

Sept. 7, 1965

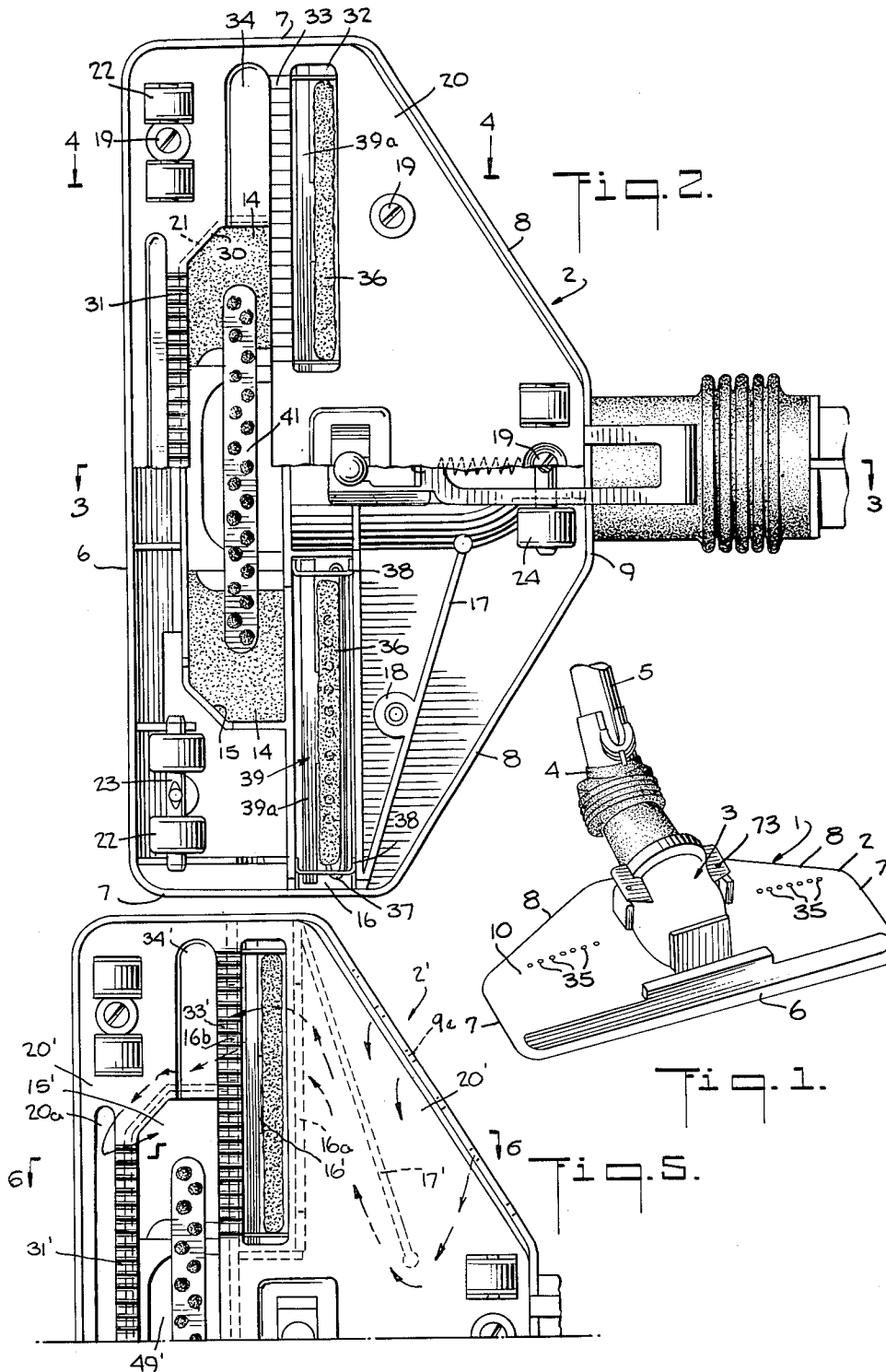
M. V. GROVES ETAL

3,204,282

SUCTION ACTUATED HEAD

Filed Feb. 7, 1963

2 Sheets-Sheet 1



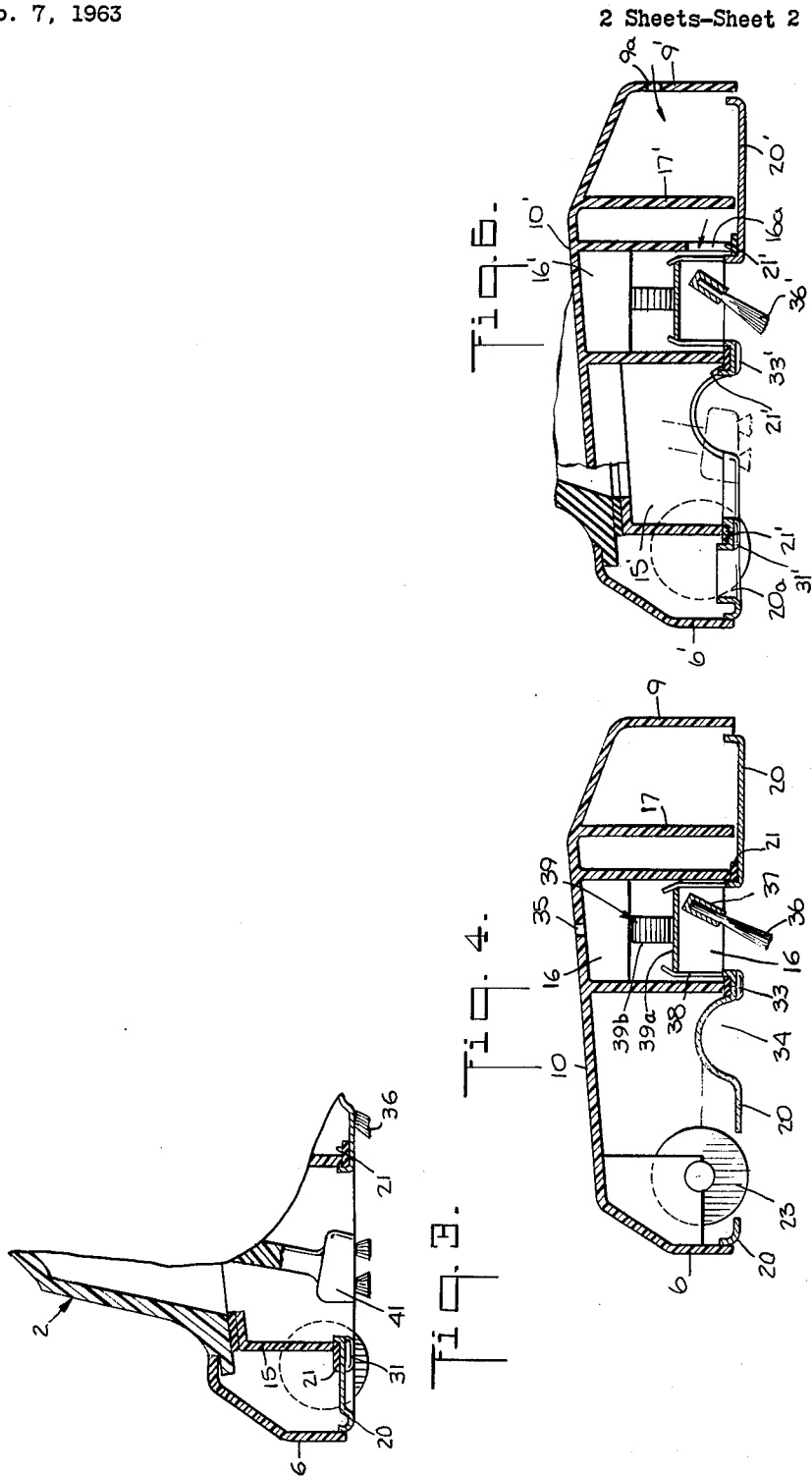
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SUCTION ACTUATED HEAD

Martin V. Groves, Greenwood Lake, and Michael Mastro-
matteo, Hartsdale, N.Y., assignors to Pul-Vac, Inc.,
New York, N.Y., a corporation of New York
Filed Feb. 7, 1963, Ser. No. 256,915
4 Claims. (Cl. 15—364)

This invention relates to suction actuated heads. Certain features of the invention are especially useful with vacuum cleaners. The invention is in the nature of an improvement over the subject matter of Martin V. Groves Patent No. 3,054,131 patented Sept. 18, 1962.

An important aspect of the invention contemplates an improved vacuum cleaner head for use in cleaning floors and floor coverings.

Various further and more specific objects, features and advantages of this invention will appear from the description taken in connection with the accompanying drawings which form a part of this specification and illustrate by way of example an embodiment of the invention and certain modifications thereof. The invention consists in such novel features and combination of parts as may be shown and described in connection with the apparatus herein disclosed.

In the drawings:

FIG. 1 is a perspective top view of an embodiment of the invention in which the main body of the head is especially adapted for use on floors and floor coverings;

FIG. 2 is a bottom view of the device shown in FIG. 1 with certain parts broken away to more clearly show the interior construction;

FIG. 3 is a sectional view on line 3—3 of FIG. 2;

FIG. 4 is a sectional view on line 4—4 of FIG. 2;

FIG. 5 is a bottom plan view showing a modified form of the vacuum cleaner head shown in FIG. 1; and

FIG. 6 is a cross sectional view taken on line 6—6 of FIG. 5 showing further details of the modified form of the housing head.

Referring more particularly to FIGS. 1 and 2, the suction actuated head is designated in general as 1, the main body or housing thereof is designated as 2, a suction impulse motor unit is designated in general as 3, an articulate and swivel connector is designated as 4 and a suction conduit, such as the wand of a vacuum cleaner, is designated as 5.

With reference to FIG. 1, a front 6 of the main body extends laterally in a relative straight line and merges with the side edges such as 7 which extend rearwardly normal to the front edge and are jointed with inwardly and rearwardly sloping rear edges such as 8 which in turn gradually merge with a centrally disposed rear edge portion 9 substantially parallel to the front portion 6. The foregoing configuration defines what may be termed as a delta shape in plan view. The thickness of the main body 2 along its forward edge and throughout its width forwardly and rearwardly disposed on respectively opposite sides of the rear edge portion 9 are relatively thin and flat to permit a major area in plan view of said head to have ready access below objects such as furniture.

The foregoing configuration of the main body 2 is provided by a unitarily formed shell, preferably molded from plastic, having a top portion 10 and downwardly extending flanges following the contour of and defining the front sides and rear edges 6, 7, 8 and 9. Also, unitarily formed by partitions extending downwardly from said top 10 is a front suction chamber 15 having a continuous peripheral wall and extending transversely generally parallel to the front edge 6 of the housing; also a pair of rearwardly disposed brush chambers such as

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16 each bordered by a peripheral wall and spaced apart laterally, closely adjacent to the rear of the suction chamber 15 with the said suction chamber 15 overlapping the space between the brush chambers such as 16. Preferably, soft sponge rubber sheet-like pieces such as 14 are disposed within the suction chamber 15 adjacent its opposite ends and against the inside of the top 10 of the housing shell to reduce noise during operation of the suction actuated head. The space within said shell rearwardly of said brush chambers 16 respectively is preferably provided with reinforcing ribs such as 17 and a plurality of suitably disposed bosses such as 18 provided with bores to receive self threading fastening screws such as 19. A bottom plate 20 is secured to the underside of the housing shell within the flange defining the walls 6, 7, 8 and 9 over-lying the partitions forming the suction chamber 15 and brush chambers 16 and stiffening webs 17 and is secured in place by screws such as 19 with intervening sealing means such as 21 (see FIGS. 3 and 4) disposed between the bottom plate 20 and the said partition members to thereby form a seal between the margins of said suction and brush chambers and said plate 20. Pairs of forward supporting rollers such as 22 are rotatably mounted on axles such as 23 which are mounted in cradles provided in said shell and are held in operative position by corresponding screws 19 and a pair of rear rollers such as 24 are similarly mounted toward the rear of said head and held in operative position by one of the screws 19. These rollers extend slightly below the lower surface of the plate 20 and serve to hold the lower plane of the plate 20 from contact with a floor or hard surface covering thereof; but when said suction head is disposed on a pile rug or the like surface, the rollers sink into the pile of the floor covering and permit the lower plate to substantially contact the upper surface of said floor covering.

The plate 20 is provided with a suction opening 30 conforming in general to the plan view of the suction chamber 15 and is provided at the forward edge of said chamber with a laterally extending corrugated ridge 31 which is relatively narrow in a direction longitudinally of said head and is spaced upwardly from the plane of the lower surface of the plate 20 to provide a space for the admission of air between said lower surface and the floor covering being cleaned. The plate is likewise provided with openings such as 32 conforming in general to the plan view of the brush chambers such as 16 and the plate 20 is provided with spaced apart laterally extending corrugated ridges such as 33 defining the forward edges of the brush chamber openings such as 32 and an overlapping portion of the suction chamber opening 30. The corrugated ridges 33, as in the case of the corrugated ridges 31, are disposed upwardly from the lower surface of the plate 20 and are relatively narrow in a fore and aft direction to permit the ready passage of air from the brush chambers 16 into the suction chamber 15. To facilitate the free passage of air between the brush chambers and the suction chamber the plate 20 is recessed upwardly a substantial distance above the corrugated ridges 33 to form channels such as 34 (FIGS. 2 and 4) serving as oppositely disposed extensions of suction chamber 15. Each of the brush chambers such as 16 (FIGS. 1 and 4) is provided with atmospheric air inlet means which in the present embodiment take the form of a series of holes 35 passing through the top 10 of the suction head shell immediately over the brush chambers such as 16. Sweeping or cleaning brushes such as 36 (FIGS. 2 and 4) are mounted within the brush chambers 16 respectively and are preferably directed downwardly and forwardly. Each of the brushes comprises a rigid back portion such as 37 having at its opposite ends clamp members such as 38 (FIGS. 2 and

4) secured rigidly to the back portion 37. Leaf spring 39 comprises a horizontal portion 39a whose outer ends are fastened to the clamp member such as 38 and each of the leaf springs is also provided with upwardly and outwardly extending cut-out portions providing spring arms such as 39b (FIG. 4) which commence near the central zone of 39a and are curved upwardly and outwardly and engage the upper wall of the chambers 16 to resiliently urge said brushes downwardly so as to normally extend below the lower face of plate 20 when the device is not in use and to be urged against the surface being cleaned when the device is in use.

A beater brush 41 is positioned in the suction opening 15 and may be operated by the suction impulse motor unit 3. The beater brush may be operated in accordance with the teachings of the above-mentioned Groves patent.

Modified suction housing head

Referring more particularly to FIGS. 5 and 6: A modified form of suction head will now be described in which instead of atmospheric air being taken into the brush chambers through the top of the shell (as through the holes 35 of FIG. 1), different air inlet means are provided. For purposes of comparison with the preferred embodiment, corresponding parts will be indicated by the same numeral to which the prime suffix has been applied. The head 2' comprises a unitarily formed shell having the same general shape and substantially identical except for the differences now to be described.

The rear walls of the brush chambers such as 16' are provided with openings such as 16a disposed adjacent the bottom plate 20' to permit the passage of atmospheric air which comes in from the rear of the housing shell and passes around the inner ends of the webs such as 17' (FIG. 5), such air entering, for example, through a plurality of holes such as 9a' in the rear wall portion such as 9'. In addition to the flow of air from the brush chamber 16' beneath the corrugated ridge 33', comparable to the operation of the preferred embodiment; in the modified structure shown in FIGS. 12 and 13, a separate path is provided for flow of air, as indicated by the arrows in FIG. 5, from the brush chamber 16' into the suction chamber 15'. This passage comprises an opening 16b provided in the forward wall of the brush chamber 16' above the corrugated ridge 33' and the depressed portion 34' into the interior of the housing and downwardly through an open slot 20a passing through the bottom 20', immediately forward of the corrugated ridge 31' and beneath the corrugated ridge 31' into the suction chamber 15'.

Other than the distinctions above set forth, the modified form of device illustrated in FIGS. 5 and 6 is constructed and arranged and operates in a manner identical with that heretofore described with reference to the preferred embodiment.

While the invention has been described in detail with respect to certain preferred embodiments, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended to cover all such changes and modifications in the appended claims.

We claim:

1. A vacuum cleaner head comprising a housing shell having an outlet opening for communication with a source of suction, said housing shell having a suction chamber, a brush chamber disposed rearwardly of and adjacent to said suction chamber, a bottom plate for engagement with a surface to be cleaned and provided with openings in register with said suction chamber and brush chamber respectively, a transversely extending ridge provided with a corrugated lower surface disposed on and somewhat above the lower surface of said bottom plate and contiguous the forward wall of said suction chamber to provide for passage of atmospheric air between said

ridge and the surface to be cleaned and thence into said suction chamber, wall portions defining said suction chamber and said brush chamber, said suction chamber being in communication with said outlet opening, atmospheric air inlet means in communication with said brush chamber, the front wall portion of said brush chamber being provided with an opening in communication with the interior of said housing shell, and said bottom plate being provided with an opening contiguous the forward edge of said transversely extending ridge to thereby cooperate with said atmospheric air inlet means and said opening in the front wall of the brush chamber to provide a passage for flow of air into the brush chamber and thence through the interior of the housing shell, under the transversely extending ridge and into the front of the suction chamber.

2. Apparatus according to claim 1 in which the brush chamber is provided with a cleaning brush resiliently held downward so as to normally extend below the lower face of said bottom plate and a portion of the bottom plate beneath the front wall portion of the brush chamber is provided with a corrugated lower surface spaced somewhat upwardly from the lower surface of said bottom plate to provide for flow of atmospheric air through said brush chamber over said brush and into said suction chamber.

3. A vacuum cleaner head comprising a housing shell having an outlet opening for communication with a source of suction, said housing shell having a suction chamber with a transversely extending beater brush disposed therein, two brush chambers disposed rearwardly of and adjacent to said suction chamber in transverse alignment therewith with their inner ends spaced apart and a sweeping brush disposed in each brush chamber so that the beater brush spans the space between the two sweeping brushes while the sweeping brushes extend transversely beyond the respective ends of the beater brush, a bottom plate for engagement with a surface to be cleaned and provided with openings in register with said suction chamber and brush chambers respectively, a transversely extending ridge provided with a corrugated lower surface on and somewhat above the lower surface of said bottom plate and contiguous the forward wall of said suction chamber to provide for flow of atmospheric air between said ridge and the surface to be cleaned and thence into said suction chamber, upwardly and downwardly extending wall portions defining said suction chamber and said brush chambers and including partitions disposed between said brush and suction chambers, said wall portions providing a substantial seal at their lower ends with said bottom plate, said suction chamber being in communication with said outlet opening and having oppositely disposed transversely extending channel portions formed by upward recesses of said bottom plate and extending outwardly from each end of the suction opening to points adjacent the outer ends of the respective sweeper brushes, atmospheric air inlet means in communication with each of said brush chambers rearwardly of said partitions, a portion of the plate beneath each of said partitions being provided with a corrugated lower surface spaced somewhat upwardly from the lower surface of said bottom plate to provide for flow of atmospheric air through said brush chambers over said brushes and into said suction chamber, an opening in the front wall portion of each of said brush chambers communicating with the interior of said housing shell above said recesses respectively and said bottom plate being provided with an elongated opening contiguous the forward edge of said transversely extending ridge to thereby cooperate with said atmospheric air inlet means and said openings in the front wall portions of the brush chambers to provide a passage for flow of atmospheric air into each brush chamber and thence through the interior of the housing shell, under the transversely extending ridge and into the front of the suction chamber.

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4. Apparatus according to claim 3 in which the atmospheric air inlet means to each brush chamber comprises openings in a rear portion of the housing shell located to the rear of the rear wall portions of the brush chambers and openings in said rear wall portions of the brush chambers positioned so as to cooperate with the openings in the rear portion of the housing shell to provide for flow of atmospheric air through the interior of the rear portion of the housing shell into the brush chambers.

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WALTER A. SCHEEL, *Primary Examiner.*