A portable ventilating appliance has a free-standing housing containing a fan wheel, filter and electric driving motor. The fan wheel has a vertical axis of rotation and is disposed above the filter which is in the form of a hollow body. A drive shaft passing through the filter couples the fan wheel to the motor which is resiliently located in the housing below the filter, the motor being suspended at the bottom end of the shaft which has a single supporting bearing adjacent the fan wheel.
PORTABLE VENTILATING APPLIANCES

BACKGROUND OF THE INVENTION

The invention relates to a portable ventilating appliance with a housing and a fan wheel driven by an electric motor which displaces the air through at least one filter.

For household use, such appliances must be of simple construction in order to keep manufacturing costs low and, if at all possible, should require no attention. Whilst the weight must be low, great stability is demanded. Particularly with free-standing appliances, it is desirable for the air to exit above the standing surface at a definite minimum distance to prevent stirring up dust, displacement of papers, etc. Difficulties are then met with in housing the filter in such a way that it is easily accessible, large in area and effective.

SUMMARY OF THE INVENTION

The object of the invention is to provide a portable ventilating appliance of the type mentioned above and such that the requirements referred to can be met whilst, especially with small, handy dimensions, a high filter performance and, with small standing surface, high stability can be obtained.

To this end, according to the invention, the fan wheel is arranged with a vertical axis of rotation in the housing above the filter, which is developed as an upright, preferably prismatic hollow body, and the electric motor is located beneath the filter and is coupled to the fan wheel by a vertical drive shaft.

The arrangement of the comparatively heavy motor in the lower part of the housing provides stability for the appliance; the standing surface equally is only small, since the motor, filter and fan wheel are arranged above one another. This also enables the air exit to be at a desired distance from the standing surface. The individual components can be accommodated in the housing and assembled and removed without great expense, which is particularly important when cleaning or changing the filter.

The construction and assembly of the appliance can be still further simplified if, developing the idea behind the invention, the drive shaft only supported by the housing in the region of the fan wheel and the electric motor is resiliently suspended in the housing. Only a single bearing is then required between the housing and the rotating parts, so that all problems of ensuring bearing alignment are dispensed with. The driving shaft bearing is usefully developed as a self-aligning bearing to permit trouble free mounting even with the drive shaft tilted.

In a preferred development of the invention, the filter is a hollow prismatic, preferably cylindrical, cartridge of a loosely pressed, in a given case stuck or sintered, adsorption medium. For example activated carbon or zeolite, in which a supported cage or wires or a wire cloth is inserted. Such a cartridge is sufficiently rigid by itself, so that a special container as is required with a granular filter structure can be dispensed with.

After being used for a certain time, absorption filters become increasingly ineffective, and they must be reactivated. Usually the filters are then removed and subjected to a heat treatment — generally at the manufacturer’s works. To avoid this removal and to facilitate thereby the handling and assembly of the appliance, in a particularly advantageous exploitation of the construction of the filter cartridges according to the invention, the supporting cage of the cartridge is used as an electrical heating element. For reactivating the adsorption filter, the cartridge is heated up by means of this heating resistance without dismantling the appliance.

In addition, a folded paper filter can be placed on the side of the filter cartridge where the air enters to trap floating materials which must be kept away from the carbon filter.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages and possible applications of the invention are mentioned in the following description of a preferred embodiment with reference to the accompanying drawings, in which:

FIG. 1 is a considerably simplified lengthwise section through a free-standing ventilating appliance of cylindrical shape, and

FIG. 2 is a section along the line II — II of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The ventilating appliance illustrated is enclosed by a housing 1, which in this example is developed essentially as a free-standing upright hollow cylinder. In the upper part of the housing there is mounted a radial-flow fan wheel 2 connected to a vertical drive shaft 3 which is mounted, beneath the fan wheel, in a bearing 4 supported by the housing. An electric motor 5 which drives the fan wheel 2 is located in a bottom section of the housing I and suspended at the lower end of the shaft 3. The motor is located radially in the housing 1 by springs 6.

A central compartment of the housing 1 is occupied by a hollow cylindrical filter cartridge 7, consisting for example of sintered activated carbon which is sintered on to a supporting cage 8 formed from wires. A folded paper filter 9 is arranged around this filter cartridge. As indicated by the broken lines, the housing 1 is pierced at the perimeter to form a grille in the region of the filter and the fan wheel so as to allow the passage of air.

The radial fan 2 sucks the air from all round the appliance — as shown by arrows — into the fan housing. It first passes through the folded paper filter 9, where floating particles are removed, and then through the filter cartridge 7; here, in particular, gaseous and steam-type impurities, such as odours, are separated out. The air is sucked out of the cylindrical hollow space 10 inside the filter cartridge upwards into the fan wheel and blown out radially.

The wires forming the filter supporting cage 8 can be connected by a switch (not illustrated) with the current supply to motor 5 and they then form an electrical heating element by means of which the filter cartridge 7 can be heated for regeneration at regular intervals, i.e., to free it from the adsorbed gaseous and steam-type substances. This switch is usefully interlocked with the switch (not illustrated) in the motor current circuit, so that the cartridge cannot be heated during the normal operation of the appliance.

The paper filter can be chemically prepared or impregnated, for example with oxidising substances, such as transition metallic oxides, which have a deodorising effect. The activated carbon filter could also be impregnated in this way.
By the arrangement of the heaviest component, namely the motor 5, in the lower part of the housing 1, the relatively tall ventilating appliance is given good stability on the supporting surface 11; the standing surface area required is, however, only small. The single bearing 4 suffices for centralising and guiding all rotating parts, with the drive shaft 3 freely aligned by the resilient suspension of the motor 5. The bearing 4 could be secured elastically to permit a swinging motion of the drawing shaft or to simplify its alignment, for example by linking the bearing 4 in known fashion with the housing by an elastic diaphragm (not illustrated). To change the filter components, the top wall of the housing 1 is removed and the fan wheel 2 withdrawn from the drive shaft 3.

Instead of a radial-flow fan as illustrated, an axial-flow fan can be used to impel the air from the interior of the filter cartridge upwards. Other housing and filter shapes are possible. However, hollow prismatic, especially hollow cylindrical, filter cartridges are preferably used. Instead of one cartridge several cartridges can be used, for example arranged alongside one another in a row or cluster, in order to increase the, while still providing a filtering wall or barrier, with optimum dimensions for the housing.

Among adsorption filters, usable within the framework of the invention, are to be counted also electrostatic filters which have the capacity to separate out odorous materials which, as is known, are adherent to floating particles.

I claim:

1. A portable ventilating appliance comprising a freestanding upright columnar housing having lower peripheral openings and upper openings, a fan wheel mounted at the upper end of the housing for rotation about a vertical axis within the housing, a filter mounted in said housing below the fan wheel and comprising a filter wall around said axis so that air is drawn by the fan wheel through said lower openings and the filter wall and expelled through said upper openings, an electric driving motor for the fan wheel positioned in the housing below the filter and a substantially vertical drive shaft passing through the filter within the filter wall and coupling the motor to the fan wheel.

2. A ventilating appliance according to claim 1, the filter comprising an adsorption medium and an electrical heating element the form of a supporting wire cage in and for said medium, whereby the filter may be heated for regeneration.

3. A portable ventilating appliance comprising an upright cylindrical housing perforated for the circulation of air therethrough, a fan wheel mounted for rotation about a vertical axis within the housing, a filter in the form of an upright hollow body mounted in the housing below the fan wheel so that air circulated through the housing by the fan wheel passes through the filter, an electric driving motor for the fan wheel positioned in the housing below the filter, and a substantially vertical drive shaft which couples the motor to the fan wheel and passes through the hollow filter, the drive shaft being supported by the housing only in the region of the fan wheel and the electric motor being resiliently suspended in the housing.

4. A ventilating appliance according to claim 3, wherein the bearing of the drive shaft is a self-aligning bearing.

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