Nov. 25, 1930. A. L. WENNER-GREN 1,782,640

VACUUM CLEANER

Original Filed April 9, 1924

Fig. 1

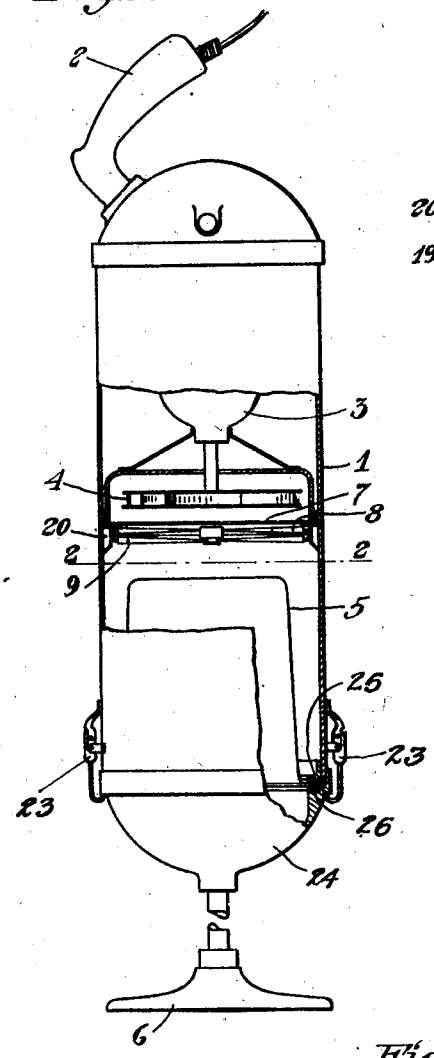


Fig. 2

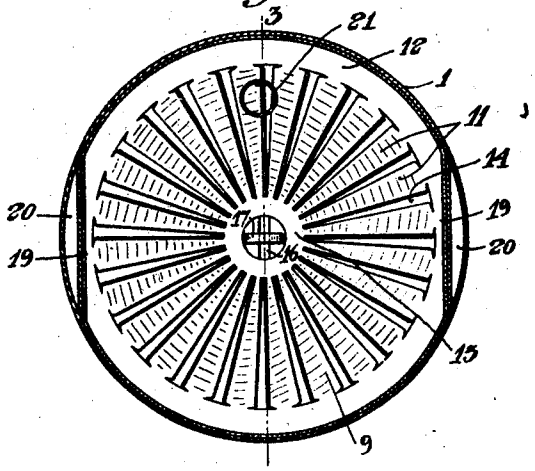


Fig. 4

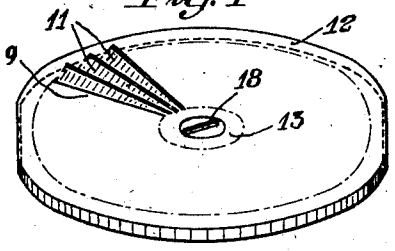


Fig. 5

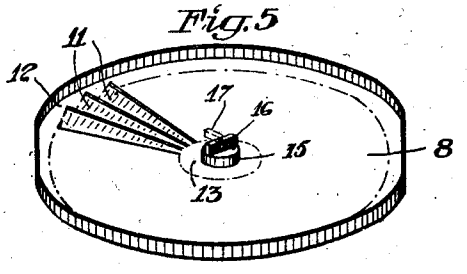
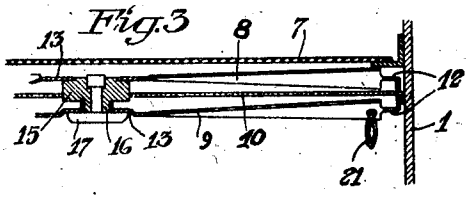


Fig. 3



Inventor
A. L. Wenner-Gren
By Marks & Clerk
Attys

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UNITED STATES PATENT OFFICE

AXEL LEONARD WENNER-GREN, OF STOCKHOLM, SWEDEN, ASSIGNOR TO INVENTIA PATENT-VERWERTUNGS-GESELLSCHAFT, OF SCHAFFHAUSEN, SWITZERLAND, A CORPORATION OF SWITZERLAND

VACUUM CLEANER

Application filed April 9, 1924, Serial No. 705,371, and in Sweden March 15, 1924. Renewed October 26, 1929.

My invention relates to vacuum cleaners and more particularly to purification of air passing through a vacuum cleaner.

Amongst the objects of my invention are: to provide a filter unit which is readily replaceable containing or carrying a readily replaceable fibrous filter, which may be impregnated with disinfecting material, to purify the induced air; to provide a filter unit, the parts of which can be readily separated and united; to provide a filter unit which is readily held in place in a vacuum cleaner casing and which fits so that it is not adversely affected by vibrations; to provide a filter unit which gives a rotary motion to air passing therethrough; and to provide a novel combination of vacuum cleaner casing and filter unit with many advantages as will more clearly hereinafter appear.

The annexed drawing shows one embodiment of the invention. Fig. 1 is a side view, partly in section, of a vacuum cleaner provided with an air conditioning device according to the invention. Fig. 2 is a transverse section of the vacuum cleaner, on an enlarged scale, taken on line 2—2 of Fig. 1. Fig. 3 is a section on line 3—3 of Fig. 2, and Figs. 4 and 5 are perspective views of the two plates adapted for retaining the filter.

In the drawing, 1 designates the cylindrical casing of a vacuum cleaner having a handle 2, and in which a suction fan 4 driven by an electric motor 3 is arranged. The casing also contains a filter bag or dust bag 5, in which the dust sucked in through the nozzle 6 is collected. Bag 5 may be removed from the casing by unloosening clamps 23 and removing member 24 from the central portion of the casing. Located between the bag 5 and the fan 4 is a partition 7 consisting of wire mesh. Adjacent partition 7 is a frame comprising two cylindrical plates 8 and 9 connected with each other and between which a filter material 10 consisting of a thin layer or pad of felt is clamped, said filter material being, if desired, impregnated with a disinfectant. Filter material 10 is adopted to receive and hold the finer dust which passes through dust bag 5. The frame and the fibrous material supported thereby constitute an air conditioning member. If a disinfectant is included in the air conditioning means, such disinfectant may also be aromatic. The disks 8 and 9, which are preferably made of sheet-metal, for instance aluminum, are provided with radially arranged and obliquely directed wings 11 formed by cutting and bending the sheet material, whereby openings 14 are formed between the wings 11, which extend between outer and inner annular parts 12 and 13 of the disks. The induced air is forced through openings 14 and the interposed filter 10. The disks 8 and 9 are held together by means of a centrally disposed locking device comprising, in the embodiment shown, an abutment 15 connected to the disk 8 and having a projection 16 of rectangular cross-section and a locking member 17 of corresponding shape turnable with relation to said projection, said member being introduced together with the projection 16 through a corresponding aperture 18 in the other disk 9 and causing, after having been turned preferably approximately 90° relatively to the aperture 18 and the projection 16, an interlocking of the disks in a certain position with relation to each other, as shown in Figs. 2 and 3, and which, as to the position of the locking member 17, is also indicated by dotted lines in Fig. 5. The outer annular parts 12 of the disks 8 and 9 are provided with flanges having edges directed towards each other between which, when turning the locking member 17 into the said position, the filter 10 is clamped, as clearly apparent from Fig. 3.

As best apparent from Fig. 3, the fibrous layer 10 has a somewhat larger diameter than the disks 8, 9, so that, when introducing the air conditioning member including the disks and the fibrous material, into the casing 1, the fibrous material will be folded over the edge or the flange of the one disk 9 and provides, on the one hand, a packing between the disks and the casing and, on the other hand, a clamping of the disks against the inside of said casing. The disks are introduced to such an extent as to bear against the partition 7 arranged in the casing 1. When using the apparatus, the suction force arising

aids to hold the disks pressed against the partition 7.

In order to prevent turning of the disks 8, 9 and a loosening caused thereby, which might occur, when the air passes past the obliquely directed propeller shaped wings 11, the disks are provided with diametrically opposed flattened surfaces 19 bearing against corresponding abutments 20 in the casing 1. If desired, only one such flattened surface and corresponding abutment may be used, and the flattened surfaces may, if desired, be replaced by one or more recesses or impressions in the edge of the disks, which are engaged by corresponding projections or teeth of the casing.

The direction of the obliquely arranged wings 11 of the disks 8, 9, acting as guide vanes, is preferably such that, after the disks have been placed in the casing 1, the induced air will obtain a rotary motion corresponding to that which is then imparted to the air by the fan 4.

In order to allow a convenient removal of the disks 8, 9 out of the casing 1 when replacing the filter, the disk 9 is provided with an eccentrically mounted lifting ring 21, which is preferably located mid-way between or approximately mid-way between the flattened surfaces 19 or, if but one such surface is used, on a radius of the disk, which is parallel or approximately parallel to said flattened surface. Thus, when lifting the disks out of the casing the disks will be tilted, wherefore the flattened surfaces 19 shown are preferred over impressions of other kind, which may hinder such movement. The flattened surfaces are of importance also in that they facilitate or render possible the removal of the disks 8, 9 from out of the casing, which is often provided at the end to be opened, with an inwardly directed flange 25 having a lesser inner diameter than the casing, against which flange a packing rim 26 of the bag 5 is pressed.

As mentioned, the exchangeable filter 10 may, if desired, be placed directly on the partition 7 and held by means of but one disk similar to the disks 8, 9, in which case also the diameter of the filter ought to be greater than the diameter of the disk, so that a packing and also a clamping will be obtained.

If desired, the filter may also be provided at the circumference with a tension ring, preferably inserted into the filter material, to obtain a packing between the filter and the casing and also a clamping of the filter to the inner wall of the casing.

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

1. A filtering device for vacuum cleaners comprising a plurality of disks each having a central portion and an annular outer portion, a series of wings extending between said central portion and said annular portion forming a series of perforations between them, locking members on the central portions adapted to coact to clamp said disks together and flanges on said disks having edges directed toward each other and serving to retain fibrous filtering material between the disks when the disks are clamped together.

2. A filtering device for vacuum cleaners comprising a plurality of substantially flat disks each having a central portion and an annular outer portion, a series of wings extending between said central portion and said annular portion and bent obliquely to the general plane of the disks forming obliquely arranged passageways between them and means to clamp said disks together.

3. A filtering device for vacuum cleaners comprising a plurality of substantially flat disks each having a central portion and an annular outer portion, a series of wings extending radially between said central portion and said annular portion and bent obliquely to the general plane of the disks forming obliquely arranged radial passageways between them and means to clamp said disks together.

4. A filtering device for insertion into a vacuum cleaner comprising a disk having a central portion and an annular outer portion, a series of wings extending between said central portion and said annular portion forming a series of perforations between them, a projection on said central portion, a movable locking member on said projection, a second disk having a central portion and an annular outer portion and wings extending therebetween forming perforations between them, the central portion on the second disk being formed to receive the projection on the first disk and to provide a bearing surface for said locking member for clamping the two disks together upon proper movement of the locking member and a pad of fibrous material adapted to be clamped between the two disks having a greater diameter than that of either disk.

5. A filtering device for vacuum cleaners comprising two substantially flat interconnected disks each having a central portion and an annular outer portion, a series of wings extending between said central portion and said annular outer portion and bent obliquely to the general plane of the disks forming obliquely arranged passageways between them and a pad of fibrous filtering material clamped between said disks and of such size as to extend beyond the edges of the disks to form a packing.

6. A filtering device as set out in claim 5 wherein the disks are formed with flanges arranged to be directed toward each other and to secure the fibrous filtering material between them.

7. In a vacuum cleaner, in combination, a

casing, a filtering device for insertion into said casing and irregular mating portions on said device and on the inside of said casing for holding said device in a given position with respect to said casing.

8. In a vacuum cleaner, in combination, a cylindrical casing, a filtering device for insertion in said casing comprising a plurality of perforated plates and a pad of fibrous filtering material between them, a flat-surfaced projection on the inside of said casing, and a flat portion on the edge of said filtering device arranged to coact with said flat-surfaced projection to prevent rotation of said device within said casing.

9. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame and fibrous material supported by said frame carrying an air purifying substance, said frame comprising a plurality of disks having openings through the same, means for clamping the disks together and flanges on said disks having edges directed toward each other and serving to retain the fibrous material between the disks when the disks are clamped together.

10. A device of the character described comprising a cylindrical casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame of circular form extending substantially the width of the casing and fibrous material supported by said frame carrying an air purifying substance, said frame comprising a plurality of disks having openings through the same, means for clamping the disks together with said fibrous material clamped between the disks and said fibrous material extending beyond the edge of the frame to form a packing between the frame and the casing to cause air passing through the casing to pass through the frame and the fibrous material therein.

11. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame and material supported by said frame carrying an air purifying substance, said member having its outer portion cooperating with the casing to cause all the air passing through the casing to pass through said member and the material supported thereby.

12. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame and material supported by said frame carrying a substance diffusible into air passing through the casing, said frame comprising cooperating parts separable to permit changing said material.

13. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame and material supported by said frame carrying a substance diffusible into air passing through the casing, said frame comprising cooperating parts adapted to be fitted together to hold said material and separable to permit changing said material and said member having its outer portion cooperating with the casing to cause all the air passing through the casing to pass through said member and the material supported thereby.

14. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a plurality of perforated plates, a fibrous material between said plates, means to clamp the plates together and flanges upon said plates having edges directed toward each other to secure the fibrous filtering material between them when the plates are clamped together.

15. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing arranged transversely to the general line of flow of air through the casing comprising a plurality of substantially flat perforated plates, a fibrous filtering material between said plates, flanges on said plates having edges directed toward each other and centrally disposed locking means on said plates adapted to co-act and clamp the said plates together, said flanges gripping said fibrous filtering material when said plates are clamped together.

16. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising two separable interconnected and perforated elements having a pad of fibrous material interposed between them, said member extending substantially across said casing and said pad extending beyond the edges of said elements to form a packing between said member and said casing whereby air passing

through the casing is forced to pass through said member.

17. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and an air conditioning member in said casing loosely arranged so as to be readily removable therefrom comprising two interconnected and perforated plates having a pad of fibrous material interposed between them, means to clamp the plates together, flanges on said plates directed toward each other to secure the fibrous material between them when the plates are clamped together, said pad extending beyond the edges of the plates and to form a packing between said member and said casing.

18. In a vacuum cleaner, a cylindrical casing, a filtering device within said casing comprising two interconnected disks each having a central portion and an annular outer portion, a series of wings extending between said central portion and said annular outer portion forming a series of perforations between them, means for clamping the central portions together and a pad of fibrous material clamped between said disks and of such size as to extend beyond the edges of the disks to form a packing between said device and said casing.

19. A device of the character described comprising a cylindrical casing, means in said casing for producing a flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a plurality of cooperating parts forming a frame of circular form and fibrous material secured between said cooperating parts, said air conditioning member being removable from said casing as an independent unit and said cooperating parts securing said fibrous material therebetween on removal of said member from the casing, said air conditioning member extending substantially the width of the casing and said fibrous material extending between the frame and the casing to form a packing between the frame and the casing to cause air passing through the casing to pass through the frame and the fibrous material supported thereby, and said air conditioning member being supported by contact with the inside wall of said casing and independently of support of said dust separator in the casing.

20. A device of the character described comprising a casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame and material supported by said frame, the frame and material being constructed and arranged to permit separation of the material from the frame in order to change said material and said member having its outer portion cooperating with the casing to cause all the air passing through the casing to pass through said member and the material supported thereby and being removable independently as a unit from the casing and being supported by frictional contact of said outer portion with the inside wall of the casing and independently of support of said dust separator in the casing.

21. A device of the character described comprising a cylindrical casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a plurality of parts forming a frame and air conditioning means supported by said frame and secured between said parts, said member having its outer portion cooperating with the casing to cause all the air passing through the casing to pass through said member and the air conditioning means supported thereby and being removable independently as a unit from the casing and being supported by contact of said outer portion with a longitudinally extending surface of the inside wall of the casing and independently of support of said dust separator in the casing.

22. A device of the character described comprising a cylindrical casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a frame and air conditioning means supported by said frame, said frame and air conditioning means being constructed and arranged to permit separation of the air conditioning means from the frame in order to change the air conditioning means and being removable independently as a unit from the casing and being supported by frictional engagement of the outer edge of the frame with a longitudinally extending surface of the inside wall of the casing and independently of support of said dust separator in the casing.

23. A device of the character described comprising a cylindrical casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a plurality of parts forming a circular frame and air conditioning material supported by said frame between said parts, said member extending transversely of said casing and having its outer portion cooperating with the casing to cause all the air passing through the casing to pass through said member and in contact with said material and being removable independently

as a unit from the casing and being supported by contact of said outer portion with the inside wall of the casing and independently of support of said dust separator in the casing.

24. A device of the character described comprising a cylindrical casing, means in said casing for producing flow of air therethrough, said casing being adapted to removably contain a dust separator, and a removable air conditioning member in said casing comprising a plurality of parts forming a circular frame and air conditioning material supported by said frame between said parts, said member extending transversely of said casing and having its outer portion cooperating with the casing to cause all the air passing through the casing to pass through said member and in contact with said material and said frame and material being constructed and arranged to permit separation of the material from the frame in order to change the material, and said member being removable independently as a unit from the casing and being supported by contact with the inside wall of the casing and independently of support of said dust separator in the casing.

In testimony whereof I affix my signature.

AXEL LEONARD WENNER-GREN.