G. R. BIMM.

ELECTRICALLY OPERATED VACUUM CLEANER.

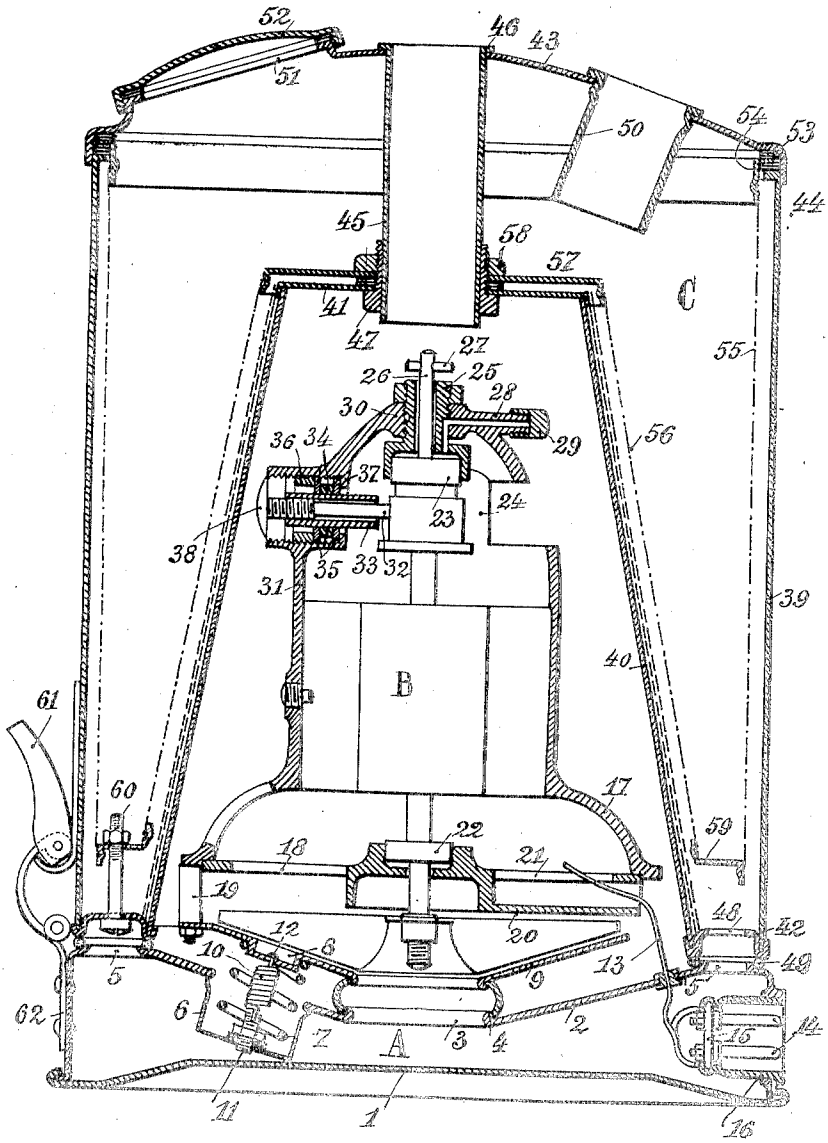
APPLICATION FILED OCT. 29, 1921.

1,415,773.

Patented May 9, 1922.

3 SHEETS—SHEET 1.

Fig. 1.



Inventor

G. R. Bimm

By Marks Clerk

Attys

G. R. BIMM.

ELECTRICALLY OPERATED VACUUM CLEANER.

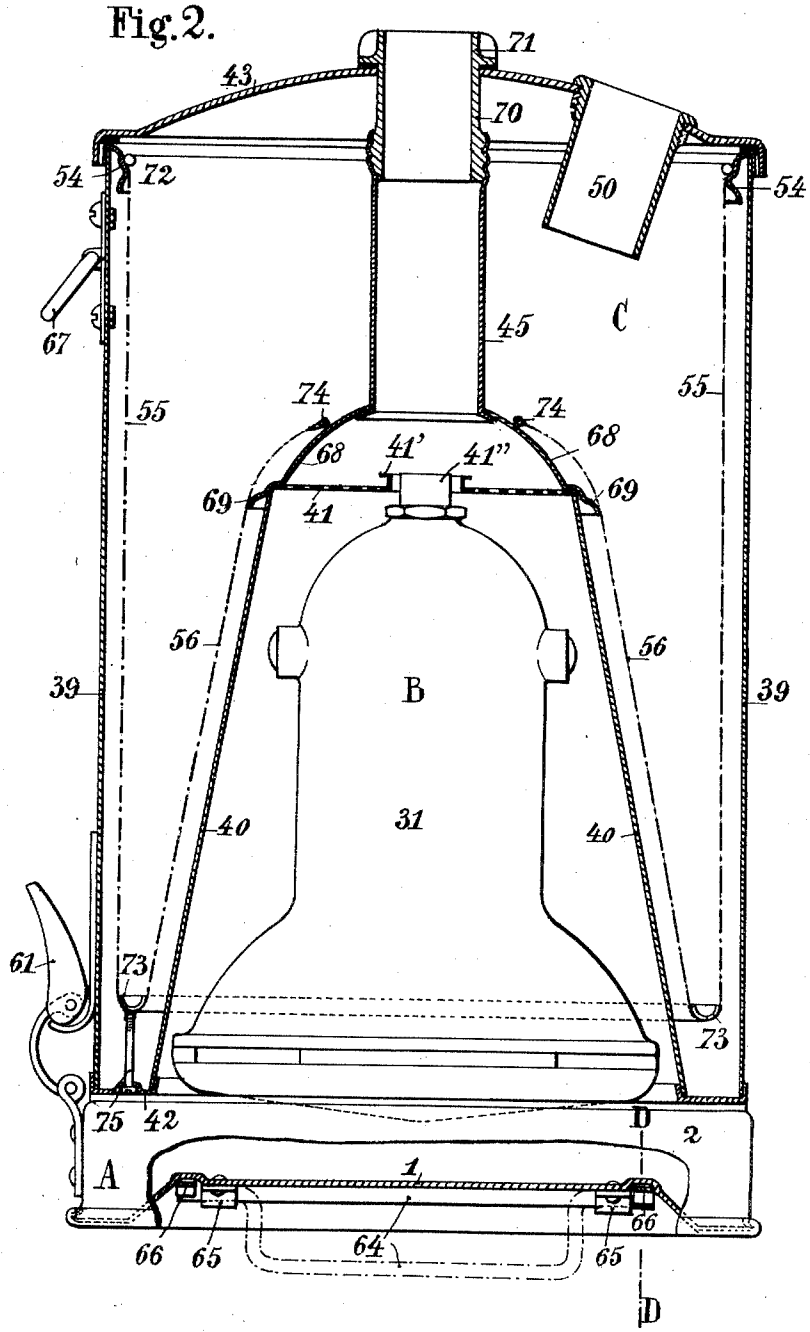
APPLICATION FILED OCT. 29, 1921.

1,415,773.

Patented May 9, 1922.

3 SHEETS—SHEET 2.

Fig. 2.



Inventor
G. R. Bimm.
By Marks & Clerk
Attys.

G. R. BIMM.

ELECTRICALLY OPERATED VACUUM CLEANER.

APPLICATION FILED OCT. 29, 1921.

1,415,773.

Patented May 9, 1922.

3 SHEETS—SHEET 3.

Fig. 4.

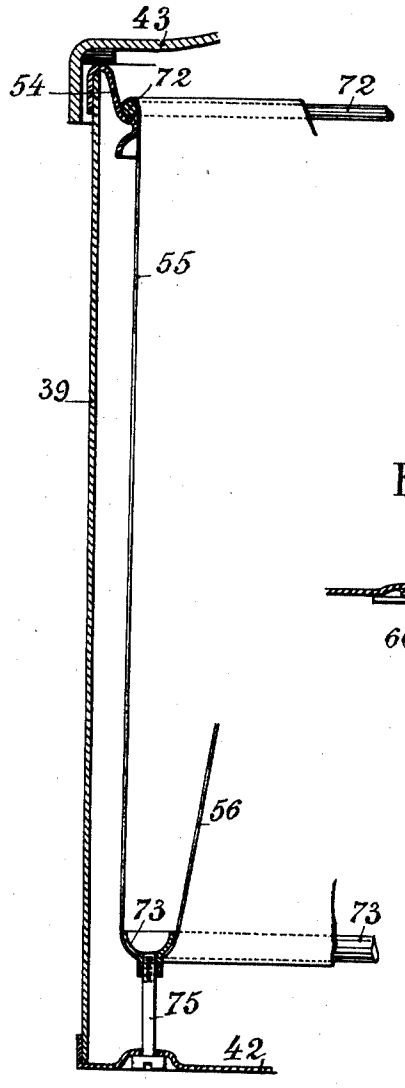
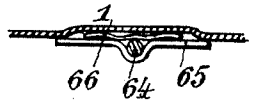


Fig. 3.



Inventor
G. R. Bimm,
By Marks & Clark
Attys.

UNITED STATES PATENT OFFICE.

GEORGES ROBERT BIMM, OF AUBERVILLIERS, FRANCE.

ELECTRICALLY-OPERATED VACUUM CLEANER.

1,415,773. Specification of Letters Patent. Patented May 9, 1922.

Application filed October 29, 1921. Serial No. 511,500.

To all whom it may concern:

Be it known that I, GEORGES ROBERT BIMM, residing at Aubervilliers, France, have invented certain new and useful Improvements in and Relating to Electrically-Operated Vacuum Cleaners, of which the following is a specification.

This invention relates to electrically operated vacuum cleaners and its objects are to provide improvements, whereby such cleaner may be rendered lighter, easier to handle and having a high efficiency.

In order to attain these purposes I arrange the motive group comprising the electric motor and the fan within a casing and such casing within an outer box; I obtain thereby an annular space between the casing and the box wherein I arrange the filtering cloth. The latter may occupy the whole inner surface of the box and nearly the whole outer surface of the casing; the filtrated air passes from the said annular space to the interior of the casing, ventilates the motor and escapes into the atmosphere.

The construction of the apparatus allows moreover of utilizing the power of the motor outside the apparatus for any other uses.

Two modes of construction according to the present invention are illustrated in the accompanying drawings in which:

Fig. 1 is a vertical section of the whole apparatus,

Fig. 2 shows, also in vertical section, a modification of construction of the same apparatus,

Fig. 3 is a partial transverse vertical section along the line D D of Fig. 2, and

Fig. 4 shows on a larger scale in vertical section the details of mounting the dust collector of the apparatus illustrated in Fig. 2.

The apparatus comprises three main parts, the base A, the motive group B comprising the fan, and the dust collector C.

The base A forms a box comprising a flat bottom 1 on which is fitted an embossed bottom 2. The latter is provided at its centre with a circular orifice 3 provided with a rim 4, and on its periphery with holes 5 the number and diameter of which are established so as to correspond with the suction orifice.

Cups 6 obtained by embossing of the bottom 2 or attached to the said bottom are arranged, preferably in number of three, between the central orifice 3 and the holes 5, and form recesses for helical springs 7 intended to constitute a resilient suspension for the motive group B, and thus to avoid the transmission of the shocks of the motor to the body of the apparatus.

The springs 7 are held in position in each of the cups 6, at their lower end by means of a bearing, and at their upper end by means of another bearing 8 provided in a plate 9, forming the lower wall of the box in which the fan rotates.

The said plate is provided in the centre with a circular orifice having the same diameter as the orifice 3 of the bottom 2 and also provided with a rim which permits in combination with the rim 4 of fixing a flexible joint intended to ensure a tight-joint fit between the box of the fan and the base A.

The plate 9 is held on the spring 7 by means of other helical springs 10 arranged inside and along the axis of the springs 7 in such a manner as to exert a pull on the said plate. To this end the springs 10 are attached on one side to the bottom of the cups 6 by means of bolts 11 or hooks, and on the other side onto the plate 9 by means of pins 12, lodged in the bearings 8.

The motive group B comprises a suitable electric motor in which the current is led in through wires 13 branched on plots 14 which are insulated by a plate 15 of a socket 16 carried by the base A and in which the plots are fixed.

The outside body of the motive group has a widened base 17 closed by a partition 18 and rendered integral with the plate 9 by means of cross pieces in variable number, the partition 18 completing together with the plate 9 the box of the fan 20. A recess 21 provided between the partition 18 and the fan 20 allows the passage of the conducting wire of the engine.

The driving shaft rotates at its lower end in fixed ball bearings 22, and at its upper end in a second ball bearing 23 mounted in a cylindrical piece 24, having a screwthreaded part on which a nut 25 is screwed permitting the adjustment of the bearings.

The member 24 is pierced at its centre so as to leave a passage for the driving shaft 26, the upper end of which passing to the outside of the member 24 is provided with a driving nut, or with a pin 27, permitting to fix a flexible transmission or any other similar member on the said shaft, with a view to

utilizing the energy which is supplied by the motor to any other use than that of the apparatus.

The lubrication of the bearing 23 is ensured by a conduit 28, on which is screwed a screwthreaded plug 29, which exerts a pressure upon the lubricant which is contained in the conduit in order to cause its passage into a groove 30, provided between the member 24 and the frame 31 and into any other conduit provided in the member 24.

The carbon brushes 32 of the motor are guided by means of a tube 33 provided with a collar 34 consisting of two washers screwed on to the tube and pressed against each other. The tube is centered in the frame 31 through the intermediary of two washers 35 made of insulating material to avoid the contact of the tube with the mass formed by the frame.

The two washers 34 and the tube 33 are held in position by the said washers 35, the ring 36 pressing the whole against the shoulder 37 of the frame 31.

A plug 38 made of insulating material which is also screwed in the frame 31 presses the spring which acts upon the carbon brushes.

The dust collector C consists of a receptacle comprising an outside cylindrical casing 39, an inside truncated conical casing 40, a circular bottom 41 closing the casing 40 at its upper part, an annular bottom 42 fixed at the lower part of the two casings which it joins together, and a cover 43 which is preferably curved and covers the upper end of the casing 39.

The various parts of the collector are assembled by means of studs, or by welding or embossing except the cover 43 which is made removable and is provided with a circular rim 44, permitting its adapting on to the cover 39 on which it is held by means of a tube 45 which traverses it at its centre. The said tube forms at its upper end a collar 46 which rests on the cover and holds it applied on the casing 39 by means of a nut 47 screwed on to the screwthreaded lower part of the tube 45.

The annular bottom 42 connecting the two casings 39 and 40 is pierced with holes 48, the diameter and number of which corresponds to the orifices 5 of the base A and has a curved section leaving between it and the base an empty space permitting the air freely to pass from the collector C to the base A without it being necessary that the orifices 5 and 48 shall be placed opposite each other.

The tight-joint fit is ensured by a joint 49 made of rubber or any other resilient substance, inserted between the base A and the casing 39 of the collector.

The cover 43 is provided with three openings, the first one serving as a passage for the central tube 45, and as an exhaust opening for the air which is sucked in and which forms a strong current that may be used for various applications.

The second opening is provided with a tube 50 forming a suction orifice and in which may be adapted a flexible tube and various air holes.

The third orifice 51 of large diameter serves for the exhaust of the dust contained in the collector; it is provided with a resilient washer forming joint and with a removable plug 52 held by the vacuum produced in the apparatus, or by means of a spring.

The tight-joint fit between the cylindrical casing 39 and its cover 43 is ensured by a double joint 53, made of a resilient substance, which serves at the same time to hold by its rim a metallic circle 54, having a circular groove, intended to fix the upper part of a cylindrical filtering cloth 55.

A second filtering cloth 56 of truncated conical shape is fixed by its upper end in the circular groove of a metallic cup 57 mounted by means of a joint and of a nut 58 upon the guiding socket of the tube 45 formed by the nut 47.

At their lower end the two cloths 55 and 56 are fixed on a metallic crown 59 having two opposite rims, each of which is provided with a circular groove.

The bolts 60 traversing the bottom 42, and distributed in a suitable number allow of adjusting the tension of the two filtering cloths by exerting a pull upon the crown 59.

A cloth made of rigid material or of a grating inserted between the conical casing 40 and the cloth 56 prevents the latter from being applied by suction against the casing.

The collector C is connected to the base A by means of an assembling device with rocking levers 61, which can be easily dismounted and the lugs of attachment 62 of which ensure the centering of the collector on the base.

The apparatus thus constituted works in the following manner:—

The fan 20 driven by the motor produces a suction through the air-hole of the air which is charged with dust.

This air enters into the collector through the tube 50, traverses the two filtering cloths 55 and 56 acting as a bag, is freed of its dust which remains in the said bag, continues its travel, and penetrates into the base A by passing through the orifices 48 and 5.

From the base A the air passing through the central orifice 3 arrives to the fan, then it is distributed into the chamber formed by the casing 40 and escapes to the outside through the tube 45.

A portion of the air passing through holes provided in the partition 18 and leaving at the upper part of the motor through the

orifice permitting the inspection of the carbon-holders, serves to ventilate the armature thereby diminishing its heating.

In order to empty the collector of the dust which has been accumulating therein it is necessary to separate the collector from the base A by lowering the levers 61, then to remove the plug 52, and to turn the apparatus upside down.

The modification of construction illustrated in Figs. 2 to 4 relates more especially to the mode of mounting of the filtering cloths, to the fixing arrangement for the cover, permitting its easy and rapid removal, for emptying the apparatus after use, and lastly to the arrangement of the grips intended to facilitate the turning upside down and the lifting of the apparatus.

A handle 64 is mounted on the bottom of the base A, which handle is linked to bows 65 and is held rabbeted against the bottom by means of blade springs 66, lodged in recesses formed by embossing the bottom.

The said handle is intended, in combination with a ring 67 fixed at the upper part of the outside cylindrical casing 39, to facilitate the turning upside down of the apparatus for emptying it. The ring 67 may also serve for suspending the apparatus.

The inside casing 40 of truncated conical shape is ended by a dome 68 and the inner section of the said casing and of the dome is provided with a perforated plate 41, having in its centre an orifice 41′ having pressed borders, the diameter of the orifice being such as to permit a free passage of the upper end of the motor. This end is provided with a rubber lining intended to damp the shocks produced by any displacement of the motor.

The dome 68 is widened at its base, so as to form a circular bearing 69 extending round the casing 40 and is traversed in its centre by a tube or conduit 45 for exhausting the air, which is fixed on the said dome.

The tube 45 is formed at its upper part with an inside screwthread on which is screwed the lower screwthreaded end of a second tube 70 engaging in the central orifice of the cover 43 and ended by a head 71 acting as a nut which is applied on to the cover.

The ring 54 inserted between the cover 43 and the upper rim of the casing 39 is embossed in such a manner as to form a border or rim intended to support the cylindrical filtering cloth 55.

To this end, the said cloth is mounted at its upper part on a rigid circle 72 which rests on the border of the ring 54 and at its lower part on a gutter 73.

The second filtering cloth 56 of truncated conical shape is connected by its shape to the cylindrical cloth 55 at its point of contact with the gutter 73; the said two capacities may also be formed of a cloth made of one piece only. The cloth 56 is guided at its upper part by a circular bearing 69 of the dome 68, which it surrounds and it is provided with a round cord or spring 74 for fixing it on to the dome.

The dust collector formed by the said filtering cloths is held inside the casing 39 by means of screws 75 distributed on the periphery of the bottom 42 and screwed into screw-threaded collars or nuts integral with the gutter 73, the said screws ensuring thus the fixation and tension of the filtering cloth, and their head is lodged in recesses formed by embossing the bottom 42.

The said mode of mounting of the dust collector permits its rapid fixing inside the apparatus without the cloth touching the walls of the inside and outside casings.

On the other hand, the cover 43 on which is mounted the suction pipe 50 is rapidly fixed and perfectly centered on to the outside casing 39, thanks to the tube 70 which is screwed in the tube 45, serving for the exhaust of the air which it prolongs and which it makes communicate with the outside, the head 71 of the tube being strongly applied on the cover 43 through the intermediary of a joint. The cover may be easily removed for emptying the dust contained in the apparatus, without it being necessary to provide the said cover with an emptying plug.

It is thus sufficient to turn the apparatus upside down when the cover has been removed, the said operation being very easily effected by seizing the ring 67 and the handle 64 mounted on the bottom 1. With this arrangement it is not necessary to separate the collector from its base in order to empty it, the said separation being only effected by means of the rocking levers 61 for inspecting the apparatus.

Lastly, the perforations provided in the plate 41 ensure the evacuation of the air which is sucked in, and its central orifice 41′ forms around the upper end of the motor an empty space which is sufficient for permitting the displacements of the motor, whilst limiting the amplitude of the said displacements, in order to avoid the motor coming into contact with the inner wall of the truncated conical casing 40.

What I claim is:—

1. In an electrically operated portable vacuum cleaner, a box, a motive group within the box, a casing inside the box, surrounding the motive group to form an annular space between box and casing, a filtering cloth suspended in the said annular space, a cover, an air outlet from the space within the said casing, a dust inlet to the space between the cover and the filtering cloth, means to ensure tensioning of said filtering cloth, and means to permit passage of fil-

trated air through the inner space of the said casing to the outlet, substantially as described.

2. In an electrically operated vacuum cleaner, a box, a motive group comprising a fan within the box, a casing inside the box surrounding the motive group, to form an annular space between box and casing, a filtering cloth suspended in the said annular space, a cover, an air outlet from the space within the said casing, a dust inlet to the space between the cover and the filtering cloth, means to ensure tensioning of said filtering cloth, means to permit passage of filtrated air through the inner space of the said casing to the outlet, and means to avoid the transmission of shocks to the motor to the apparatus.

3. In an electrically operated vacuum cleaner, a box, a motive group comprising a fan within the box, a casing between box and motive group, a filtering cloth between casing and box, a cover, an air outlet from the space within the casing, a dust inlet to the space between the cover and the filtering cloth, means to tension the filtering cloth, means to permit communication of filtrated air with the interior of the casing and to the outlet, a bottom plate for the motive group, a bottom in the box, and helical springs to support the said bottom plate, substantially as described.

4. In an electrically operated vacuum cleaner, a box, a motive group comprising a fan within the box, a casing between box and motive group, a filtering cloth between box and casing, a cover, an air outlet from the space within the casing, a dust inlet to the space between the cover and the filtering cloth, means to tension the filtering cloth, means to permit communication of filtrated air to the interior of the casing and to the outlet, a bottom plate for the motive group, a base in the box, helical springs to support yieldingly the said bottom and additional helical springs to exert a pull on said bottom plate, substantially as described.

5. In an electrically operated vacuum cleaner a box, a motive group within the box, a casing inside the box, surrounding the motive group to form an annular space between box and casing, a filtering cloth in the said annular space, a cover, an air outlet from the space within said casing, a dust inlet to the space between cover and filtering cloth, means to ensure tensioning of said filtering cloth, means to permit passage of filtrated air through the inner space of the said casing to the outlet, an electric motor in said motive group, an extension on the shaft of said electric motor, and means permitting to arrange transmission members on said extension, to utilize the energy supplied by the motor to any purpose apart from cleaning.

6. In an electrically operated portable vacuum cleaner a box, a motive group within the box, a casing inside the box and surrounding the said motive group, to form an annular space between box and casing, a filtering cloth suspended in the said annular space, a cover, an air outlet from the space within the said casing, a dust inlet to the space between the cover and the filtering cloth, means to ensure tensioning of the said filtering cloth, means to permit passage of the filtered air through the inner space of the said casing to the outlet, said casing having a truncated conical shape, said filtering cloth having a cylindrical part and a truncated conical part, said parts contacting, a gutter on the line of contact of both parts and means to fix easily and detachably the said cloth in the said box and upon the said casing, substantially as described.

In testimony whereof I have signed my name to this specification.

GEORGES ROBERT BIMM.