Aug. 11, 1925. 1,548,839

P. P. HENSHALL

VENTILATOR

Filed Nov. 22 1924

Fig. 1.

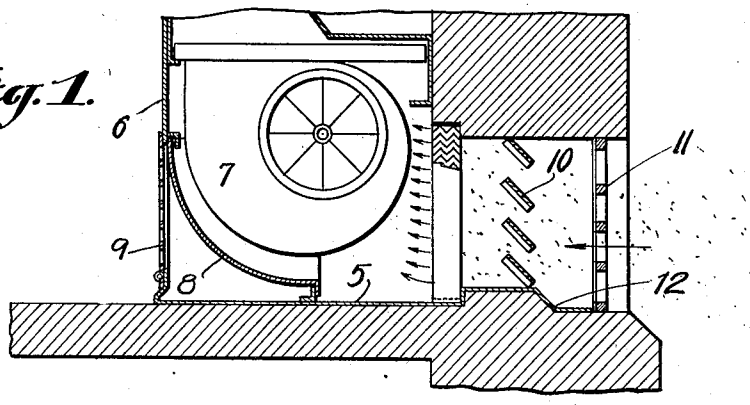


Fig. 2.

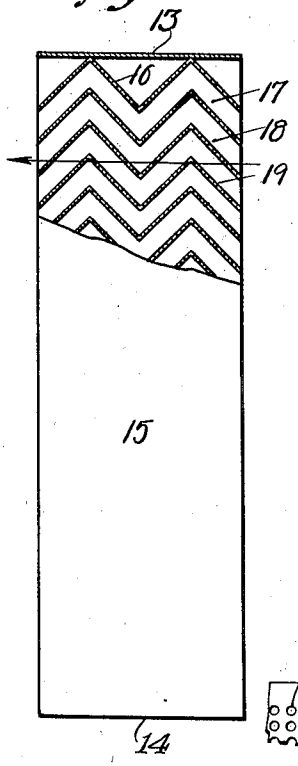


Fig. 3.

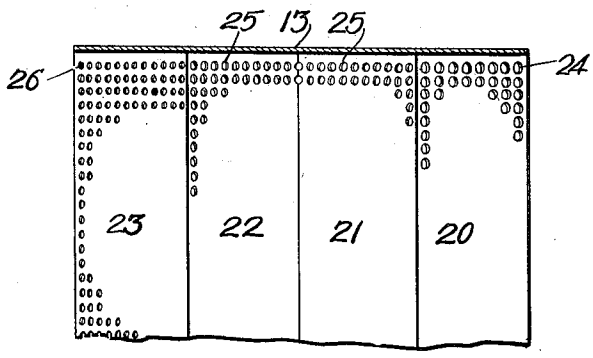
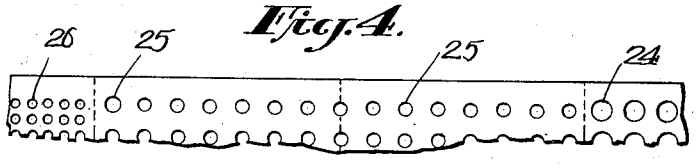


Fig. 4.



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UNITED STATES PATENT OFFICE.

PERCIVAL P. HENSHALL, OF ATLANTIC CITY, NEW JERSEY, ASSIGNOR TO JOHN J. NESBITT, INC., OF ATLANTIC CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

VENTILATOR.

Application filed November 22, 1924. Serial No. 751,597.

To all whom it may concern:

Be it known that PERCIVAL P. HENSHALL, a citizen of the United States, residing at Atlantic City, in the county of Atlantic and State of New Jersey, has invented certain new and useful Improvements in Ventilators, of which the following is a specification.

This invention relates to air filters for heating and ventilating units.

The primary object of my invention is to produce an air-filter which may be installed in the fresh air intake of a ventilating unit to exclude the dust, dirt and foreign matter being drawn into the ventilating unit by fans; to overcome the resistance to the flow of air against an ordinary baffle plate; to permit the delivery of the maximum quantity of air without retarding the operation of the motor and fans; to separate and retain the heavier dust and dirt particles in advance of the dust and soot, and to finally remove and cleanse the air of the fine particles before it enters the interior of the ventilating and heating unit, and thence to the room.

In order to more fully understand and appreciate my invention, reference is had to the accompanying drawing, showing a preferred embodiment of my construction, wherein:

Fig. 1 is a fragmentary view, in section, showing the bottom of a heating and ventilating unit and the position of the filter in the fresh air intake.

Fig. 2 is a side view, partly in section of the filter.

Fig. 3 is a view of the baffle plates within the casing of the filter.

Fig. 4 is an enlarged fragmentary view of the baffle plates, showing the relative size of the openings.

Referring now to the drawing, wherein like reference characters designate corresponding parts of the several views of the drawing, 5 designates the bottom of the ventilator casing 6. A fan housing 7, damper 8 and inspection door 9 are in a direct path with a series of louvers 10 and wire mesh screen 11, positioned in the wall box 12 which constitutes the fresh air inlet of the casing.

Between the louvers and the fan housing is positioned my novel and improved air filter for cleansing the air as it is drawn through the ventilator casing into the room from the outside of the building.

Referring particularly to Figs. 2, 3 and 4, it will be observed that the filter comprises a frame having a top and bottom 13, 14, sides 15 being open at its front and rear for the passage of the air as it is drawn into the casing by the fans. A series of superimposed, baffle plates 16, 17, 18 and 19 preferably formed from a single piece of material, are soldered or welded to the sides of the frame, the top and bottom plates being also soldered or welded to the top and bottom respectively of said frame to provide a rigid structure.

Each baffle plate is bent to provide four equal area sections 20, 21, 22 and 23, at right angles to each other from the front to the rear of the frame. The plates are arranged in such a manner that there is a definite opening between the plates and a definite maximum free air space with a definite maximum filtering capacity yet with the minimum amount of air friction.

When the air passes through the filter it must continually change direction due to three forces:

Force 1—The course which the air would take if the baffle plates were made of a solid material which would be in a sinuous path between the respective plates.

Force 2—The course which the air would take if it were compelled to travel in the direct path through the holes stamped in the plates.

Force 3—The course which the air takes as a result of a combination of these forces, that is, being drawn in contact with the plates continually, as they change direction.

What actually takes place in the filter can best be determined by a study of the deposits on the respective baffle plates. A certain part of the air travels through the holes in the plates, the said holes being of

the same size throughout the surfaces of the plates or graduated in size, smaller toward the back, as indicated by Fig. 4. The holes are in staggered relation relative to each other so that of necessity, any air carrying particles of dust passing through the larger holes 25 of baffle 20 would strike baffle plate 21. Any air carrying particles of dust passing through baffle 21 would strike plate 22 and the next plate 23. Upon examination of the filtering plates, it is found that the heavier and larger particles of dust are deposited on the baffle at the inlet, while the very fine particles of dust are deposited on the baffles 21 and 22. On baffle 23, the size of the particles are so small and so few that this filter plate is never dirty except when the filter is overloaded. The purpose therefor of baffle plate 23 is to take care of the over-load.

The first section 20 of the baffle plate is provided with apertures 24 throughout its surface; it catches the heavier and larger particles of dust and dirt entering the filter and at the same time creates the least amount of air friction, being nearest the inlet, the apertures being one-sixteenth ($\frac{1}{16}''$) in diameter. The adjacent sections 21, 22 of the baffle plate are provided with apertures 25 which are smaller, being three sixty-fourths ($\frac{3}{64}''$) in diameter. They catch the smaller particles of dust or soot, passing the first section. The relation of the size of dust particles filtered to the size of holes stamped in the various plates approaches a constant free air capacity through the plates. The back section 23 of the baffle plate is provided with the smallest apertures 26, which are only one thirty-second ($\frac{1}{32}''$) of an inch in diameter.

The filters are dipped in a special viscous oil and the plates at the points where each hole is stamped, act as a separate oil reservoir. When the air is drawn into the filter and impinges itself on the plates, the dust particles adhere to the oil. At this point there is a definite and immediate action. The oil penetrates the dust and has a similar effect to that of placing a lamp-wick on the face of the filter plate, that is, the oil is caused to advance in a position upward from one reservoir to the next aperture or reservoir immediately above it, and so on. This action causes the face of the plate to present a sticky surface to the dust particles rendering the baffles more efficient. Both sides of the plates are of course covered with the oil. As the air strikes the top surface of one plate it is deflected to the bottom surface of the next and adjacent plate. In other words when the air strikes the top surface of plate 17 upon entering the filter, a certain volume will be deflected toward the bottom surface of plate 16. On the other hand a certain volume of air striking the bottom surface of plate 16 will be deflected to strike the top surface of plate 17, that is to say between the front and back of the filter. Consequently both the top and bottom surfaces of all the plates are covered with dirt particles and dust thus obtaining the maximum efficiency within the filter.

The baffle plates are preferably constructed of tin, Monel metal or the like, while the frame for the baffle plates are of galvanized iron or steel.

Having shown and described my invention, what I now claim as new and desire to secure by Letters Patent of the United States is:—

1. An air filter of the class described comprising a frame open at its front and back, a plurality of superimposed, apertured baffle plates arranged within the said frame adjacent and in direct communication with each other to exclude the larger dirt particles in advance of the smaller dirt particles.

2. An air filter of the class described comprising a frame open at its front and back, a plurality of superimposed, bent baffle plates secured within the frame and having apertures diminishing in size from front to back and arranged to exclude the larger dirt particles in advance of the smaller dirt particles.

3. An air filter of the class described comprising a frame open at its front and back, a plurality of superimposed baffle plates divided into sections and secured to the sides of the frame, said sections having apertures diminishing in size from front to back and arranged in different planes to exclude the larger dirt particles in advance of the smaller dirt particles.

4. An air filter of the class described comprising a frame open at its front and back, a plurality of superimposed baffle plates divided into a plurality of equal sections secured to the sides of the frame, said sections being disposed at an angle to each other and having apertures diminishing in size from front to rear whereby the larger dirt particles are excluded in advance of the smaller dirt particles.

5. An air filter of the class described comprising a frame open at its front and back, a plurality of superimposed baffle plates secured to the sides of said frame, each plate being bent into four sections, each section being disposed at an angle to each other, the front section of each plate having large apertures and the rear section of said plate having small apertures therethrough, said intermediate and connecting sections having apertures of a size intermediate the size of the apertures in the front and rear sections whereby the larger dirt particles are

excluded in advance of the smaller dirt particles.

6. An air filter comprising a frame open at its front and back, a plurality of superimposed zig zag baffle plates arranged within said frame in close proximity to each other, said plates having apertures throughout their surfaces and a viscous coating on the top and bottom surfaces thereof for excluding dirt particles from the air passing through said apertures and over the coated surfaces.

In testimony whereof I affix my signature.

PERCIVAL P. HENSHALL.