

Feb. 4, 1936.

H. E. BIRKHOLZ
AIR OR GAS FILTER UNIT

2,029,406

Filed March 27, 1933

2 Sheets-Sheet 1

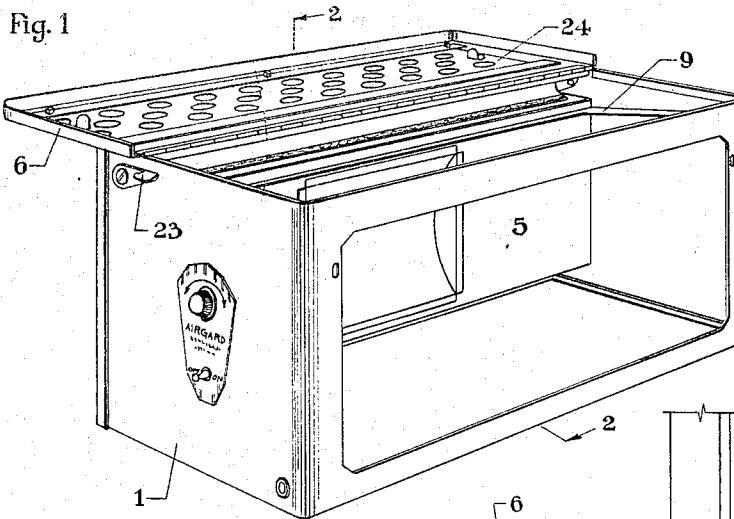


Fig. 2

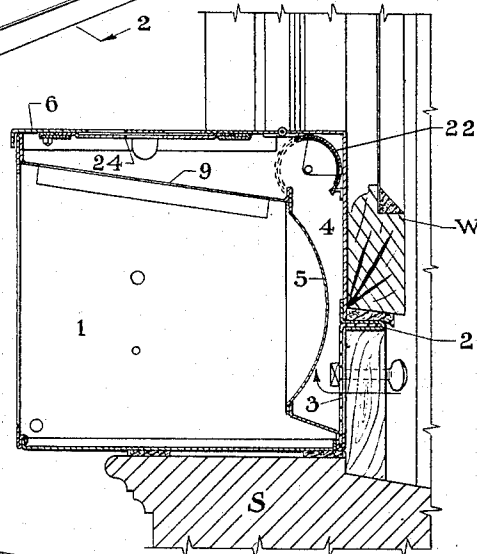
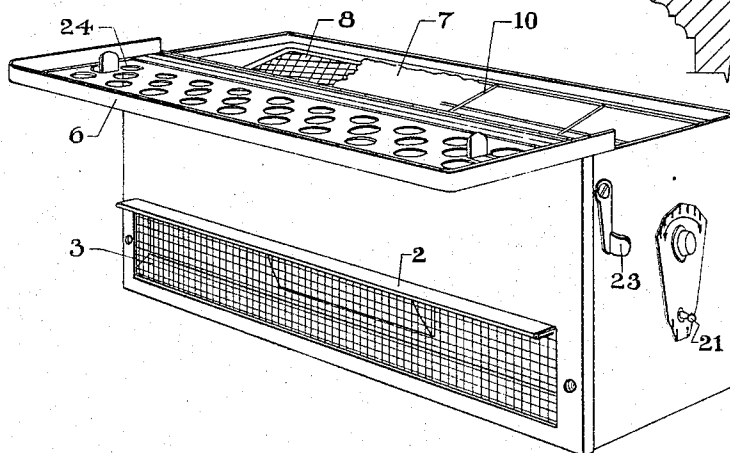


Fig. 3



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Fig. 4

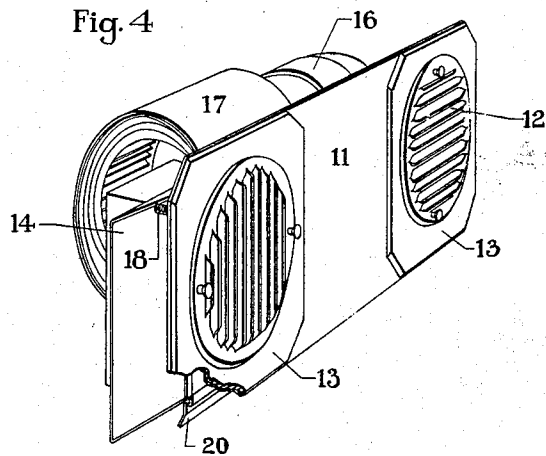


Fig. 8

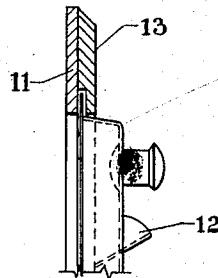


Fig. 6

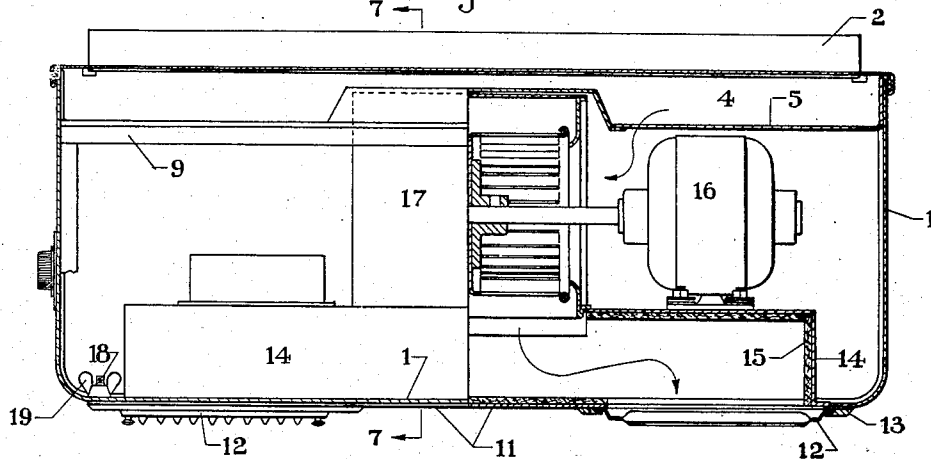


Fig. 7

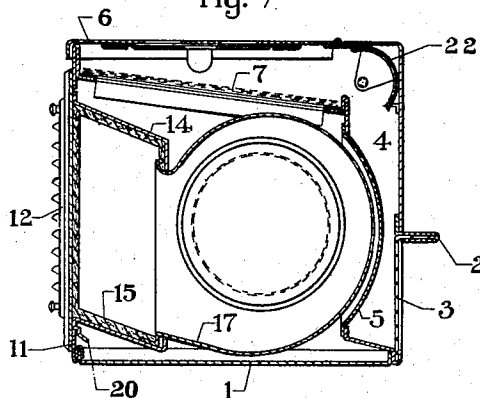
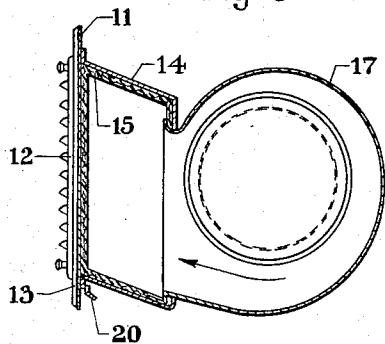


Fig. 5



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2,029,406

AIR OR GAS FILTER UNIT

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Application March 27, 1933, Serial No. 662,931

4 Claims. (Cl. 98—94)

This invention relates to an air or gas filter unit of the type having a motor driven blower and filter medium mounted within a housing as a self-contained unit. The construction is particularly intended for use adjacent the open window of a room wherein it functions to filter the air drawn through the window opening and to force it into the room.

An important object of this invention is to provide a construction of this character which permits the filter medium to be positioned such that while it is concealed from view and fully protected against the destructive action of rain, snow, and other elements encountered during use, it nevertheless remains instantly accessible for inspection and removal or replacement.

Another object is to provide a construction by which the outside air may be shut off and the room air recirculated through the filter medium.

Another object is to provide a construction having a removable chassis on which the parts most subject to derangement are mounted whereby they may be readily removed for repair or adjustment.

A further object is to accomplish the foregoing objects with a structure of extremely simple and compact design.

The invention is illustrated in the accompanying drawings wherein:

Figure 1 is a front perspective view of the casing with the lid 6 raised and the chassis, filter medium 7, screen support 8, and guard member 10 removed;

Figure 2 is a sectional view taken along line 2—2 of Figure 1 and showing also the relation of the casing with respect to a window as it appears in use;

Figure 3 is a rear perspective view similar to Figure 1, but with the filter medium 7, screen support 8, and guard member 10 in place, these parts being suitably broken away to bring out their relation;

Figure 4 is a front perspective of the chassis partly broken to show the sealing lip 20;

Figure 5 is a vertical section taken through the chassis in a plane which passes through the blower 17 and to one side of the nearest louvre 12.

Figure 6 is a horizontal section through the filter unit with filter medium etc. removed, the left half of this section being taken above the casing 14 and the right half centrally through the unit.

Figure 7 is a sectional view taken along line 7—7 of Figure 6 but with the filter medium in place; and

Figure 8 is a fragmentary sectional view showing the relation of the louvre 12 with respect to plates 11 and 13.

In carrying out the invention I utilize a housing 1, preferably composed of sheet metal fashioned in rectangular shape. This housing contains the working parts of the structure, and in use is positioned on the sill S of a window W (see Figure 2) with its rear wall adjacent the opening of the window, the rear wall having a ledge 2 upon which the lower edge of the open window rests. A screen covered air inlet opening 3 is provided in the rear wall of the housing under the ledge 2, this opening preferably extending the length of the ledge. The inlet opening 3 communicates with a rear vertical passage 4 which is defined by the rear wall of the housing and a partition 5 extending from the rear bottom edge of the housing inwardly for a short distance and thence upwardly to a point short of the top. The air passing through the passage 4 crosses over the upper edge of the partition 5 into the space between the hinged lid 6 at the top of the housing and the filter medium 7 (see Figures 3 and 7) and thence passes downwardly through the filter medium 7. Any suitable filter medium may be utilized. At the present time I prefer the use of a paper medium such as is described and claimed in Patent No. 1,897,976, and consequently utilize a screen support 8 therefor, this support preferably being held in the slanting position shown by a seat 9 which is suitably formed on the upper parts of the partition 5 and adjoining inner walls of the housing proper. If desired the paper may be held against the screen by an open guard member 10. With the filter medium in this position, it is not only effectively concealed from view and protected against the action of snow, rain, and other destructive agencies which may be contained in the outside air, but, at the same time, it is through the agency of the lid 6 always immediately accessible for inspection, etc. Furthermore, the position of the lid and filter medium permit the latter to be inspected in situ, the advantage of which is obvious.

It will be noted that the partition 5 and filter medium 7 cooperate to divide the housing into inlet and outlet chambers respectively, which communicate with each other through the filter medium. The fan and blower mechanism are located in the outlet chamber and thereby protected by the filter medium 7 against the action of the impurities carried by the air being filtered. These parts may be mounted in any suitable manner.

Inasmuch, however, as they have movable parts which may require attention from time to time, I prefer to mount them on a chassis which can be removed from the housing as desired. To this end the front wall of the housing is provided with a large opening in which the chassis may be inserted. The chassis includes a front plate 11 which fits against the front wall of the casing and over the opening. This plate is provided with suitable outlet openings near opposite ends, each opening being covered by a circular louvre 12. Each louvre is rotatably held in position by an auxiliary plate 13 extending over its marginal edge or periphery, and providing, in connection with the front plate 11, a circular groove which permits the rotation of the louvre, these plates 13 being secured to the front plate 11 in any suitable manner. The air guide vanes of the louvres are slanted to compel the air to pass from the filter at an oblique angle and thereby enable the direction of the air to be changed to any of a number of oblique positions simply by turning the louvres to the appropriate position.

The air drawn through the filter medium passes axially into the blower which discharges it peripherally and then forces it to the louvre openings through an outlet conduit. The outlet conduit is defined by the front plate 11 and a casing 14 which is secured to the inner face of the plate 11, the conduit extending in opposite directions from a central opening in the rear face of casing 14 to the louvre openings. The inner walls of this conduit are covered by sound absorbing material 15 so as to reduce the transmission of noise through the unit. Its top and bottom walls are slanted downwardly to facilitate the removal and replacement of the chassis. The rear wall of this conduit carries the motor 16 and blower casing 17.

The motor 16 is bolted or otherwise secured to the rear face of the conduit casing 14 at one side of its central opening while the blower casing is secured by having its outlet passage which extends into the central opening, welded to the adjacent portion of the outlet casing 14. In the embodiment shown the central portion of the partition 5 is provided with a rearwardly extending bulge to accommodate the blower casing 17 which extends rearwardly beyond the main vertical plane of the partition.

In order to hold the chassis firmly in place, its front plate 11 is provided at opposite upper corners with studs 18, which in use extend through suitable openings in the front wall of the housing 1 thereby permitting the chassis to be bolted to the housing by the wing nuts 19. To this same end the front lower edge of the outlet casing 14 is provided with a lip 20 which cooperates with the front plate 11 to provide a groove into which the adjacent edge of the front wall extends. Now in order to remove the chassis, the filter medium 7, and screen support 8, and guard member 10, are removed, the holding wing nuts 19 unscrewed, the chassis tilted forward to bring the upper edge of casing 14 clear of the adjacent edge of the casing 1, and then raised so that the holding lip 20 clears the adjacent edge of the housing 1, whereupon the chassis may be drawn forwardly out of the housing. Naturally to replace the chassis the procedure is reversed.

In operation the lid 6 is ordinarily closed and the motor 16 started simply by operating the switch 21 on one side of the housing. With the blower in operation, air is drawn through the inlet opening 3, passage 4, filter medium 7 into the outlet or clean air chamber and axially into the

blower which discharges it peripherally and then forces it through the conduit 14 and louvres 12 from the filter unit. Sometimes it is desirable to recirculate the room air without drawing air from the outside. To permit this the interior of the housing is provided at its upper rear corner with a damper 22 which may be moved through lever 23 from an open position, in which it extends directly in the corner, to a closed position in which it extends from the top of the housing 1 across the inlet passage to the seat 9 on the front face of the partition 5, as shown in dotted lines in Figure 2. The damper thus prevents any air from being drawn through the unit from outside. To draw air from the room through the filter medium it is simply necessary to open the lid. If desired, however, the lid may be provided with a series of openings and with a slidable plate 24 having a similar series of openings which coincide with the lid openings in one position, the plate blocking the lid openings in another position. Thus the lid may remain closed and the slidable plate 24 moved to a position in which its openings coincide with the lid openings whereupon the unit is conditioned to receive room air through such openings. This is desirable because it permits recirculation without exposing the filter medium, the latter ordinarily being more or less unsightly after a little use. To remove the filter medium, it is only necessary to raise the lid and then lift out the guard member 10 and filter medium.

Having described my invention, I claim:

1. An air filtering unit comprising a rectangular housing having an inlet opening in the lower portion of its rear wall, an outlet opening in its front wall and a normally closed lid at its top, a partition spaced from the rear wall and extending upwardly from the bottom to a point short of the top, a filter medium extending from said partition toward the front wall of said casing, said partition and filter medium cooperating to divide the housing into an inlet chamber which extends from the inlet opening to the filter medium and an outlet chamber which extends from the filter medium to the outlet opening, means in the outlet chamber for causing a flow of air between said openings.

2. An air filtering unit comprising a housing having inlet and outlet openings, means interposed within said housing between said openings for dividing it into inlet and outlet chambers, said means including a filter medium through which said chambers communicate, means in said outlet chamber for causing a flow of air between said openings, and means between the inlet side of the filter medium and the inlet openings for restricting the flow of air, said housing having a normally closed auxiliary inlet opening between said restricting means and the inlet side of said filter medium.

3. A gas filter unit comprising a housing having an inlet opening, means interposed within said housing for dividing it into inlet and outlet chambers, said means including a filter medium through which said chambers communicate, the housing having an opening in a wall of the outlet chamber, a plate covering said wall opening, said plate having an air outlet opening, a blower in said outlet chamber for causing a flow of air, a conduit connecting the blower outlet with the plate outlet opening, said plate and conduit and blower being arranged for removal from or insertion into said wall opening as a unit.

4. An air filter unit comprising a housing having an inlet opening at its rear and an outlet

opening at its front, a filter medium extending from the upper portion of the front wall rearwardly across the housing and dividing the entire interior thereof into an upper inlet chamber and
5 a lower outlet chamber which communicate respectively with said inlet and outlet openings, and

means in the outlet chamber for creating a flow of air between said openings, the upper wall of the housing having a normally closed opening permitting access to said filter medium and inspection thereof in situ.

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