

Feb. 13, 1968

J. F. KRAVOS ET AL

3,368,231

PORTABLE ELECTRIC CLOTHES CLEANER

Filed Aug. 19, 1964

4 Sheets-Sheet 1

Fig. 1.

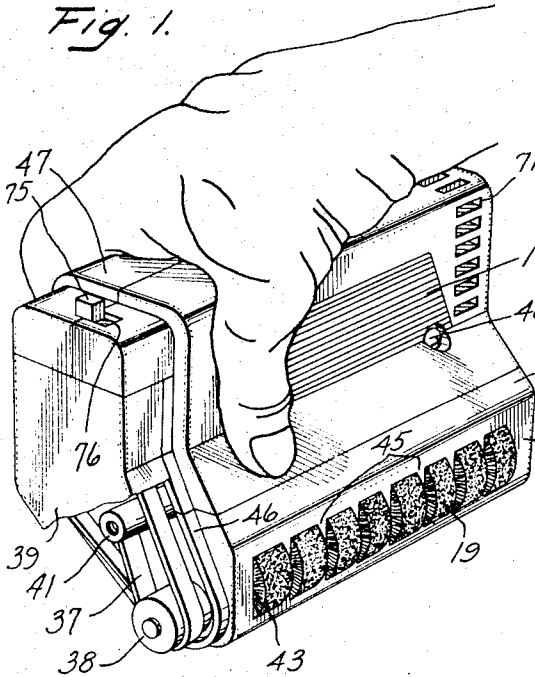


Fig. 2.

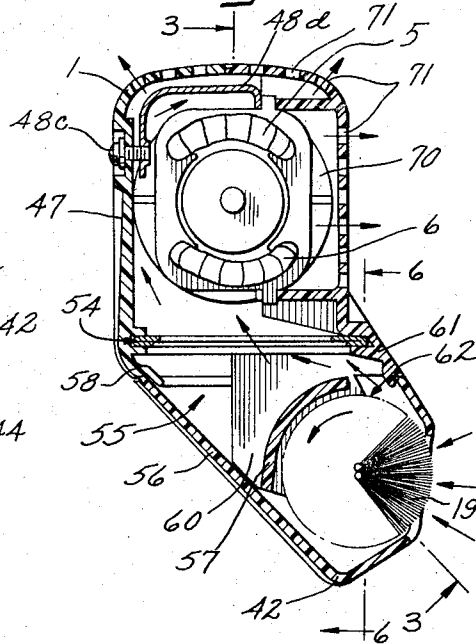
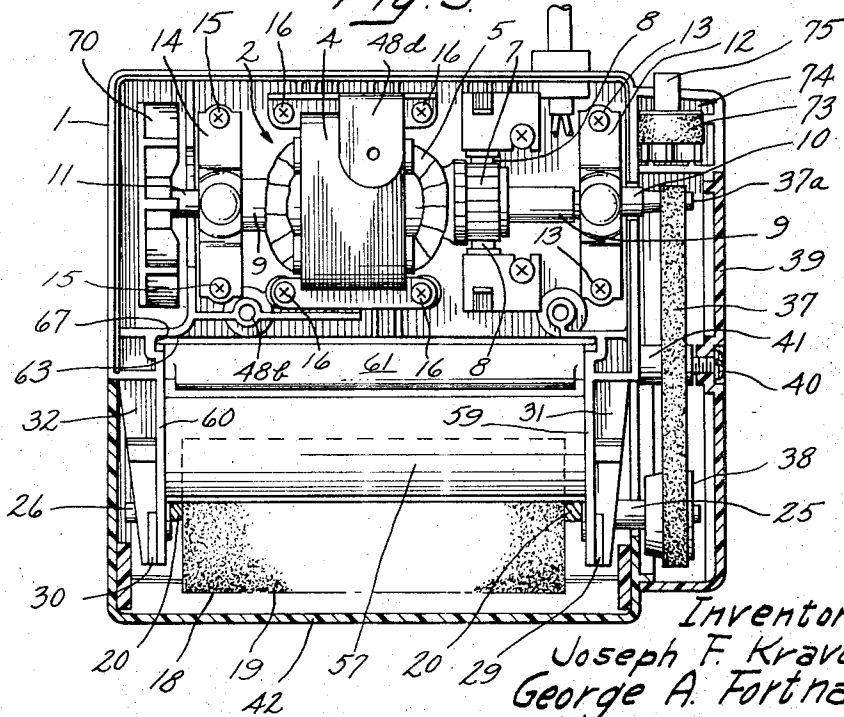


Fig. 3.



Inventors:
Joseph F. Kravos,
George A. Fortnam
by *Leland J. Platt*
Attorney

Feb. 13, 1968

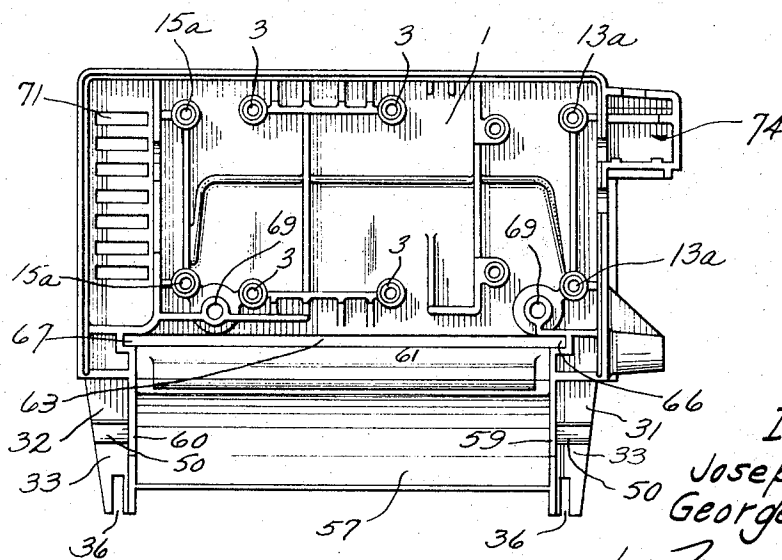
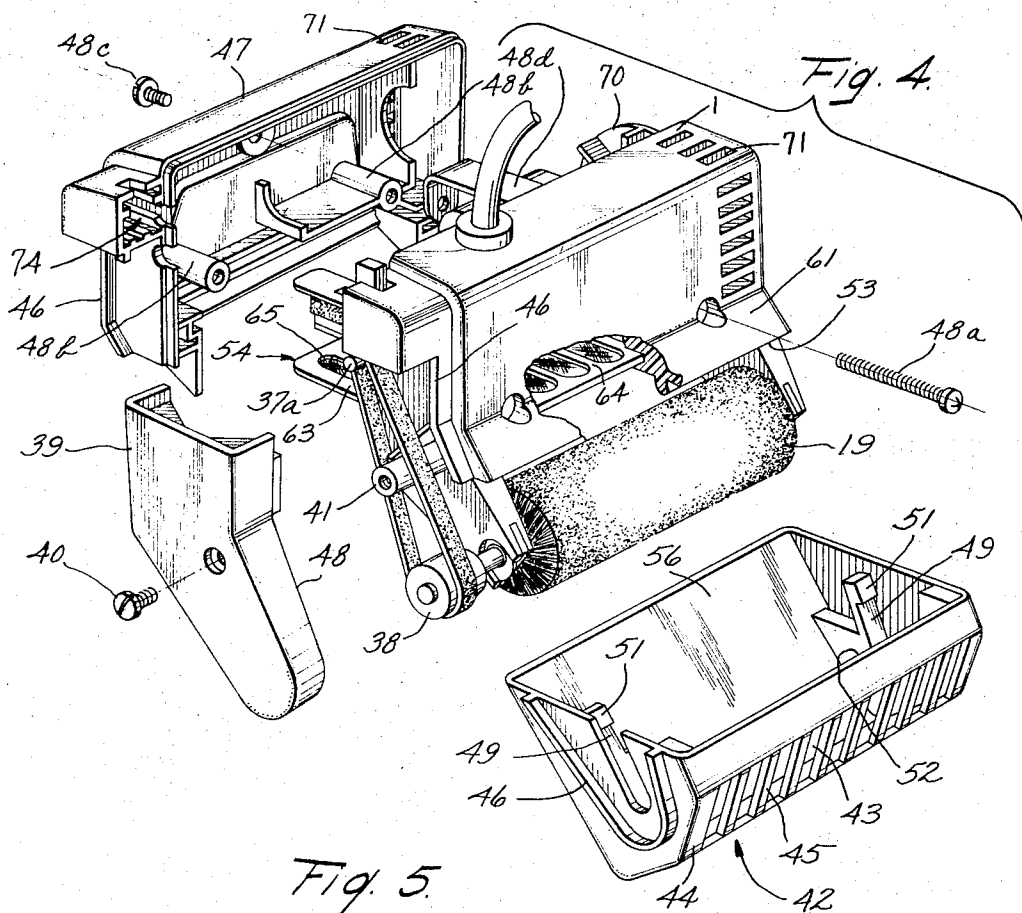
J. F. KRAVOS ET AL

3,368,231

PORTABLE ELECTRIC CLOTHES CLEANER

Filed Aug. 19, 1964

4 Sheets-Sheet 2



Inventors:
Joseph F. Kravos,
George A. Fortnam.
by Leonard Platt
Attorney

Feb. 13, 1968

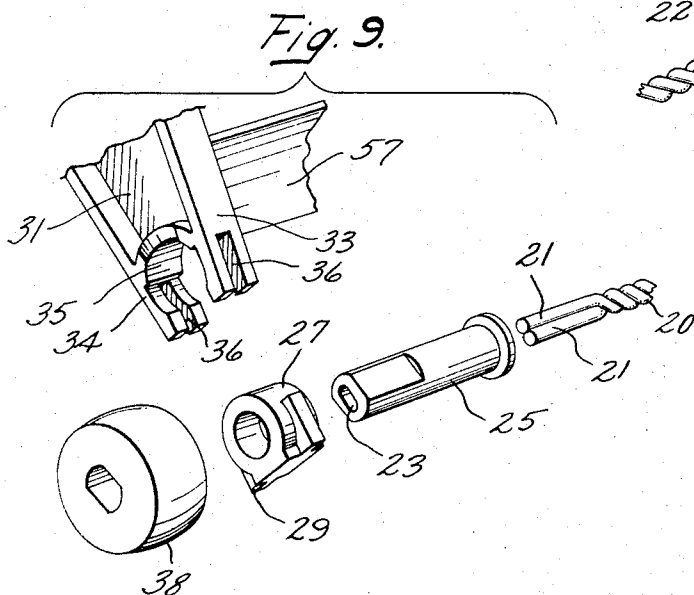
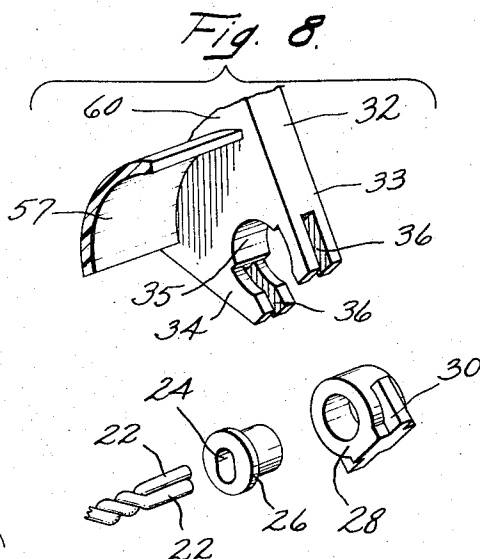
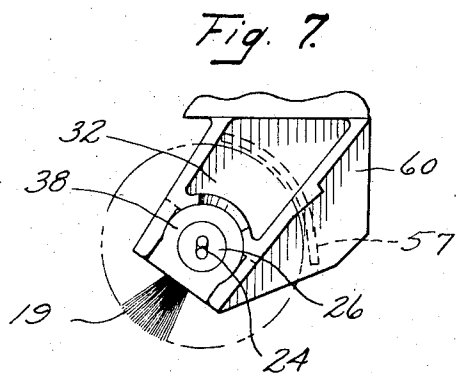
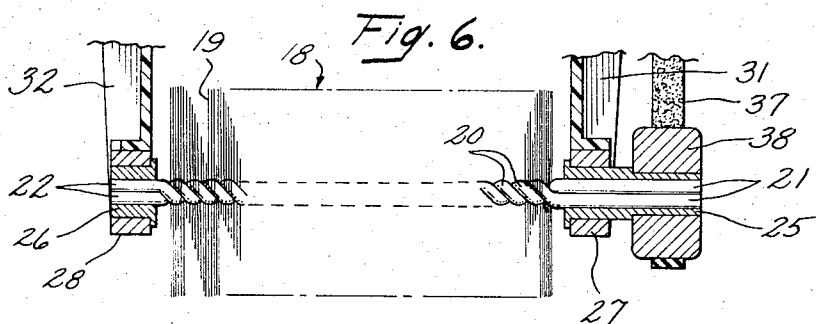
J. F. KRAVOS ET AL

3,368,231

PORTABLE ELECTRIC CLOTHES CLEANER

Filed Aug. 19, 1964

4 Sheets-Sheet 3



Inventors:
Joseph F. Kravos,
George A. Fortnam.
by *Zenaid Platt*
Attorney

Feb. 13, 1968

J. F. KRAVOS ET AL

3,368,231

PORTABLE ELECTRIC CLOTHES CLEANER

Filed Aug. 19, 1964

4 Sheets-Sheet 4

Fig. 12.

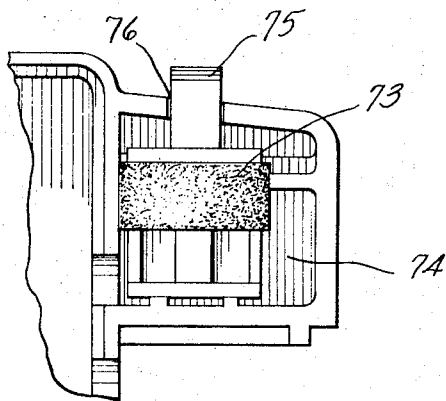


Fig. 10.

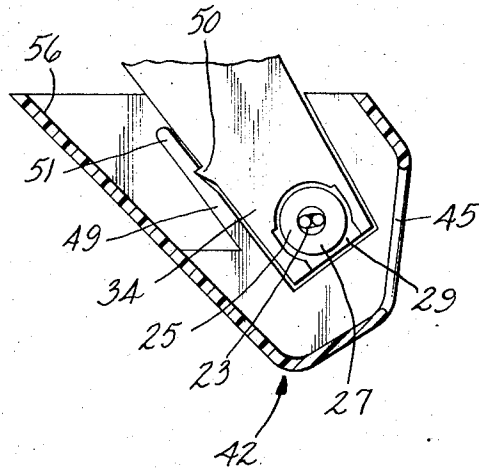
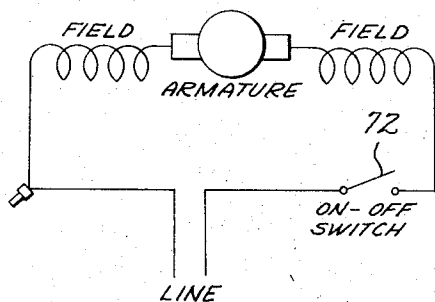


Fig. 11.



Inventors:
Joseph F. Kravos,
George A. Fortnam.
by Leonard Platt
Attorney

1

3,368,231

PORTABLE ELECTRIC CLOTHES CLEANER

Joseph F. Kravos, Chesterland, and George A. Fortnam,
South Euclid, Ohio, assignors to General Electric Com-
pany, a corporation of New York

Filed Aug. 19, 1964, Ser. No. 390,548

12 Claims. (Cl. 15—344)

Our invention relates to portable electric clothes cleaners, and more particularly, to a rigid and compact cleaner having both vacuuming and brushing capabilities.

In recent years a number of patents have issued disclosing portable electric clothes cleaners of various types and constructions. One type of cleaner utilizes one or more electrically driven rotary brushes to dislodge and pick up dirt from the material being cleaned. Generally these cleaners provide a chamber for collecting the dirt picked up by the rotary brushes. This type of cleaner is inefficient in that a large percentage of the dirt which is dislodged from the material being cleaned is not drawn into the dirt-collecting chamber, but rather is scattered to another area of the material. A second type of cleaner incorporates an electrically driven fan which creates suction at a nozzle for the device; however, these cleaners do not employ a brush for loosening the dirt from the dirt-laden material. These devices have the evident disadvantage that dirt embedded deeply within the material will not be dislodged by the mere drawing effect of the suction, and will remain in the material throughout the cleaning operation. A third category of portable electric clothes cleaners includes our cleaner, employing both a rotary brush to dislodge and pick up dirt from the material, and suction for drawing the loosened dirt into a dirt-collecting chamber within the device. Prior art cleaners of this combined type have been of inefficient design and cumbersome to operate.

It is an object of our invention to provide an improved portable electric clothes cleaner including means for both brushing and vacuuming the material being cleaned.

It is an object of our invention to provide a portable electric clothes cleaner having a rigid, compact and highly maneuverable construction.

It is a further object of our invention to provide a portable electric clothes cleaner having provisions for readily detaching the brushing means from the cleaner.

It is another object of our invention to provide a portable electric clothes cleaner having provisions for preventing the material being cleaned from being drawn into the cleaner.

It is still another object of our invention to provide a portable electric clothes cleaner having means for easily emptying collected dirt from within the cleaner.

It is an additional object of our invention to provide a portable electric clothes cleaner which is highly efficient in operation and economical to produce.

Further objects and advantages of our invention will become apparent as the following description proceeds. The features of novelty which characterize our invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In carrying out the objects of our invention, in one form thereof, we provide a portable electric clothes cleaner having a generally thin, wide and short over-all construction, the cleaner being designed to be held easily and comfortably between the thumb and fingers of the user. A compact maneuverable construction is made possible by disposing the drive motor and the rotary brush on opposite sides of an elongated dirt-collecting chamber with their axes parallel to the axis of the chamber. A detachable nozzle mounted on the forward end of the cleaner and

2

an arrangement for detaching the rotary brush provide means for easily removing collected dirt from within the dirt-collecting chamber. A belt for driving the brush is arranged on the motor drive shaft on one side of the stator and a centrifugal fan is arranged on the drive shaft on the other side of the stator thereby balancing each other and promoting the desirable thin, wide and short configuration of the cleaner. In operation, the brush dislodges dirt from the material being cleaned and "flicks" a portion of the dirt directly into the dirt-collecting chamber; the remaining dirt is drawn by the fan into the nozzle and deposited upon a filter forming a side of the dirt-collecting chamber. By these means all the dirt is deposited in the dirt-collecting chamber. The filtered air then cools the motor before being expelled from the housing by the fan.

For a better understanding of my invention, reference may be made to the accompanying drawings in which:

FIG. 1 is a perspective view of the cleaner in the user's hand, showing a cover for the belt drive partially broken away.

FIG. 2 is a view taken on a section through the cleaner perpendicular to the motor and brush axes.

FIG. 3 is a view of the cleaner with the nozzle and a cover for the belt shown in section and with a cover for the motor housing removed to show the internal components.

FIG. 4 is an exploded view of the cleaner.

FIG. 5 is an interior view of the motor housing.

FIG. 6 is a sectional view taken on line 6—6 of FIG. 2.

FIG. 7 is a side view of the forward end of the cleaner, with the nozzle removed.

FIG. 8 is an exploded view of an arrangement for journaling one end of the brush.

FIG. 9 is an exploded view of an arrangement for journaling the other end of the brush.

FIG. 10 is a sectional view through the cleaner nozzle, showing the latching arrangement for detachably securing the nozzle upon the motor housing.

FIG. 11 is a circuit diagram for the electric drive motor for the device.

FIG. 12 is an enlarged view of a switch and cover assembly mounted in place upon the motor housing.

Referring to the drawings, and especially to FIG. 1, it will be seen that the cleaner has a relatively thin, wide and short over-all configuration which is easily held and manipulated in the hand of the user. The basic structural element in the cleaner is a one-piece, molded motor housing 1, serving as an external skeleton for the device. The housing 1 serves to accurately mount all of the essential components of the cleaner in the desired relationship to each other. The use of our one-piece housing also provides an arrangement which precludes any unwanted relative movement between the internal components of the cleaner.

FIGS. 2-5 clearly reveal the housing 1 and the operating components mounted within the housing. A drive motor 2, mounted on studs 3 integral with the housing 1, comprises conventional stator field laminations 4, stator field windings 5, 6, a commutator 7, carbon brushes 8, and a drive shaft 9. The drive shaft 9 has a belt-driving end 10 on one side of the stator and a fan-driving end 11 on the other side of the stator. The belt-driving end 10 of the drive shaft 9 is journaled in an oil-impregnated, sintered bearing (not shown) secured to the motor housing 1 by a bearing strap 12 held by screws 13 engaging studs 13a integral with the housing 1. The fan-driving end 11 of the drive shaft 9 is similarly journaled in an oil-impregnated, sintered bearing (not shown) secured to the motor housing 1 by a bearing strap 14 held by screws 15 engaging studs 15a. Screws 16, engaging studs 3, affix the motor 2 securely upon the housing 1.

In order to dislodge and pick up dirt on the material being cleaned, a rotary brush 18 is provided. Parenthetically, "dirt" is used in this specification to encompass lint, litter, debris, dust, and other forms of foreign matter which would ordinarily be present on material being cleaned. By reference to FIGS. 6-9 it will be seen that the brush 18 comprises a helically-wound row of bristles 19 secured between a pair of twisted wires 20. The helical arrangement of bristles provides an even distribution of bristles along the brush length for preventing the material being cleaned from becoming snagged and possibly damaged. This brush construction also gives each individual bristle both a gentle "flicking" action and a deep penetration into the material being cleaned.

The wire ends 21, 22 are straight and juxtaposed in order that they may be received within conforming elongated holes 23, 24 through sleeves 25, 26, respectively. Due to the conformance in shape of the holes 23, 24 with the juxtaposed wire ends 21, 22, any relative angular movement between the brush 18 and the sleeves 25, 26 is prevented.

The sleeves 25, 26 are formed of oil-impregnated, sintered iron and each is loosely mounted within one of a pair of detachable brush bearings 27, 28. The bearings 27, 28 are also of oil-impregnated sintered iron. The bearings 27, 28 are provided with integral flanges 29, 30, respectively, which serve to prevent axial movement of the bearings 27, 28 when they are assembled on the cleaner, and which guide the bearings into place during the assembly operation.

A pair of arms 31, 32, formed integrally with the motor housing 1, extend forwardly from each side of the forward end of the housing 1 to provide a means for supporting the bearings 27, 28. Each of the arms 31, 32 has a pair of integral resilient fingers 33, 34 defining a circular recess 35. Each of the fingers 33, 34 has a groove 36 therein which receives a corresponding one of the guide flanges 29, 30 on the bearings 27, 28 during the assembly operation, the grooves 36 functioning to guide the bearing into the recess 35. The groove and flange arrangement also acts to secure the bearings 27, 28 in the axial direction when they are in the assembled position in the recesses 35.

It will be evident that during the assembly operation the resilient fingers 33, 34 are deformed outwardly by the bearings 27, 28. The fingers then snap back into tight gripping engagement with the bearings 27, 28 as the bearings 27, 28 enter the recesses 35. With this arrangement the brush 18 can be readily detached for cleaning or replacement.

It is evident at this point in the specification that the housing 1 not only offers means for rigidly and compactly mounting the motor 2 and its drive shaft 9, but that it also provides integral arms 31, 32 for supporting the rotary brush 18.

In order to provide for power transmission between the motor 2 and the brush 18, in a manner such that the motor 2 will not burn out if the brush 18 becomes jammed, a belt 37 is utilized. The belt 37 is disposed between a spindle 37a at the termination of the belt-driving end 10 of the motor drive shaft 9 and a pulley 38 received on sleeve 25.

A belt cover 39 is employed to protect the belt 37 and prevent any possible clogging of material therein during operation of the cleaner. The belt cover 39 is mounted on the housing 1 by a screw 40 engaging a stud 41 integral with the housing 1.

Referring especially to FIGS. 4 and 10, a canted molded nozzle 42 on the forward end of the housing 1 is employed to protect the brush 18 and control the flow of inlet air into the cleaner. Spaced openings 43 in a planar tip portion 44 of the nozzle 42 admit inlet air and provide a means by which the brush 18 can contact the material being cleaned. Between each opening 43

is a rib 45 which prevents the material being cleaned from being pulled into the nozzle 42 by the brush 18. A flange 46 is formed integrally with respective sides of the nozzle 42, the housing 1, and a cover 47. The flange 46 abuts a side edge 48 of the belt cover 39 to provide a tight fit between the cleaner and the cover 39.

The cover 47 for the housing 1, introduced above, is a one-piece molded member fitting tightly upon the housing 1 to protect the cleaner components which are mounted in an exposed attitude on the housing 1. The cover is secured upon the housing 1 by a pair of screws 48a passing through the cover 47 into threaded studs 48b formed integrally with the housing 1. A third securing screw 48c engages a mounting bracket 48d mounted upon the housing 1.

It is highly desirable that the nozzle 42 be easily detachable from the housing 1 for purposes of cleaning the collected dirt from within the housing 1 and gaining access to the brush 18. A latching arrangement for accomplishing this end comprises spring arms 49, formed integrally with the nozzle 42, which cooperate with snap lugs 50 integral with the arms 31, 32 supporting the brush 18. The spring arms 49 are cantilevered so as to extend within the interior of the nozzle 42 toward the open side thereof. On the end of each of the spring arms 49 is a latch dog 51 for engaging the snap lugs 50 on arms 31, 32. To mount the nozzle 42 upon the housing 1, the user need merely place edge 52 of the nozzle 42 upon edge 53 of the housing 1 and rock the nozzle 42 rearwardly until the latch dogs 51 on spring arms 49 snap into firm engagement over the snap lugs 50 on the arms 31, 32. A firm rocking of the nozzle 42 in the reverse direction will disengage the spring arms 49 from the snap lugs 50 to free the nozzle 42 from the housing 1.

During the cleaning operation dirt is entrained in the air drawn into the cleaner through the nozzle openings 43 (see especially FIG. 2). A filter 54 forming one side of a dirt-collecting chamber 55 traps this dirt within the chamber 55. The dirt-collecting chamber 55 has its axis disposed parallel with the axes of the brush 18 and the motor 2 and is defined by: (1) the filter 54, (2) a part of the inner surface of one wall 56 of the nozzle 42, (3) the convex surface of an arcuate brush shield 57 formed integrally with the housing 1, (4) a portion 58 of the cover 47 for the housing 1, and (5) vanes 59, 60 forming side walls for the chamber 55. Easy access to the chamber 55, as for cleaning purposes, may be obtained by removing the nozzle 42 in the manner described in the preceding paragraph.

The arcuate brush shield 57, introduced above as one element defining the dirt-collecting chamber 55 is disposed between the arms 31, 32 and formed integrally therewith. The shield 57 serves to guide dirt entrained in the inlet air into the dirt-collecting chamber 55, and thus minimizes redeposition of the dirt upon the material being cleaned. A second function of the brush shield 57 is to form with the inner surface of a wall portion 61 of the housing 1 a restricted air inlet passage 62 into the chamber 55 for purposes of increasing the velocity of the inlet air flow and thus improving the suction characteristic of the cleaner.

An arrangement for filtering dirt from the inlet air is shown in FIGS. 2-4. As discussed cursorily above, the dirt is trapped in the dirt-collecting chamber 55 by a filter 54. The filter 54 comprises a rectangular frame 63 with spaced transverse bars 64, which frame supports a reticulated screen 65. The filter 54 is received in grooves 66, 67 formed as a part of the housing 1. The filter 54 can easily be removed for cleaning or replacement by merely removing the cover 47 from the housing 1 and sliding the filter 54 from the grooves 66, 67.

As discussed above, our cleaner utilizes suction to aid in drawing the dirt loosened by the brush 18 into the dirt-collecting chamber 55. This suction is created by a centrifugal fan 70 mounted on the fan-driving end 11 of the

5

motor drive shaft 9. The fan 70 exhausts radially through apertures 71 in the housing 1. The suction produced by the fan 70 draws inlet air through the nozzle openings 43, through the filter 54, and over the motor 2 to prevent the motor 2 from over-heating.

To control the motor 2, a switch (shown schematically in FIG. 11 at 72) is provided; the switch 72 is incorporated into a switch and cover assembly 73. The switch and cover assembly 73 is received in a pocket 74 formed in the motor housing 1 and is retained therein by the cover 47 (see especially FIG. 12). Switch actuator button 75 for the switch 72 projects through an aperture 76 in the housing 1, being readily accessible for operation by the user.

It is evident from this specification that our one-piece, molded motor housing 1 serves to mount, in a rigid compact unit, the motor assembly 2, the rotary brush 18, the belt cover 39, and the housing cover 47, and additionally functions to receive the filter 54 and the switch and cover assembly 73. The housing 1 also offers integral means for detachably retaining the nozzle 42 upon the housing 1. Thus, the housing promotes compactness of the cleaner, enhances its rigidity and durability, and reduces production costs.

Our invention is not limited to the particular details of the construction of the embodiment illustrated and we contemplate that various and other modifications and applications will occur to those skilled in the art. It is therefore our intention that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A hand-held electric clothes cleaner comprising:

- (a) a molded housing;
- (b) a detachable unitary nozzle on the forward end of said housing, said nozzle having a front wall, a rear wall and two side walls, spaced openings formed in the front wall of said nozzle, and said nozzle including means thereon for ready detachment thereof from said housing;
- (c) a brush rotatably mounted on said housing and within said nozzle;
- (d) said brush projecting through said openings in said nozzle for loosening dirt in the material being cleaned;
- (e) a motor mounted on said housing on an axis parallel to and spaced from the axis of said brush, said motor including a drive shaft;
- (f) a dirt-collecting chamber between said brush and said motor having an axis parallel to the axes of said brush and said motor, the rear wall and two side walls of said nozzle forming side walls of said dirt collecting chamber;
- (g) a filter received by said housing and forming another side of said chamber;
- (h) a belt drive operatively interconnecting an end of said drive shaft and said brush for driving said brush; and
- (i) a fan on the other end of said drive shaft for drawing air through said openings in said nozzle, through said filter and over said motor to pick up the dirt loosened by said brush and to cool said motor; and
- (j) said nozzle being detachable for removal of dirt from said dirt collecting chamber and also being detachable to fully expose said brush and filter to permit cleaning of said brush and said filter.

2. The cleaner as defined in claim 1 wherein said openings in said nozzle are serially arranged on a planar tip portion of said nozzle, the ribs formed between said openings aiding in preventing material from being drawn into said nozzle.

3. The cleaner as defined in claim 1 wherein said brush comprises spiral-wound bristles for presenting a continuous path of bristles along the length of said brush, when

6

said brush is rotating, to prevent snagging of the material being cleaned between said brush and the edges of said nozzle openings.

4. The cleaner as defined in claim 1 wherein said filter comprises a planar frame having transverse bars spaced along the length thereof and a reticulated screen on said frame.

5. A hand-held electric clothes cleaner comprising:

- (a) a molded housing including a front wall and two side walls;
- (b) a first pair of studs integrally formed on said front wall and extending rearwardly from said front wall;
- (c) a motor mounted upon said first pair of studs, said motor including a drive shaft;
- (d) a second pair of studs integrally formed on said front wall and extending rearwardly therefrom;
- (e) bearings for said drive shaft mounted upon said second pair of studs;
- (f) parallel arms integral with and projecting forwardly and downwardly from said front wall and positioned in front of said wall;
- (g) a rotary bearing supported on each of said arms;
- (h) a brush rotatably mounted in said bearings;
- (i) means operatively interconnecting an end of said drive shaft and said brush for driving said brush;
- (j) a nozzle at the forward end of the cleaner partially enclosing said brush;
- (k) means for detachably securing said nozzle upon said housing; and
- (l) said nozzle positioned on said housing and including a front wall, a rear wall and two side walls, spaced openings formed in the front wall of said nozzle, said front wall of said nozzle projecting downwardly and substantially forwardly from said front wall of said housing.

6. The cleaner defined in claim 5 wherein said means for detachably securing said nozzle upon said housing comprises an integral snap lug projecting from each of said arms and a pair of integral spring arms projecting from the inner surface of said nozzle, said spring arms having latch dogs engaging said snap lugs on said arms to secure said nozzle upon said housing.

7. A hand-held electric clothes cleaner comprising:

- (a) a molded housing;
- (b) a detachable unitary nozzle on the forward end of said housing, said nozzle having a front wall, a rear wall, and two side walls, spaced openings formed in the front wall of said nozzle and including means thereon for ready detachment thereof from said housing;
- (c) a dirt-collecting chamber, the rear wall and two side walls of said nozzle forming side walls of said dirt collecting chamber;
- (d) a filter received in opposed grooves in said housing and forming another side of said chamber;
- (e) said filter comprising a planar frame having transverse bars spaced along the length thereof and a reticulated screen on said frame;
- (f) a motor mounted within said housing; and
- (g) a fan driven by said motor for drawing air through said opening in said nozzle, through said filter, and over said motor.

8. A hand-held electric clothes cleaner comprising:

- (a) a molded housing;
- (b) a pair of parallel arms integral with and projecting from the forward end of said housing;
- (c) each of said arms including resilient fingers unitary therewith and defining a recess at the extreme outer end of said arm;
- (d) a detachably mounted rotary bearing received in each of said recesses;
- (e) said resilient fingers deforming outwardly during the assembly operation of said bearing and snapping back into tight gripping engagement with said bearing as said bearing enters said recesses;

- (f) means carried by each of said arms for preventing axial movement of said bearings;
- (g) a rotary brush journaled in said bearings; and
- (h) a motor mounted on said housing for driving said brush. 5
9. A portable hand-held electric clothes cleaner comprising:
- (a) a molded housing;
- (b) a pair of parallel arms integral with and projecting from the forward end of said housing; 10
- (c) each of said arms including resilient fingers unitary therewith and defining a recess on the extreme outer end of said arm;
- (d) a detachably mounted rotary bearing received in each of said recesses; 15
- (e) means carried by said arms to prevent axial movement of said bearings;
- (f) said resilient fingers deforming outwardly during the assembly operation of said bearing snapping back into tight gripping engagement with said bearing as said bearing enters said recess; 20
- (g) a rotary brush releasing dirt from the material being cleaned comprising:
- (1) a helically-wound row of bristles secured between a pair of twisted wires, and 25
- (2) said wires having straight, juxtaposed ends;
- (h) a pair of sleeves having axial, elongated holes for receiving said juxtaposed wire ends of said brush to prevent relative angular movement of said brush with respect to said sleeves; 30
- (i) said sleeves being journaled in said bearings; and
- (j) a motor mounted on said housing for driving said brush.
10. A hand-held electric clothes cleaner comprising:
- (a) a molded housing; 35
- (b) a pair of parallel arms integral with and projecting from the forward end of said housing;
- (c) each of said arms including resilient fingers unitary therewith and defining a recess at the extreme outer end of said arm; 40
- (d) each of said fingers having a groove formed therein;
- (e) a detachably mounted rotary bearing received in each of said recesses; 45
- (f) a flange on each of said bearings, said flange being received in said grooves and said fingers during the bearing assembly operation to guide said bearing into said recess;
- (g) said flanges serving to preclude axial movement of said bearings when said bearings are assembled on said housing; 50
- (h) said resilient fingers deforming outwardly during the assembly operation of said bearing and snapping back into tight gripping engagement with said bearing as said bearing enters said recess; 55
- (i) a rotary brush journaled in said bearing;
- (j) a motor mounted on said housing for driving said brush; and
- (k) a belt operatively interconnecting said motor and said brush for driving said brush. 60
11. A hand-held electric clothes cleaner comprising:
- (a) a molded plastic housing including a front wall, a top wall, and a rear wall;
- (b) a detachable nozzle positioned on said housing, said nozzle having a front wall, a rear wall, and top side walls, spaced openings formed in the front wall of said nozzle, said front wall of said nozzle projecting downwardly and substantially forwardly from the front wall of said housing; 65

- (c) a brush rotatably mounted on said housing, said brush being positioned within said detachable nozzle;
- (d) said brush having portions projecting through the openings formed in the front wall of said nozzle for loosening dirt in the material being cleaned;
- (e) a motor mounted on said housing on an axis parallel to and spaced rearwardly from the axis of said brush, said motor including a drive shaft;
- (f) a dirt collecting chamber between said brush and said motor, a rear wall and two side walls of said nozzle forming side walls of said dirt collecting chamber;
- (g) a filter positioned within said housing and forming another side wall of said dirt collecting chamber;
- (h) a belt drive operatively interconnecting one end of said drive shaft and said brush for driving said brush;
- (i) a fan on the other end of the drive shaft for drawing air through said opening in said nozzle, through said filter and over said motor to pick up the dirt loosened by said brush; and
- (j) the walls of said plastic molded housing and of said nozzle being of such size that thumb of an average hand will be positioned on the front wall of said housing slightly behind forward portions of said brush due to the clearance provided by the front wall of said nozzle and the front wall of said housing, the forefingers of the hand will be positioned over the rear wall of the housing and the palm of the hand will be positioned over the top wall of the housing so that the brush may be readily manipulated by the hand of the user.
12. A portable electric clothes cleaner comprising:
- (a) a molded plastic housing including a front wall, a top wall and a rear wall;
- (b) a pair of parallel arms integral with said housing, said arms projecting forwardly and downwardly from the bottom of said housing;
- (c) an integral snap lug projecting from each of said arms;
- (d) a rotary bearing supported in each of said arms;
- (e) a brush rotatably mounted in said bearings;
- (f) a detachable nozzle positioned on said housing, said nozzle having a front wall, a rear wall and two side walls; and
- (g) a pair of integral spring arms projecting inwardly from each of the side walls of said detachable nozzle, said spring arms having latch dogs engaging the snap lugs on said parallel housing arms to secure said nozzle on said housing, said nozzle enclosing said arms and said integral snap lugs when said nozzle is mounted on said housing.

References Cited

UNITED STATES PATENTS

1,952,014	3/1934	Kirby	15—388 X
1,965,885	7/1934	Dyer.	
1,426,765	8/1922	Pesarillo	15—344
1,829,582	10/1931	Carson	15—347
2,633,596	4/1953	Turner et al.	15—413 X
2,740,977	4/1956	Allen	15—344 X
2,960,713	11/1960	Wistrand	15—344
2,974,346	3/1961	Hahn	15—344

FOREIGN PATENTS

290,185 7/1956 Switzerland.