

Dec. 23, 1969

W. H. CASE

3,484,890

PRESSURE-VACUUM CLEANING AND TREATING DEVICE

Filed March 12, 1968

2 Sheets-Sheet 1

FIG 1

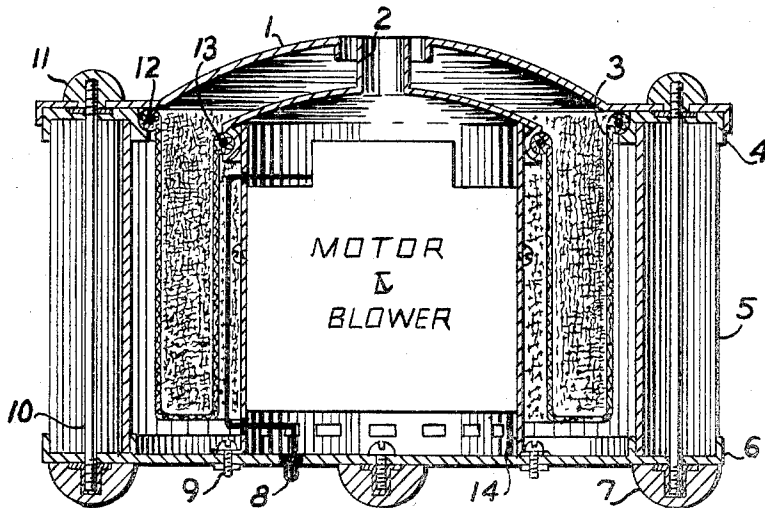


FIG 2

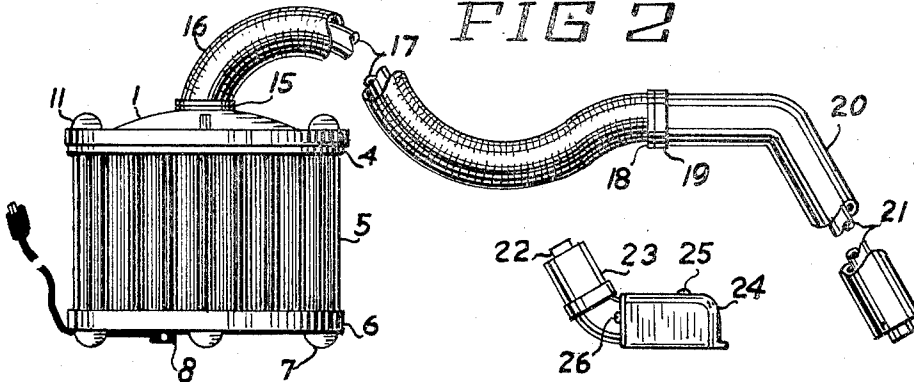
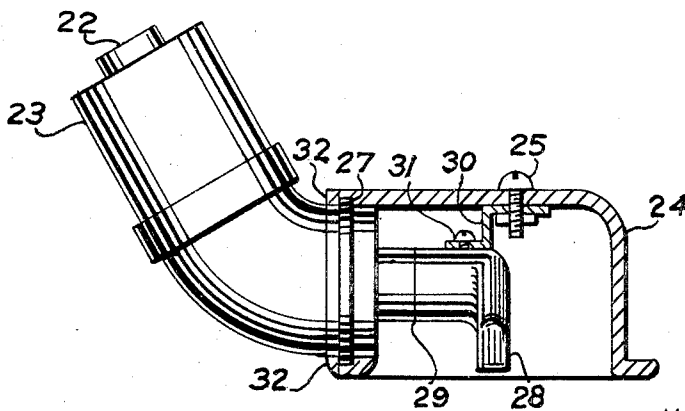


FIG 3



INVENTOR
William H. Case

Dec. 23, 1969

W. H. CASE

3,484,890

PRESSURE-VACUUM CLEANING AND TREATING DEVICE

Filed March 12, 1968

2 Sheets-Sheet 2

FIG 4

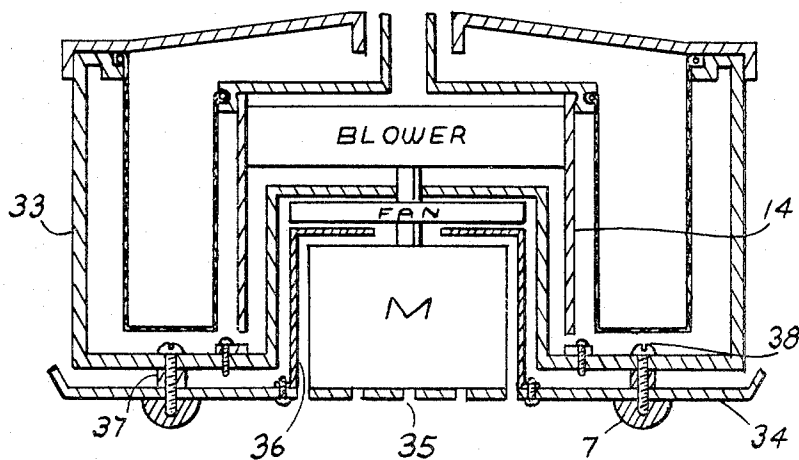
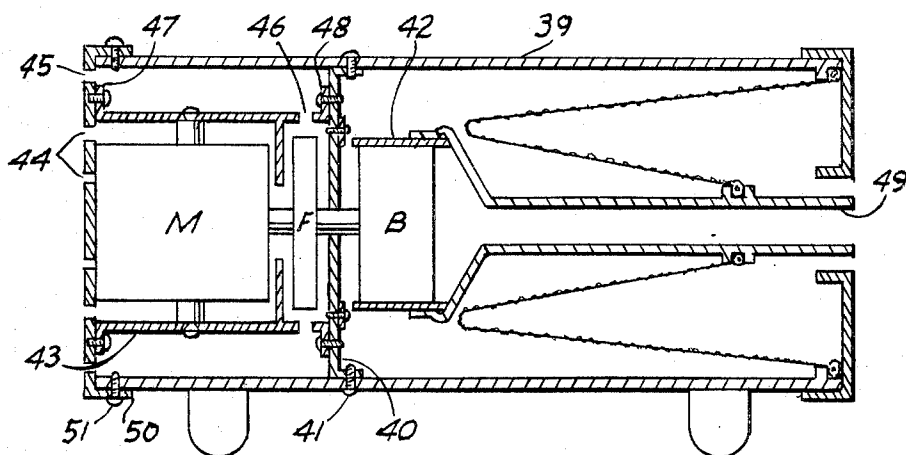


FIG 5



William H. Case
INVENTOR

1

3,484,890

PRESSURE-VACUUM CLEANING AND TREATING DEVICE

William H. Case, 308 S. 2nd St.,
Marshalltown, Iowa 50158

Filed Mar. 12, 1968, Ser. No. 712,552

Int. Cl. A47I 5/14, 7/04

U.S. Cl. 15—346

6 Claims

ABSTRACT OF THE DISCLOSURE

A device having a motor and air blowing fan so arranged that the air is moved under positive pressure through a duct means and directed at the surface to be cleaned by means of a positive pressure head and then out via a negative pressure head and negative pressure air duct connected to a filter chamber from which the air is conducted to the blower for recirculation thus utilizing all air pressure and avoiding air exhaust; heat radiating chamber walls and pipes used when motor is not in a separate air cooled chamber.

BACKGROUND OF INVENTION

This device removes loose material from surfaces and fumigates surfaces simultaneously if so desired, by means of a pressurized stream of air circulated through air ducts, cleaner heads, filter chamber, blower and motor and without a means of exhaust in proper use.

Prior art depends on a negative air-pressure condition in a cleaner head which is relieved by air under atmospheric pressure forcing under the edge of the cleaner head and blowing loose particles through a negative pressure air duct to a filter chamber from which the filtered air is exhausted back into the atmosphere by means of a motor and blower and carrying with it unfilterable virus germs and dirt. A suction drag picks up small rugs and cleaning power is lost if the head is lifted to avoid said drag. Coverings cannot be fumigated and cleaned simultaneously and it is not possible to confine fumes to a definite portion of the coverings and so avoid contaminating the room air. In the pressure-vacuum cleaning and treating device both positive and negative air-pressure are utilized directly in the surface treatment or cleaning, there is no suction drag, no exhaust, and positive control of fumes other than residual effect makes possible the germicidal fumigation of filtered dirt particles as well as fabrics and surfaces being cleaned.

SUMMARY OF INVENTION

This device comprises a motor and centrifugal air pump blower assembly, positive pressure and negative pressure air-ducts connected to motor and blower assembly, a negative pressure cleaning head within which is attached a positive pressure cleaning head both of which are slidably and rotatably attached to said air ducts by means of tubular handle assembly, a filter bag being enclosed between negative pressure air-duct and said motor and blower assembly with heat radiating design and material being used where necessary.

The air circulates in said device by means of a closed continuous duct, being moved by a blower attached to motor, the cleaning and/or fumigating action being produced by the passage of air and/or fumes from the positive pressure cleaning head to the negative pressure cleaning head with dust being removed at filter bag and air or fumes being recirculated. Where motor is enclosed within the said continuous duct overheating may be avoided by means of corrugated heat radiating chamber walls and heat radiating material being used where possible in the rest of said duct and said cleaning heads.

2

Chemicals in crystal or powder form are placed in filter bag and the fumes are circulated continuously through the nap of rug coverings leaving only a residual amount in the rug. No suction condition occurs between said heads.

The purpose of said device is to provide a more efficient and sanitary way of removing dust and other particles from surfaces and to provide a more efficient and sanitary way of fumigating said surfaces and floor coverings. Also suction drag is eliminated by the positive pressure neutral effect.

BRIEF DESCRIPTION OF DRAWING

In the drawing of the pressure-vacuum cleaning and treating device FIG. 1 is a sectional view in elevation of a vertical tank type in which 1 is filter chamber cover, 2 is pressure chamber cover, 3 is filter bag, 4 is corrugated wall retainer cap, 5 is corrugated wall, 6 is flanged base, 7 is threaded coaster nut, 8 is electrical connection, 9 is pressure chamber base anchor nut and bolt, 10 is threaded corrugated wall retainer bolt, 11 is winged cover nut, 12 is outer annular filter bag support, 13 is inner annular filter bag support, 14 is pressure chamber wall, legend indicates motor and blower; threaded washer under winged cover nut is optional.

FIG. 2 is an elevation view of the vertical tank and attachments in which 15 is rotatable hose connector, 16 is negative pressure hose, 17 is positive pressure hose, 18 is rotatable hose connector to tubular handle, 19 is friction hose connector to tubular handle, 20 is tubular handle, 21 is positive pressure handle tube, 22 is rotatable tubular connector to positive pressure head, 23 is rotatable flanged tubular connector to negative pressure head, 24 is negative pressure head, 25 is bracket bolt, 26 is screw to negative pressure head retainer plate.

FIG. 3 is a sectional view in elevation of the negative pressure head exposing connected parts in which 27 is flanged sleeve attached to rotatable flanged tubular connector 23, 28 is positive pressure head, 29 is end of rotatable tubular connector 22, 30 is head bracket, 31 is positive head bracket bolt, 32 is section of negative head retainer plate.

FIG. 4 is a cross-section view in elevation of a vertical tank type having motor in a separate chamber with a separate cooling system.

FIG. 5 is a cross-section view in elevation of a horizontal tank type having motor in a separate chamber with a separate cooling system.

DETAILED DESCRIPTION OF INVENTION

The pressure-vacuum cleaning and treating device may be designed in a variety of ways such as horizontal tank, vertical tank or on the order of the upright vacuum cleaner. The motor may be enclosed with the blower or occupy a separate chamber with its separate cooling system. The motor may be energized by electric, gas, diesel, steam or natural force such as water power according to usage and size of said device. The type of motor used will influence the design of said device. The negative and positive pressure ducts may be concentric or separate tubes. Heat radiating design and material should be used where motor is confined with blower as shown in accompanying drawing. Possible uses of said device may vary from stationary units tending moving material to mobile units for street sweeping or for household units designed for floor, wall, drapery and fabric cleaning and/or fumigating.

In the said drawing the motor and blower indicated by legend are the same as the standard motors and blowers used in tank type vacuum cleaners. The motor and blower unit is secured to pressure chamber wall 14 allowing sufficient space above base 6 for air to enter the vent holes in lower part of said wall 14. Electric connections to

3

switch and outlet are threaded through appropriate insulated holes in said wall 14 and base 6 as shown by reference 8. Center coaster nut 7 is attached to base 6 and then pressure chamber wall 14 is secured to base 6 by nut and bolt 9. Pressure chamber cover 2 is pressed onto chamber wall 14 where it is secured by appropriately spaced raised portions in rim of wall 14. The four outer coaster nuts 7 are threaded onto bolt 10 and insert the said bolt into appropriate holes between flanges in base 6. Corrugated wall 5 is fitted between said flanges in base with all bolts 10 either outside said wall or inside said wall. Corrugated wall retainer cap 4 having four holes is fitted onto said bolts 10 and flanges of said cap 4 are fitted over top of corrugated wall 5. A threaded washer not numbered may be screwed down to recessed space in cap 4 or it may be an integral part of cap 4 as a means of securing said cap over wall 5. Recessed flanges on the inner edge of cap 4 and the outer edge of cover 2 support filter bag 3 which comprises a sleeve of filter material whose diameter on one end is that of the recessed flange on the inner edge of cap 4 and the diameter on the other end fits that of the recessed flange on the outer edge of cover 2. 12 is a rigid annular core fitted into the larger end of said filter bag and 13 is an elastic annular core such as an extension spring or rubber or combination of materials allowing expansion and contraction which is fitted into the smaller end of the filter bag. Filter bag 3 is positioned in proper flanges and cover 1 having four rectangular slots is fitted over protruding ends of bolts 10 outer flange of said cover fitting outside cap 4. Winged nut 11 which is smaller than rectangular slot in cover 1 is screwed onto end of bolt and tightened down to right angles to rectangular slot. To remove cover 1 loosen winged nut 11 one fourth turn so that nut 11 fits inside said rectangular slot. After assembling as shown cover 1 may be secured or removed by one fourth turn of the four winged cover nuts 11. Hoses 16 and 17 are attached to covers 1 and 2 by rotatable connector 15. Rotatable connector 18 is secured to hoses 16 and 17 and rotatably secured to sliding friction connector 19. The upper end of handle 20 is bent in an angle of about 60 degrees allowing a comfortable hand-hold and tube 21 being made of sufficiently flexible material is slid past the angular portion of handle 20 and having a corresponding angular upper portion is held in handle 20 allowing a small portion to extend beyond each end of said handle 20. Said hoses are then rotatably attached handle and tube and are now ready to be attached to head assembly shown in FIGS. 2 and 3. Material of said handle and said head assembly should preferably be made of heat radiating metal such as aluminum. Said hoses may be made of similar material and design as standard to tank type vacuum cleaners.

In said head assembly, bracket 30 being curved to fit tubular portion of head 28 is attached securely to said head by bolt 31 and flat arm of said bracket is secured to head 24 by bolt 25 and nut. Tube 22 is rotatably and slidably attached to head 28 having enough overlap to prevent disconnection from head 28 when flanged connector 23 with attached flanged sleeve 27 is secured to head 24 by retainer plate 32 and screw 26. Flanged sleeve 27 fits into recessed groove in head 24 and allows 23 to rotate in relation to head 24. Bracket 30 as a variable adjustment can be designed so that raising and lowering head 28 can be accomplished by screwing bolt 25 up or down and so get more efficient action for different surface conditions.

FIG. 4 and 5 merely show obvious forms of how the motor could be mounted in a separate chamber with a separate cooling system.

In FIG. 4 a modification of FIG. 1 is shown in which a cannister 33 with a recessed compartment in its base provides a means of separation between the motor M and the air ducts of the cleaning system, said motor M having its own cooling fan which continuously circulates

4

fresh air around the motor. Said motor is mounted on a base baffle plate 34 ventilated by holes 35 below motor position and is enclosed in a duct separator 36 with said fan secured to the motor shaft so that it draws air through and around the motor, and through an opening in said duct separator, and exhausts said air in a channel formed by the base of the cannister body and the adjacent surface of said baffle plate and said duct separator. Said baffle is secured to said base of cannister body by means of four coaster bolts 38, sleeve spacers 37 and coaster nuts 7. The shaft of motor extends to interior of cannister body through a fitted hole in the center of said recessed compartment. Blower and pressure chamber wall 14 are secured to said shaft inside said cannister body and said chamber wall 14 is secured to proper position in base of said cannister. Filter bag assembly and chamber covers similar to those of FIG. 1 are secured by or in convenient variation of means shown in FIG. 1. Corrugations may be incorporated into wall of cannister to eliminate such heat that might enter through base of cannister or said base may be coated with insulating material.

FIG. 5 shows a horizontal tank type with motor M in a separate compartment and having a separate cooling system. Motor is assembled to duct separator 43 and motor chamber cover 50, and fan F is secured to motor shaft. Chamber divider 40 is secured to flange 48 of duct separator 43 with motor shaft extending through centered shaft hole in said divider. Modified positive pressure chamber wall 42 vented around its base is attached to blower B secured to motor shaft and is then secured to chamber divider 40. Motor and attached parts are inserted into cannister wall 39 and secured by means of bolts and predetermined holes to chamber divider flange and motor chamber cover 50. Duct cooling system has vent holes 46 around fan F in duct separator 43 for exhaust air. The reference numbers 44 and 45 identify respectively the intake and exhaust vents in motor chamber cover 50 through which fresh air is circulated to cool the motor separate from the cleaning ducts. Filter bag and covers accommodating chambers in cleaning portion of device are similar to those of FIGS. 1 and 4 with modification of flanges and in comparative size.

Said handle assembly is attached to said head assembly and the pressure-vacuum cleaning and treating device is ready to be connected to an electric power source. To operate said device properly the negative pressure head should have good contact with the surface to be treated and the positive head can be slightly above said surface for more efficient action. It will be found that dirt is extracted efficiently without any suction drag and a very small amount of crystalline moth killer in the filter bag will demoth the rug at the same time it is being cleaned. Also the operation of emptying the filter bag will be less hazardous due to the chemical treatment of the dust by the continuous passage of fumes through said filter bag.

I claim:

1. In a tank type pressure-vacuum cleaning and treating device:

a housing having an outer wall and an open end, a filter chamber in said housing, a filter chamber cover for said open end of said housing, said cover having an air duct inlet formed therein, means for securing said filter chamber cover to said housing; a positive pressure chamber formed within said filter chamber at the end opposing said filter chamber cover, said pressure chamber having an open end adjacent said housing open end, vent holes formed in said positive pressure chamber adjacent said opposing end communicating said pressure chamber with said filter chamber, a positive pressure chamber cover having an air duct outlet formed therein, means for securing said positive pressure chamber cover to said positive pressure chamber; said positive pressure chamber so

5

disposed within said filter chamber to allow said outlet to fit concentrically within said inlet of filter chamber cover with space provided between said filter chamber cover and positive pressure chamber cover to allow for efficient flow of air; a centrifugal air pump mounted in said positive pressure chamber and drivably connected to an electric motor; a removable filter bag shaped to fit into the space between said filter chamber wall and positive pressure chamber, means for securing said filter bag therein so that air from said inlet is filtered through said bag before entering said vent holes in said positive pressure chamber to be expelled through said outlet of said positive pressure chamber.

2. The cleaning and treating device of claim 1 including an outer flexible negative pressure hose containing an equal length inner flexible positive pressure hose of generally one half the cross-sectional capacity area of said negative pressure hose; ends of said hoses at one end rotatably attachable respectively to said air duct inlet and to said concentric air duct outlet; an outer rigid tubular handle containing an inner handle tube of generally one half the cross-sectional capacity area of said tubular handle, upper end of said tubular handle rotatably attachable to other end of said negative pressure hose, upper end of said handle tube rotatably attachable to other end of said positive pressure hose; a negative pressure head containing a positive pressure head adjustably attached therein; said negative pressure head rotatably attachable to lower end of said tubular handle, said positive pressure head rotatably attachable to lower end of said handle tube; said hoses and attachments being in communication when assembled so that a balanced air duct is provided for air to flow to the positive head and onto the surface to be cleaned and/or treated, the negative head to collect said air from said surface and return said air to source of supply.

3. The cleaning and treating device of claim 1 wherein: said filter chamber is formed of heat radiating material and in heat radiating design; said electric motor is enclosed

6

with said centrifugal air pump within said positive pressure chamber; said positive pressure chamber is disposed concentrically in relation to walls of said filter chamber; said filter bag is secured by concentric flange means to the open end of said filter chamber and said positive pressure chamber exterior surface respectively in a proper plane to each other.

4. The cleaning and treating device of claim 1 wherein: said filter chamber is cylindrical in form; said positive pressure chamber is cylindrical in form and concentrically disposed in relation to wall of said filter chamber; said filter bag is annular in form and is secured in the concentric space between said filter chamber wall and said positive pressure chamber by means of concentric flanges formed respectively in the rim of said filter chamber wall and around the exterior surface of said positive pressure chamber in a convenient and proper plane with each other.

5. The cleaning and treating device of claim 4 wherein: said electric motor is housed in a separate chamber and has a separate cooling system.

6. The cleaning and treating device of claim 1 wherein: said electric motor is housed in a separate chamber and has a separate cooling system.

References Cited

UNITED STATES PATENTS

3,257,681	6/1966	Miller	15—346 X
1,281,925	10/1918	Farnsworth	15—346
2,269,482	1/1942	Rebogle	15—336 X
2,314,334	3/1943	Frantz	15—413

FOREIGN PATENTS

661,573	6/1938	Germany.
620,253	5/1961	Italy.

ROBERT W. MICHELL, Primary Examiner

U.S. Cl. X.R.

15—327, 413