shaft 46 which also carries a cam 47 in engagement with a roller 48 on the extremity of one arm of a bell-crank lever 49 having its pivot at 50 within a fork depending from the top of the casing interior. The other arm of the lever 49 articulates with a clevis 51 for actuation of a beater mechanism (separately shown in Figure 6) comprising a rod 52 secured to the middle of a transversely extending bar 53 of squared cross section and surrounded by a coil of spring wire 54. The reciprocation of the spring 54 for tapping action through a suitable bottom opening in the casing is equivalent in operation to the forms earlier described, although according to this form the cam 47 positively lifts while the tension springs 54*a* alternately depress the beater mechanism as will be readily understood.

Fig. 7 is a modification of the style of cam operation disclosed in Fig. 1 though only by the addition of a manual control whereby actuation of the beater mechanism, mechanically or relative to the casing, may selectively be permitted to occur or to be frustrated. A pivot pin 55 for the rock lever 14 is provided at the pivot point with an eccentric 56 and exteriorly of the casing carries a wing lever 57 enclosing a ball 58 subject to the pressure exerted by a compression spring 59 to hold it in one or two diametrically opposite hemispherical sockets 60 which are formed in the front of the casing in the circular path of movement which is adapted to be imparted manually by effecting a turning movement of the handle 57 against the slight retaining resistance of the ball and socket connection. Manifestly, a half turn imparted to the handle 57 will so shift the eccentric as to permit or to frustrate reciprocation of the beater mechanism, the latter by elevating the fulcrum of the rock lever 14 so that the latter is beyond the reach of the cam 13.

Figures 8 and 9 illustrate another modification which comprises a casing 61 provided interiorly on each side a hollow boss 62 in which is detachably seated the extremity of a coiled end 63 of wire which is of zig-zag shape at 64 as it extends toward the middle of the casing to be there inserted through a rock lever 65 pivoted at 66 to ears on the front of the casing. The free end 67 of the rock lever 65 is depressed by, during every rotation of, a cam 68 which is on a brush shaft 69 which is suitably mounted in bearings on opposite walls of the casing. The shaft 69 is similarly driven by a crossed round belt 70 leading (as shown in Figure 8) to a horizontally disposed sheave 71 which is rotatable by the motor 72. It is to be understood that Figure 9 is a fragmentary view of about one lateral half of the inherently resilient zig-zag beater bar structure. The zig-zag shape supplies a larger area of tapping contact while retaining the added effectiveness of independently created vibration coincident with less abrasive wear and thumping noise.

Figure 10 reveals a casing 73 carrying at its top a compartment 74 for an electric vibrator (subject to separate switch control, not illustrated because old practice for which no claim is made) 75 for imparting impulses to a tremor finger 76 which has one end fixed at 77 while its free end is adapted rapidly to tap the upper extremity of the push rod 78. A reacting spring

control 79 functions in the usual manner to control the reliability of reciprocal movement imparted to the beater mechanism here designated in its entirety by the numeral 80.

The final modification shown in Figure 11 pertains to the beater structure which instead of being reciprocated bodily as complete unit comprises one rapidly reciprocated bar adapted to impinge against a separately supported coil of spring wire which contacts the fabric to be beaten or tapped. A casing 81 encloses a pair of guides 82 and in between a middle guide 83. Through the latter passes an actuating rod 84 (to be reciprocated in any of the various ways I have disclosed) attached to a bar 85 the opposite ends of which are similarly returned by the springs 86 which are in tension and serve to lift the bar 85. The latter is adapted to impinge lengthwise against a coiled wire 87 spacedly enveloping a fixed rod 88 and having its upstanding ends 89 secured to the casing by set screws 90.

I claim:

1. In an appliance of the character described, the combination of a casing having a bottom opening, a rock lever pivotally mounted for movement within said casing, means comprising a cam for actuating said lever, a tapping element connected with said lever, said element being located when stationary just above the margin of said opening and being adapted additionally for vibratory movement relatively to while it travels bodily with said lever, and manually adjustable means for bodily moving the pivotal connection of said lever whereby to control the functioning of said element by removing it beyond the reach of said cam.

2. Beater mechanism comprising the combination of a casing open in its lower side, power means carried by said casing, a structure movably carried superadjacent to the opening in said casing and adapted for movement toward and away from the plane of said opening, means including guides and reacting springs associated with said structure, said structure being operatively connected with said power means and a coil spring spacedly enveloping a part of said structure and adapted for independent bodily movement relatively thereto whereby reactingly to tap a surface to be cleaned while under said opening.

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