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2,651,383

SUCTION CLEANER

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Fig. 1

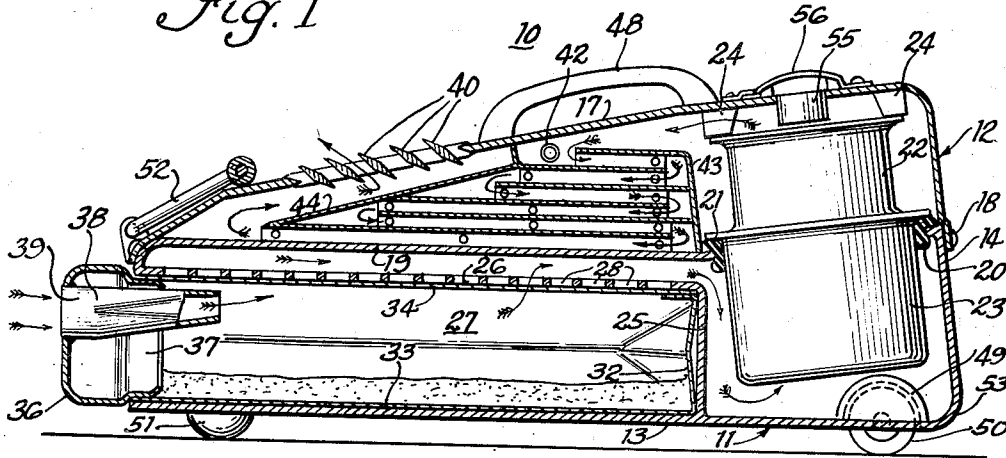


Fig. 2

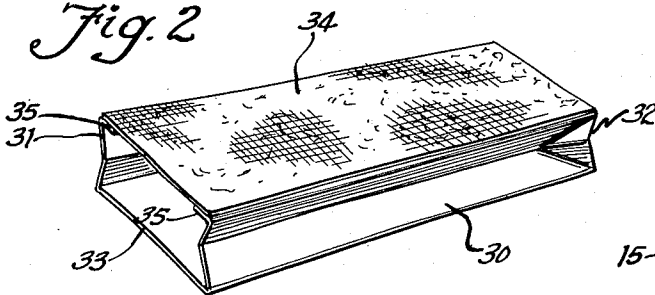


Fig. 3

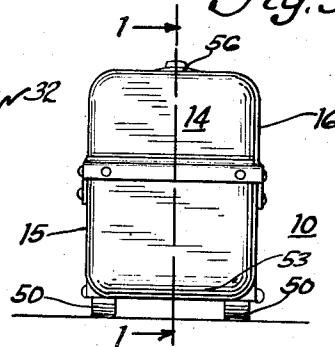


Fig. 4

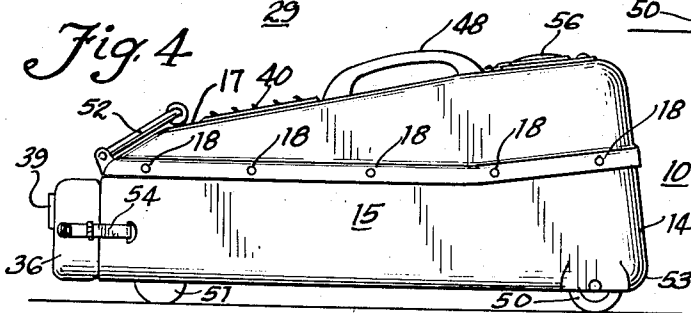


Fig. 5

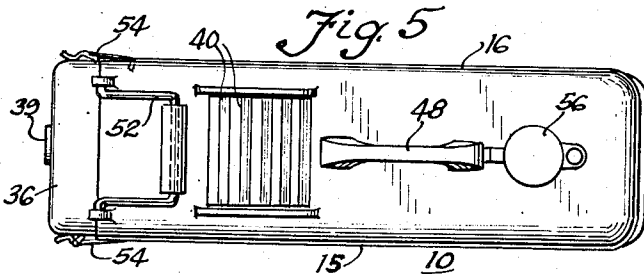
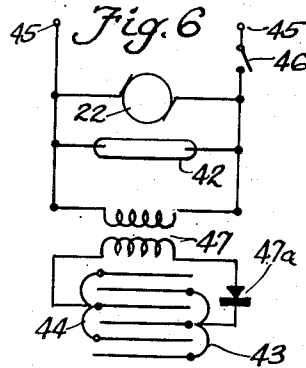


Fig. 6



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SUCTION CLEANER

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3 Claims. (Cl. 183—37)

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This invention relates to suction cleaners, more particularly to suction cleaners of the type employing readily removable and replaceable fragile filter elements formed of paper, and the invention has for an object the provision of improved suction cleaners of this character.

In a prior Patent No. 2,242,277, issued to the present applicant on May 20, 1941, there is disclosed a tank type suction cleaner which is provided with an elongate open topped dust pan having an air intake at one end and adapted to support a removable filter and suction generating assembly, the filter portion of which comprises a sheet of porous filter paper and a perforated backing member which extend substantially parallel to the path of the blast of dust-laden air that is discharged into the dust pan through the intake, whereby the dirt particles in the air blast travel along the filter surface and exert a scouring or scrubbing action.

While suction cleaners thus constructed operate very satisfactorily to accomplish the desired cleaning operations, it is necessary in order to empty the dust pan, after the cleaner has been used for predetermined periods of time, to first remove the entire filter and suction generating assembly, to then empty out the accumulated dust and dirt from the dust pan and to replace the used sheet of filter paper before reassembling the filter and suction generating assembly on the dust pan. Such manipulation of the dust pan and the filter, while relatively simple compared to the operations required in other types of suction cleaners, may result in soiling of the operator's hands or clothes, or in the spilling of dust and dirt from the dust pan, and accordingly something is yet to be desired in suction cleaners of this type whereby the accumulated dust and dirt may be easily and simply removed from the cleaner with a minimum of effort and with complete safety against soiling either the premises or the person.

It is therefore a further object of the invention to provide an improved suction cleaner wherein a disposable dust receptacle is employed which may be readily removed from the cleaner and replaced with a clean receptacle, whereupon the used receptacle may be disposed of without removing the dust and dirt therefrom.

Another object of the invention is to provide an improved suction cleaner of the type normally occupying a horizontal position but which may be readily tilted to a vertical position to provide for removal and installation of disposable dust receptacles.

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Still another object of the invention is to provide a suction cleaner having the above characteristics and which may be economically constructed and which is of simple and rugged design.

It is likewise an object of the invention to provide a novel and inexpensive disposable dust receptacle or bag having a wall portion thereof formed of porous filter paper.

A still further object of the invention is the provision of improved dust precipitating means for removing minute dust particles which may remain in the air stream after passage through the filter.

In carrying out the invention in one form, a suction cleaner is provided comprising a suction chamber having an intake for dust-laden air and including an air-pervious wall portion, the chamber being adapted to receive a disposable bag-shaped dust receptacle which conforms substantially to the shape of the chamber and includes a wall portion formed of porous filter paper arranged to extend along the air-pervious wall portion of the chamber in juxtaposed relation thereto.

More particularly, the suction cleaner comprises an elongated casing having a substantially flat end wall and containing suction-generating means which are supported in the casing closely adjacent the end wall. The casing is provided with partition means therein defining a suction chamber extending horizontally inward from the other end of the casing and being open at the other end, which partition means includes an air-pervious top wall portion through which communication is established between the chamber and the suction-generating means. The suction chamber contains a disposable bag-shaped dust receptacle, as above described, and a removable closure cap is provided for the open end of the chamber, which includes an intake for dust-laden air and which likewise includes a clamping portion which serves to secure the dust receptacle to the chamber walls adjacent the open end. In addition the casing is provided adjacent the end opposite from the suction-generating means with a handle for tilting the casing from its normal horizontal position to a vertical position resting on the flat end wall in order to facilitate removal of the closure means and removal and replacement of the disposable dust receptacles. Likewise suitable dust precipitating means comprising a source of ultra violet light for at least partially ionizing the air and oppositely charged spaced precipitator plates disposed for

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passage of the ionized air therebetween, are provided between the filter and the discharge outlet from the casing.

For a more complete understanding of the invention, reference should now be had to the drawing, in which:

Fig. 1 is an elevational view, taken substantially along the line I—I of Fig. 3, of a suction cleaner embodying the present invention;

Fig. 2 is a perspective view of a disposable bag-shaped dust receptacle embodying the present invention utilized in the suction cleaner of Fig. 1;

Figs. 3, 4 and 5 are respectively right hand end, elevational, and top plan views of the suction cleaner shown in Fig. 1; and

Fig. 6 is a circuit diagram illustrating a form of electrical circuit which may be employed in the suction cleaner of Fig. 1.

Referring now to the drawing, the invention is shown as embodied in the suction cleaner 10 comprising a one piece bottom casting 11 and a cover member 12, which cooperate to form an elongate casing of substantially the shape shown in the drawing, having a flat bottom wall 13 and an upwardly extending flat end wall 14. The vertical side walls 15 and 16 of the casing, which are conjointly formed by the bottom member 11 and the cover member 12, taper as shown best in Figs. 1 and 4 and are connected by a sloping top wall 17. At its left hand end, i. e., the end opposite the end wall 14, the casing is provided with an opening, as will be more fully described hereinafter. While the top and bottom members 11 and 12 may be interfitted and secured together in any desired fashion, they have been shown for purposes of illustration as having a suitable flange formed on the top or cover member and overlapping the upper edges of the bottom member 11 for receiving suitable securing screws 18.

As shown in Fig. 1, the bottom member 11 includes a horizontal extending partition member 19, which is provided adjacent the end wall 14 of the casing with a suitable aperture for receiving a resilient supporting ring 20, which is preferably formed of rubber or similar material and which is adapted to be engaged by an annular flange 21 formed on a combined motor and air pump unit which preferably comprises a shaft-connected electric motor 22 and a two-stage turbine or air pump 23. In order securely to hold the motor and pump unit on the supporting ring 20, a plurality of resilient spacer blocks 24 are provided which are preferably secured to the cover member 12 and extend downwardly therefrom so as to engage a suitable flange on the upper edge of the motor 22.

In addition to the horizontally extending flange 19, the bottom casting 11 is provided with a transverse vertically extending partition 25 and horizontally extending partition 26, which, together with the bottom wall 13 and the side walls 15 and 16 of the casing, define a suction chamber 27, which is open at its left hand end and which extends inwardly therefrom toward the motor and pump unit. As shown in Fig. 1, the horizontal partition 26, which forms the top wall of the suction chamber 27, is provided with a plurality of apertures 28 so as to provide an air-pervious wall through which air may flow from the suction chamber 27 to the intake of the pump 23.

Located within the suction chamber 27 is a disposable bag-shaped dust receptacle 29, which, as shown best in Figs. 1 and 2, conforms substantially to the shape and dimensions of the suction chamber 27 and is preferably in the form of a

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conventional paper bag having foldable end walls 30 and 31, a bottom wall 32, and a pair of substantially flat side walls 33 and 34. In accordance with the present invention, the side wall 34 of the receptacle 29 is formed of suitable porous filter paper so as to constitute the filter element of the suction cleaner. While various types of porous paper may be used, the paper sold in the trade as "Dextilose" is satisfactory. This particular paper is a long fibered, unsized paper having a high degree of porosity. On the surface of such paper are fibers which extend from the surface and tend to retain dirt and function as a focus for dirt accumulation. However, it has been found that the paper surface may be treated to bind down these extending fibers without impairing the porosity, the resulting smooth surface of the paper thus making it more difficult for dirt to adhere. The paper may be glossed by calendering with hot dry rolls, or other suitable binders may be applied to the surface of the paper in sufficient quantity and at proper viscosity to cement down the fibers without appreciably filling the pores, thereby producing a smooth surfaced porous filter. In constructing the disposable dust receptacle 29, the smooth surface of the filter paper employed to form the side wall 34 is disposed inwardly so that when the dust receptacle is assembled in the suction chamber 27, this smooth inner surface is subjected to the scrubbing action of the dirtladen air blast as more fully described in the above referred to Patent No. 2,242,277.

While the disposable dust receptacle 29 may be formed entirely of porous filter paper if desired, and may be formed in conventional bag making machines, the receptacle preferably is formed by employing ordinary non-porous paper bag stock to form the end walls 30 and 31, the bottom wall 32 and the side wall 33, suitable flanges 35 being provided on the upper edges of the end walls 30 and 31 and the bottom wall 32, to which flanges the filter paper constituting the side wall 34 may be suitably secured as by adhesives.

In order properly to clamp the disposable dust receptacle 29 in the suction chamber 27 and properly to direct the blast of dust-laden air into the receptacle when the suction cleaner is in operation, a closure cap 36 is provided, having an inwardly extending split resilient flange portion 37, which is adapted to extend into the opening at the left hand end of the suction chamber 27 so as resiliently to clamp the end of the dust receptacle 29 against the corresponding walls of the suction chamber. The closure cap 36 is formed to provide an intake for dust-laden air which is in the form of an inwardly extending nozzle 38 arranged to direct the stream of dust-laden air entering therethrough along the inner surface of the porous wall 34 of the receptacle 29 at a high velocity to effect a scouring or scrubbing action on the wall 34, as fully described in the aforesaid prior patent. The nozzle 37 terminates in the usual receptacle portion 39 adapted to receive the conventional cleaning attachments such as a suction tool or brush carried on a flexible hose portion.

As is indicated by the arrows in Fig. 1, the dust-laden air entering through the nozzle 38 passes into the suction chamber 27 and through the filter paper 34 and the partition 26 to the suction side of the turbine or pump and, after passing therethrough is discharged at the top of the motor casing 22. The dust or dirt, as shown in Fig. 1, accumulates in the receptacle 29. From the discharge end of the motor casing the air

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flows to a suitable outlet and is discharged from the cleaner casing into the room, suitable discharge louvers 40 being provided in the top wall 17 of the casing, as shown in Figs. 1, 4 and 5. If desired, suction cleaners embodying the present invention may be provided with additional air cleaning means between the discharge from the motor 22 and the point of discharge from the casing. Thus, as shown in Fig. 1, a suitable ultra violet source, such as a quartz mercury vapor lamp, 42 may be arranged adjacent the top wall of the casing and suitably supported between the opposed side walls, and an electrical dust precipitating labyrinth may be provided suitably supported on the partition 19 and comprising two sets of oppositely charged plates 43 and 44, between which the flow of air passes before being discharged through the louvers 40.

Referring to Fig. 6 and the exemplary circuit there shown, it will be observed that the motor 22 and the mercury vapor lamp 42 are connected in parallel across a source of alternating current represented by the terminals 45 through a suitable manually operable switch 46, and the two sets of precipitator plates 43 and 44 are connected to a high voltage current system deriving its power from the same source of alternating current, such, for example, as the step-up transformer 47 and the rectifier 47a. The air, in passing over the ultra violet lamp 42 becomes partially ionized, thereby facilitating the precipitating operation which is effected during passage of the air between the oppositely charged precipitator plates.

The cover or top member 12 may be provided with a suitable handle 48, by means of which the entire cleaner may be picked up and carried from room to room, but in accordance with the present invention additional means are provided for facilitating the transportation and manipulation of the cleaner. As shown in Fig. 1, the bottom wall 13 of the suction cleaner casing is provided adjacent its right hand end with suitable recesses 49 for receiving a pair of roller type floor engaging elements, which are shown as constituting wheels or casters 50 but which may, if desired, constitute a single roller, the wheels 50 being disposed substantially beneath the motor and fan unit, and a pair of additional floor engaging members which are in the form of resilient bumpers or feet 51 are provided adjacent the left hand end of the bottom wall 13. Secured to the left hand end of the top or cover member 12 is a pivoted handle 52, which may be employed to raise the left hand end of the cleaner casing so as to permit manipulation of the cleaner on the wheels 50, thus eliminating the necessity of lifting the entire cleaner for transportation purposes. Inasmuch as the wheels 50 are disposed substantially beneath the motor and pump unit, the left hand end of the cleaner will represent only a light weight and may readily be lifted. Furthermore, in accordance with the present invention and in order to facilitate removal and replacement of the disposable dust receptacles, the handle 52 may be employed to tilt the casing about the wheels 50 until the rounded corner 53 of the casing engages the floor, whereupon the casing may be further tilted to assume a substantially vertical position resting on the flat end wall 14. In this position of the casing it will be apparent that removal and replacement of the disposable dust receptacle 29 may readily be accomplished simply by removing the closure cap 36, which is held in place on the casing by

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suitable toggle type latching members 54 and by then lifting out the dust receptacle 29. By thus removing the dust receptacle in a vertical direction, all danger of spilling the dust or dirt which has accumulated therein is eliminated and a new dust receptacle may be readily inserted into the suction chamber 27, whereupon the closure cap 36 may be replaced and latched in position.

In order to adapt the suction cleaner shown in Fig. 1 for use in blowing operations, the louvers 40 are provided with suitable means, not shown, for effecting closure thereof and the casing is provided immediately over the motor and blower unit with a receptacle 55 for receiving a suitable blower connection, the receptacle normally being rendered inaccessible by a suitable cover 56 secured to the top wall 17 of the casing. Upon closure of the louvers 40 and removal of the blower cover 56, which is preferably provided with a swivel type connection, operation of the motor and pump will cause pressure to build up in the portion of the casing above the partition 19 so that a blast of air may be discharged under pressure through the blower connection.

In addition to their usefulness in facilitating removal of the dust receptacles 29 from the suction chamber 27, the provisions for tilting the vacuum cleaner casing from the normal horizontal position to a vertical position, in which the casing rests on the flat end wall 14, may be employed in effecting cleaning of restricted areas such as staircases, for example, since the cleaner may be operated as well in the vertical as in the horizontal position.

While a particular embodiment of the invention has been shown, it will be understood, of course, that the invention is not limited thereto since many modifications may be made and it is therefore contemplated by the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A suction cleaner comprising an elongate outer casing having a substantially flat end wall and internal partition means extending longitudinally of said casing to provide intake and discharge chambers, intake and discharge means respectively communicating with said chambers adjacent the end of said casing remote from said end wall, a suction generating unit supported on said partition means adjacent said end wall with the suction side thereof in said intake chamber and the discharge side thereof in said discharge chamber, said suction generating means locating the center of gravity of said cleaner adjacent said end wall to provide stability of said cleaner for operation in either a horizontal position or in a vertical position resting on said end wall, air filtering means in said intake chamber including a disposable bag shaped dust receptacle having an open end encompassing said intake means and including a wall portion formed of porous filter paper, precipitation means in said discharge chamber between said discharge side of said suction generating means and said discharge means, said precipitation means consisting entirely of a source of ultraviolet energy disposed in the path of the air discharged from said suction generating means for ionizing said air and a labyrinth of alternately oppositely charged precipitator plates positioned longitudinally of said casing within said discharge chamber and adjacent said suction generating means, said

plates being disposed between said source and said discharge means and arranged for the sinuous downward passage of the ionized air therebetween.

2. A suction cleaner comprising an elongated outer casing having internal partition means extending longitudinally of said casing to provide an intake chamber and a discharge chamber, suction generating means interposed between said intake chamber and said discharge chamber and in fluid communication therewith to form a single fluid passageway through said casing, air filtering means positioned in said intake chamber and including a porous wall portion interposed in said passageway between said intake chamber and said generating means, said discharge chamber having an intake opening therefor extending transversely to said outer casing, and precipitating means forming a tortuous fluid pathway positioned in said discharge chamber and in registration with said opening to form a portion of said passageway.

3. The suction cleaner defined in claim 2 in which an elongated source of ultraviolet energy is positioned within said casing with the longitudinal axis thereof extending along the longitudinal axis of said elongated opening.

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