Oct. 18, 1938. D. M. DOW ET AL 2,133,741

VACUUM CLEANER

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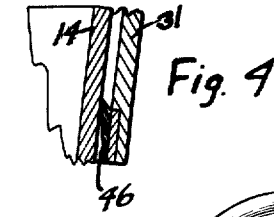


Fig. 4

Fig. 1

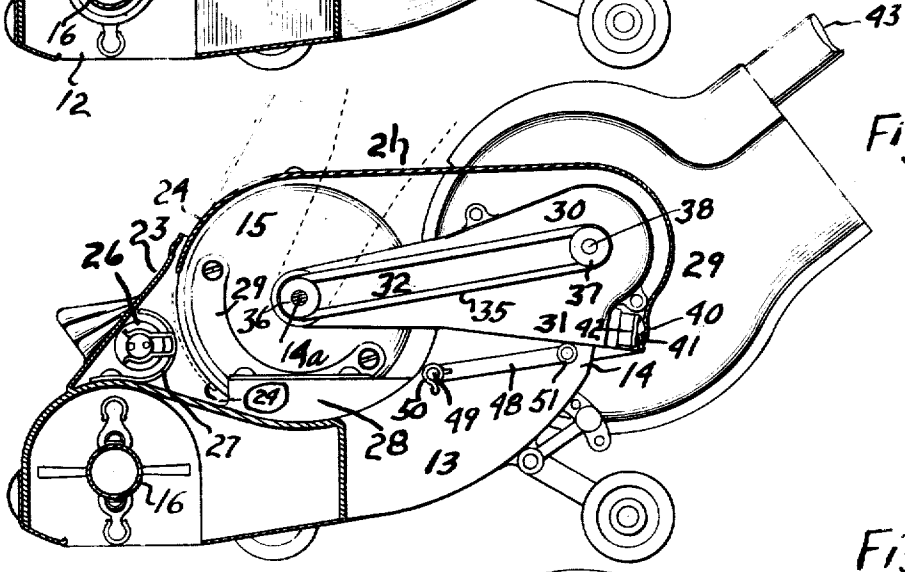


Fig. 2

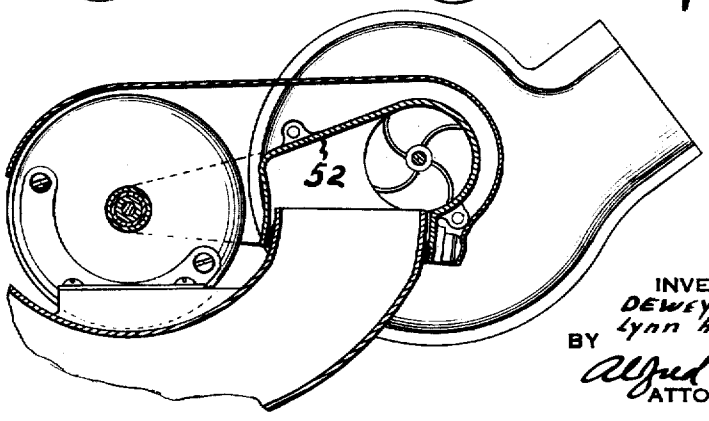


Fig. 3

INVENTORS
DEWEY M. DOW
LYNN H. LOTTA
BY Alfred F. Rees
ATTORNEY

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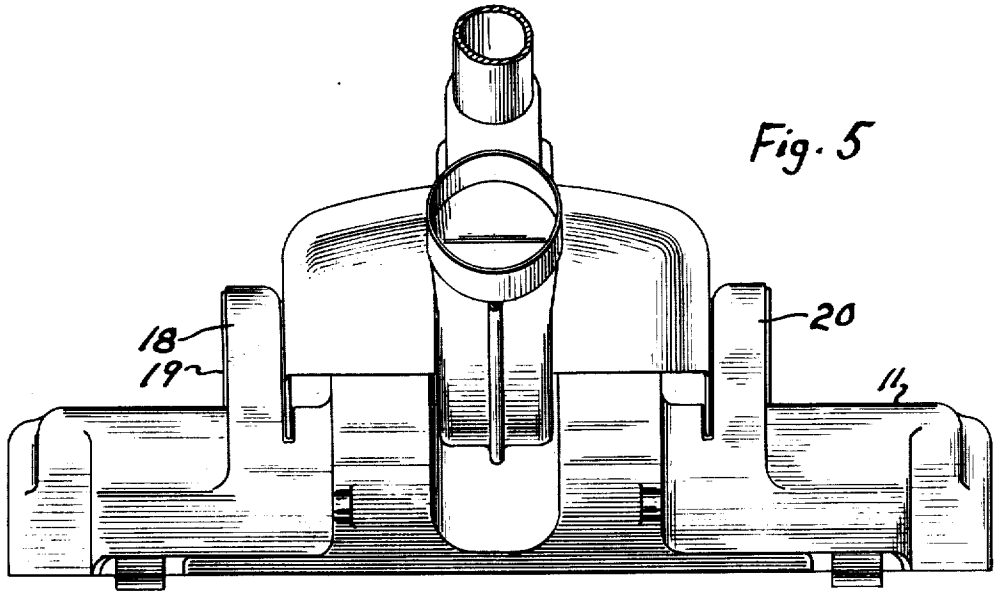


Fig. 5

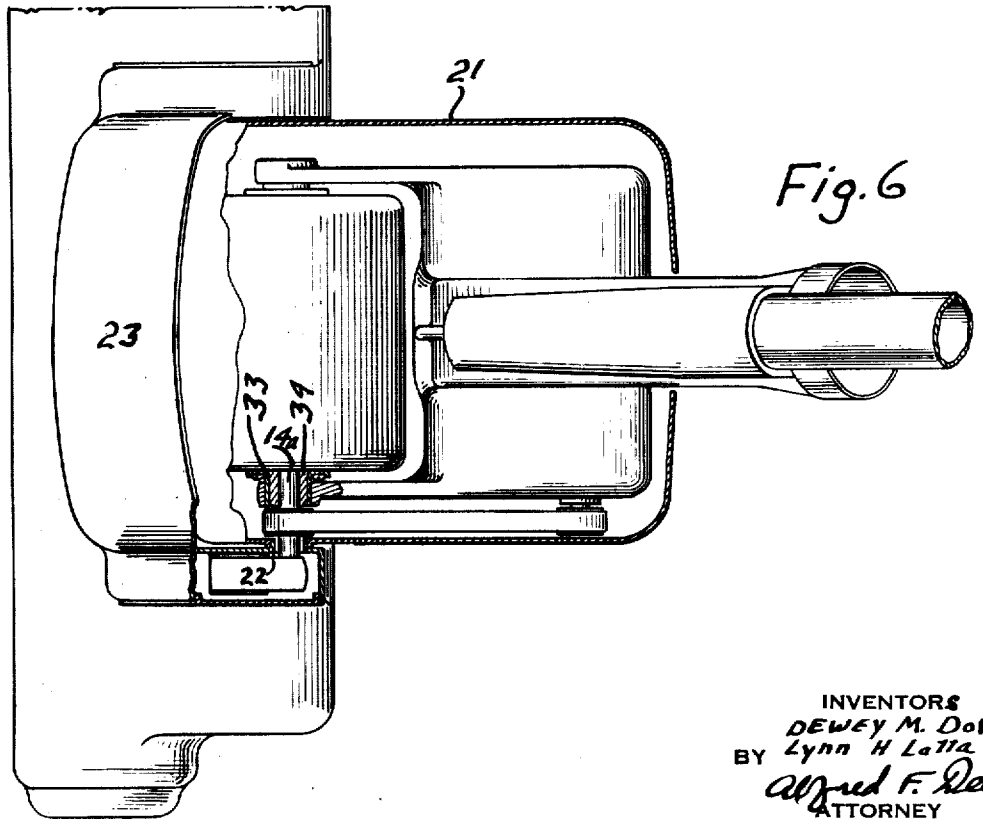


Fig. 6

INVENTORS
DEWEY M. DOW
LYNN H LATTA
BY Alfred F. Rees
ATTORNEY

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Fig. 8

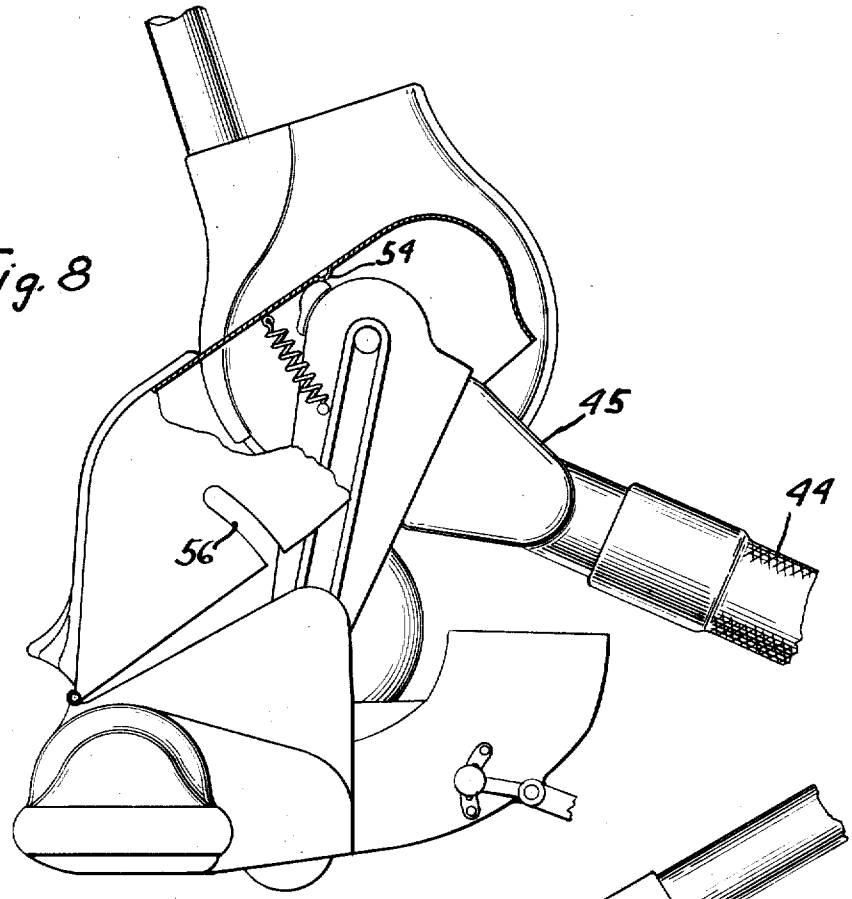
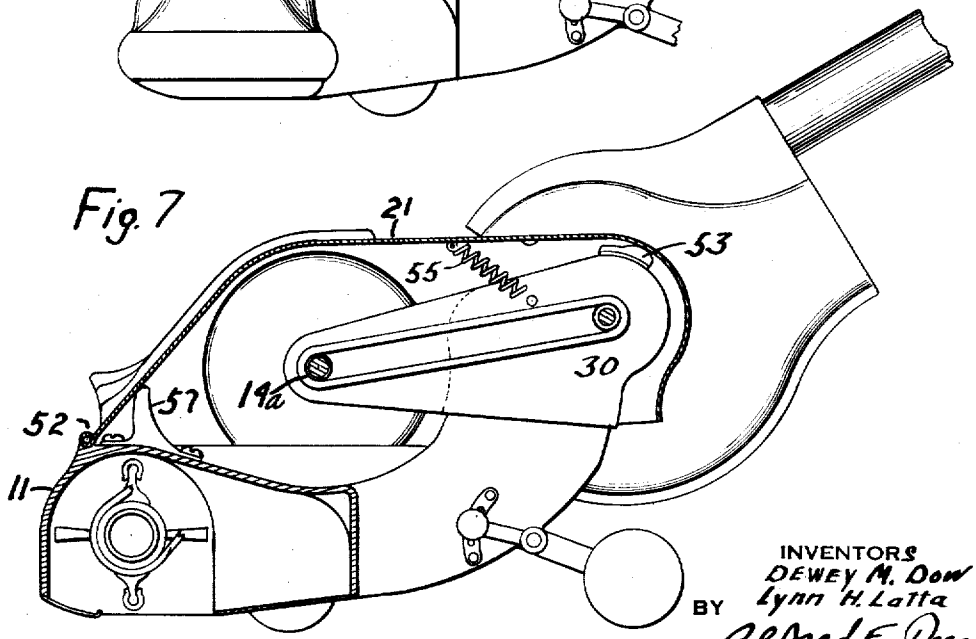


Fig. 7



INVENTORS
DEWEY M. DOW
LYNN H. LATTA
BY Alfred F. Deer
ATTORNEY

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UNITED STATES PATENT OFFICE

2,133,741

VACUUM CLEANER

Dewey M. Dow and Lynn H. Latta, Toledo, Ohio, assignors to Air-Way Electric Appliance Corporation, Toledo, Ohio, a corporation of Delaware

Application January 11, 1937, Serial No. 119,953

10 Claims. (Cl. 15—6)

This invention relates to vacuum cleaners of the type wherein the fan case is rigidly attached to the handle to swing therewith relative to the suction chamber, and has as its object to provide in such a cleaner an arrangement wherein the fan case swings around the axis of the motor which drives the fan, whereby a belt drive from the motor to the fan, unaffected by the swinging movement, may be employed.

Another object is to provide a cleaner of the type having a fan case disposed with its axis transverse to the direction of cleaner travel, wherein the necessary inlet elbow connecting the fan case to the suction chamber, can be readily cleaned out if it should become clogged.

Another object of the invention is to provide a suction cleaner having a novel arrangement for effecting the attachment of auxiliary tools, wherein the movement of the handle to an inoperative position (upstanding) causes the fan case inlet neck to become released from its connection with the suction chamber, so that auxiliary tools may be connected directly to the neck, and wherein movement of the handle back to normal operating position causes the neck to become coupled with the outlet throat of the suction chamber.

Further objects will appear in the perusal of the following detailed description of the invention in connection with the accompanying drawings in which:

Fig. 1 is a side elevation of a cleaner embodying the invention, one end of the floor tool being shown in section, to better illustrate the construction,

Fig. 2 is a similar view, the motor cover and visor also being shown in section,

Fig. 3 is a similar view, the fan case inlet neck and suction chamber outlet throat also being shown in section,

Fig. 4 is a detailed sectional view through adjacent walls of the telescoping regions of fan case inlet neck and suction chamber outlet throat,

Fig. 5 is a rear elevation of the cleaner, the rear walls being omitted to better illustrate the construction,

Fig. 6 is a plan view of the same, the motor cover and adjacent parts being shown in section,

Fig. 7 is a view similar to Fig. 2 of a modified form of the invention, and

Fig. 8 is a side elevation of this modified form, the handle and fan case being in raised position and an attachment tool being shown coupled to the fan case inlet neck.

The invention provides a suction chamber 10 including an agitator chamber 11 having a carpet engaging mouth 12 and one or more rearwardly and upwardly curved outlet throats 13, the upper regions of which as at 14 are disposed arcuately circumferential with respect to the shaft 14a of the motor 15 which is mounted in the depression formed in the top of the suction chamber.

A rotary agitator 16 is mounted in the agitator chamber 11 and is driven by a belt 17 connecting the shaft 14 to the rotary agitator 16.

The belt 17 is housed within a belt housing 18 attached to the top of the suction chamber 10 and projecting upwardly therefrom. A removable end plate 19, attachable to the belt housing 18 gives access to the belt 17 (see Fig. 5).

The belt housing 18 is located near one end of the agitator chamber 11. Near the other end of the chamber 11 is an upwardly projecting ear 20 of the same shape and proportions as the housing 18 giving symmetry to the appearance of the cleaner. The ear 20 and housing 18 both function as brackets to support the forward end of the motor cover 21. The latter is provided in its side walls with openings receiving trunnions 22 (Fig. 6) projecting inwardly from the respective members 18 and 20. Through the side opening in the belt housing side, the shaft 14 projects into the belt housing without touching the trunnions 22 at any point.

The ear 20 and housing 18 are connected by a visor 23. The forward region of the motor cover 21 is arcuate as at 24, coaxial with the shaft 14, and shaped to fit just inside the visor 23 without touching the same at any point.

The visor 23 has a light opening (not shown) and there is a reflecting hood 25 just above said opening. A head-lamp 26 is mounted in a suitable lamp mounting 27 secured to the top of the agitator chamber 11, and is positioned to direct rays of light through the opening below the hood 25.

The bridge members 28, formed integrally with the suction chamber 10, on which the motor 15 is mounted through the medium of resilient mountings 29, extend only part way across the depression in the top of the suction chamber 10, being cut away at their forward ends to provide space wherein the arcuate portions of the cover may rotate within the visor 23 to a position indicated in the dotted lines, in which position the cover 21 projects upwardly.

We provide a fan case 29 rigidly secured between a pair of elbow inlet necks 30 the lower

regions 31 of which are arcuate and disposed circumferentially of the shaft 14, the necks 30 being mounted for swinging movement around the shaft 14 by means of arms 32 secured to the fan case 29 and preferably formed integrally with the elbows 30. The arms 32 are pivoted upon the sleeve 33 which has the bearings 34 in which rotates the shaft 14.

A belt 35 connects the pulleys 36 and 37 on the shaft 14 of the motor and the shaft 38 of the fan respectively. The cover 21 extends over this belt 35 and over the necks 30, the central area of its rear region being cut away as at 39 to receive the fan case 29, leaving two bifurcated portions, one on either side of the fan case, housing the respective necks 30.

The lower rear extremities of these bifurcated portions are provided with indentations 40 receiving buttons 41, the latter mounted in rubber cushions 42 which in turn are attached to the necks 30. The cushions 42 dampen vibrations which otherwise would be transmitted from the necks 30 to the cover 21.

By the use of a little pressure, the indentations 40 can be released from the buttons 41 and the entire cover may then be swung upwardly away from the necks 30, uncovering the belts 35, so as to give access to the latter. Normally, however, the motor cover 21 moves as a unit with the fan case 29 and the handle 43 which is rigidly attached thereto, the entire unit swinging around the axis of the shaft 14. In this relation, the handle, fan case and cover may be swung to an inoperative position where the handle is upstanding. The position is practically the same for the fan case and arms 32 as that shown in Fig. 8 of the other form of the invention, and allows the direct attachment of an auxiliary cleaning tool including a hose 44 and a coupling member 45 insertable into one or both of the necks 30. In the latter case, the coupling member would be bifurcated.

It will now be seen that in order to effect conversion from on-floor to off-floor it is only necessary to lift the handle and insert the coupling member.

The connection between the telescoping portions 14 and 31 of the suction chamber outlet throat and fan case inlet neck respectively is sealed by means of a rubber sealing ring 46 secured in the mouth of the member 31 and engaging against the outer surface of the member 14. This sealing ring in cross section is triangular-shaped, its inner surface flaring downwardly and outwardly and its free edge forming the engaging portion. As a result of this flared construction, when the handle is lowered from an inoperative position to a position where the throat 14 commences to enter the neck 31, such entrance will be facilitated by the bell-shaped opening which is thus formed by the inner surface of the ring 46.

The arm 48, pivoted upon a stud 49 on the side of the motor 13 urged upwardly by a coil spring 50, and engaging at its upper end a roller 51 which engages the lower edge of the neck 30, serves to partially balance the weight of the fan case and the handle so that the hand of the operator is relieved of a considerable portion of the load thereof.

It will now be noted that in the normal operation of the cleaner, with the handle approximately in the position shown in Figs. 1 and 2, the cleaner may be pushed back and forth, the handle and fan case rising and falling slightly in accordance with variations in the weight of the operator's hand caused by the arcuate path of swing of the operator's arm from the shoulder, and that the region 31 of the necks 30 will correspondingly telescope with respect to the region 14 of the throat 13.

When it is desired to clean under low furniture, the handle 43 may be depressed to a position almost parallel to the floor, the region 14 of the throat being allowed to move upwardly into the neck 30 until it substantially contacts the top wall 52 thereof. This movement will bring the fan case down to the level of the top of the motor thereby giving minimum clearance height.

The arcuate shape of the regions 14 and 31 allows this telescoping to occur.

When it is desired to store the cleaner or to use the accessories, the handle is simply lifted, and the telescoping regions are freely separated from each other. This is preferably done when the machine is not running.

The arm 48 serves not only to take a portion of the weight of the handle and fan case away from the hand of the operator but also serves to oppose the action of the suction within the throat 13 and neck 30 tending to draw the two members together.

In the form shown in Figs. 7 and 8, the construction is the same with the exception of the cover 21 which in this case is hinged at 52 to the top of the agitator chamber 11, and is slidingly engaged against a pair of rubber buffer elements 53 one of which is secured to the top of each elbow 30. As the handle is raised, the buffer 53 will swing upwardly and forwardly, lifting the cover 21 and sliding forward with respect thereto until, in the forward limit of movement of the handle the buffers will catch beneath an indentation 54 in the cover 21, thus serving the secondary function of locking the parts in the raised position, all as shown in Fig. 8.

The buffers 53 serve to dampen vibrations which otherwise would be transmitted to the cover 21. The cover 21 is resiliently urged against the buffers 53 at all times with a force considerably greater than that of gravity, by a coil spring 55, one end of which is attached to the cover 21, and the other end of which is attached to the neck 30. The spring 55, being under tension at all times, tends, when the handle is in the normal position, to urge the neck 30 forwardly with respect to the cover 21. The resultant of this force is a tendency to lift the handle and fan case unit. As a result a substantial portion of the weight of the handle and fan case is balanced or neutralized. When the handle is in the raised position, however, the spring functions merely to hold the cover in engagement with the buffers 53 so as to restrain the handle and fan case unit against accidental movement back to normal position. When it is desired to release the handle-fan-case unit from its inoperative position the operator may simply lift slightly upon the cover 21 and the buffers 53 clear the indentation 54.

In this form of the invention, the side walls of the cover 21 are provided with arcuate slots 56 to receive the shaft 14.

This form of the invention also incorporates a vibration absorbing finger 57 which is secured to the top of the suction chamber 10, and resiliently presses against the underside of the cover 21 near the hinge 52. As the cover is lowered into its normal position, the finger 57 is placed under distortion, i. e., bent laterally from its unstrained position. The parts are so arranged that the

finger 87 will remain under distortion through the relatively small arc of normal movement of the handle in cleaning position. Being made of flexible rubber it readily yields so as not to inflict any appreciable resistance against the movement of the parts in normal cleaning operations. This particular feature of construction is usable not only in connection with the present invention where the cover has a slight amount of movement during normal cleaning operations but also in connection with any arrangement in which the cover is hinged so that it may be lifted with respect to the body of the cleaner. Such a construction is of advantage in connection with an arrangement wherein the axis of the fan case remains stationary with respect to the suction chamber, the cover being raisable around its hinge so as to give access to the belts for example.

We claim as our invention:

1. In a vacuum cleaner, a suction chamber, a motor mounted thereon, its axis horizontal and transverse to the direction of cleaner movement, a fan case displaced from the axis of said motor and mounted for swinging movement around the axis of said motor, a fan and a fan shaft rotatably mounted in said case, means to transmit power from said motor to said fan and fan shaft and a handle rigidly attached to said fan case, said suction chamber having an outlet and said fan case having an inlet arranged to telescopically connect with said outlet when the handle is in a normal cleaning position, and to be disconnected from said outlet when the handle is raised to an upstanding, inoperative position, said fan case inlet being adapted to receive auxiliary cleaning tools when the handle is in said inoperative position.

2. A vacuum cleaner as set forth in claim 1, including a motor and drive cover the forward region of which is pivotally mounted with respect to said motor axis, and the rear region of which is attached to the fan case so as to move therewith.

3. A vacuum cleaner as set forth in claim 1, including a motor and drive cover the forward region of which is pivotally mounted with respect to said motor axis, and the rear region of which is attached to the fan case so as to move therewith, the attachment of said cover to the fan case being releasable so as to allow said cover to be lifted away from the fan case to uncover said drive element.

4. A vacuum cleaner as set forth in claim 1, including a motor and drive cover the forward region of which is pivotally mounted with respect to said motor axis, and the rear region of which is attached to the fan case so as to move therewith, the forward region of said cover being arcuate and disposed coaxially with the motor axis, and a visor projecting upwardly from the suction chamber receiving said arcuate region, the latter being adapted to move between the motor and the visor as the cover is swung upwardly.

5. A vacuum cleaner as set forth in claim 1, including a motor and drive cover the forward region of which is pivotally mounted with respect to said motor axis, and the rear region of which is attached to the fan case so as to move therewith, the forward region of said cover being arcuate and disposed coaxially with the motor axis, a visor projecting upwardly from the suction chamber receiving said arcuate region, the latter being adapted to move between the motor and the visor as the cover is swung upwardly, said visor forming, together with the motor and the top of the suction chamber, a space of triangular cross section, and a headlamp disposed in said space.

6. A vacuum cleaner as set forth in claim 1, including a motor and drive cover the forward region of which is pivotally mounted with respect to said motor axis, and the rear region of which is attached to the fan case so as to move therewith, the forward region of said cover being arcuate and disposed coaxially with the motor axis, a visor projecting upwardly from the suction chamber receiving said arcuate region, the latter being adapted to move between the motor and the visor as the cover is swung upwardly, said visor forming, together with the motor and the top of the suction chamber, a space of triangular cross section, a headlamp disposed in said space, and a reflecting hood on said visor, an aperture being formed in the visor below said hood to permit passage of light from said headlamp.

7. A vacuum cleaner as set forth in claim 1, including a motor and drive cover the forward region of which is pivotally mounted with respect to said motor axis, and the rear region of which is attached to the fan case so as to move therewith, the attachment of said cover to the fan case including a cushioning element to dampen vibrations set up in said motor and fan case.

8. A vacuum cleaner as claimed in claim 1, including a motor cover pivoted to the top of the suction chamber forwardly of the motor, the rear region of said cover being slidably engaged against a member attached to the fan case so that the cover will be lifted in unison with the raising of the fan case.

9. A vacuum cleaner as set forth in claim 1, wherein one of said telescopically connected parts is provided with a flexible sealing ring engageable with the other of said parts to provide an air tight connection.

10. In a vacuum cleaner, a suction chamber, a motor mounted thereon, its axis horizontal and transverse to the direction of cleaner travel, a fan case mounted for swinging movement around the axis of said motor, a handle rigidly attached to said fan case, said suction chamber having an outlet throat and said fan case having an inlet neck, said throat and neck having arcuate portions disposed circumferentially with respect to said motor axis and telescopically engaged with each other to allow said handle to move up and down while maintaining a closed air passage from said suction chamber to said fan case.

DEWEY M. DOW.
LYNN H. LATTA.

DISCLAIMER

2,133,741.—*Dewey M. Dow* and *Lynn H. Latta*, Toledo, Ohio. VACUUM CLEANER. Patent dated October 18, 1938. Disclaimer filed October 26, 1939, by the assignee, *Air-Way Electric Appliance Corporation*.

Hereby enters this disclaimer to claim 10 in said specification.

[*Official Gazette November 21, 1939.*]

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