

July 6, 1937.

G. E. ATKINS

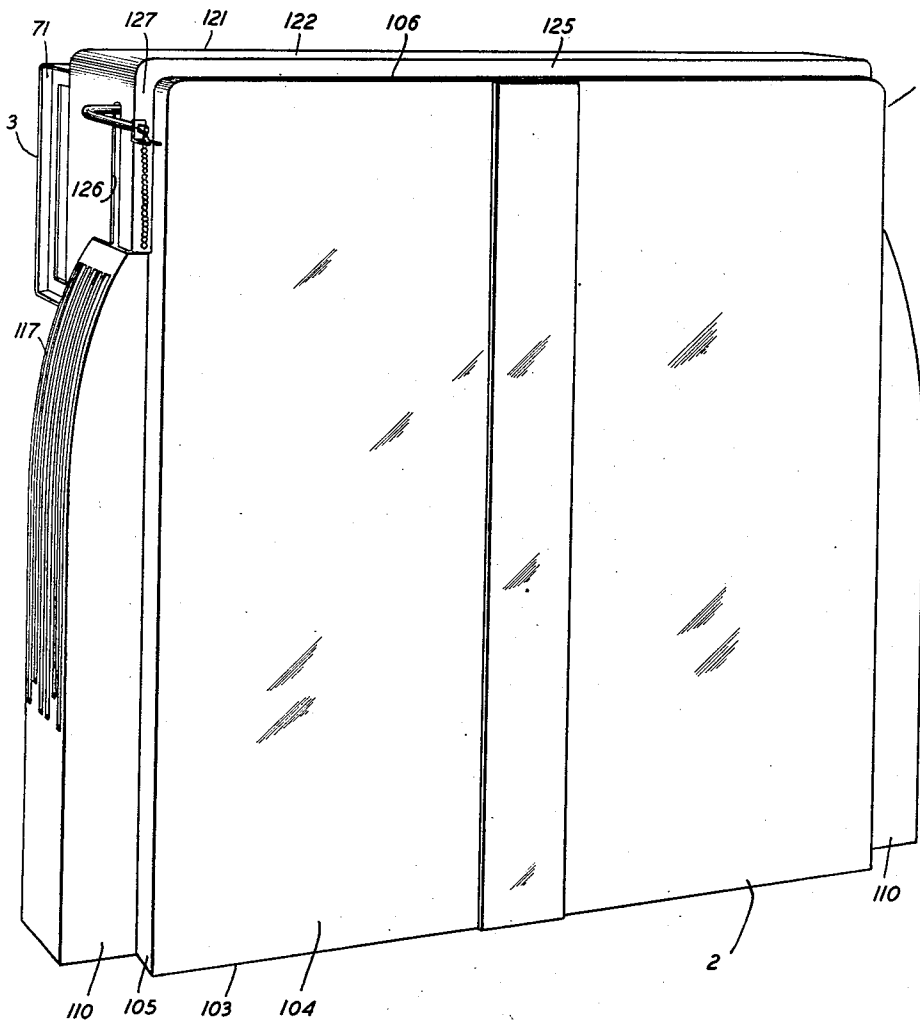
2,086,112

VENTILATOR

Filed Nov. 23, 1935

4 Sheets-Sheet 1

FIG. 1



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FIG. 2

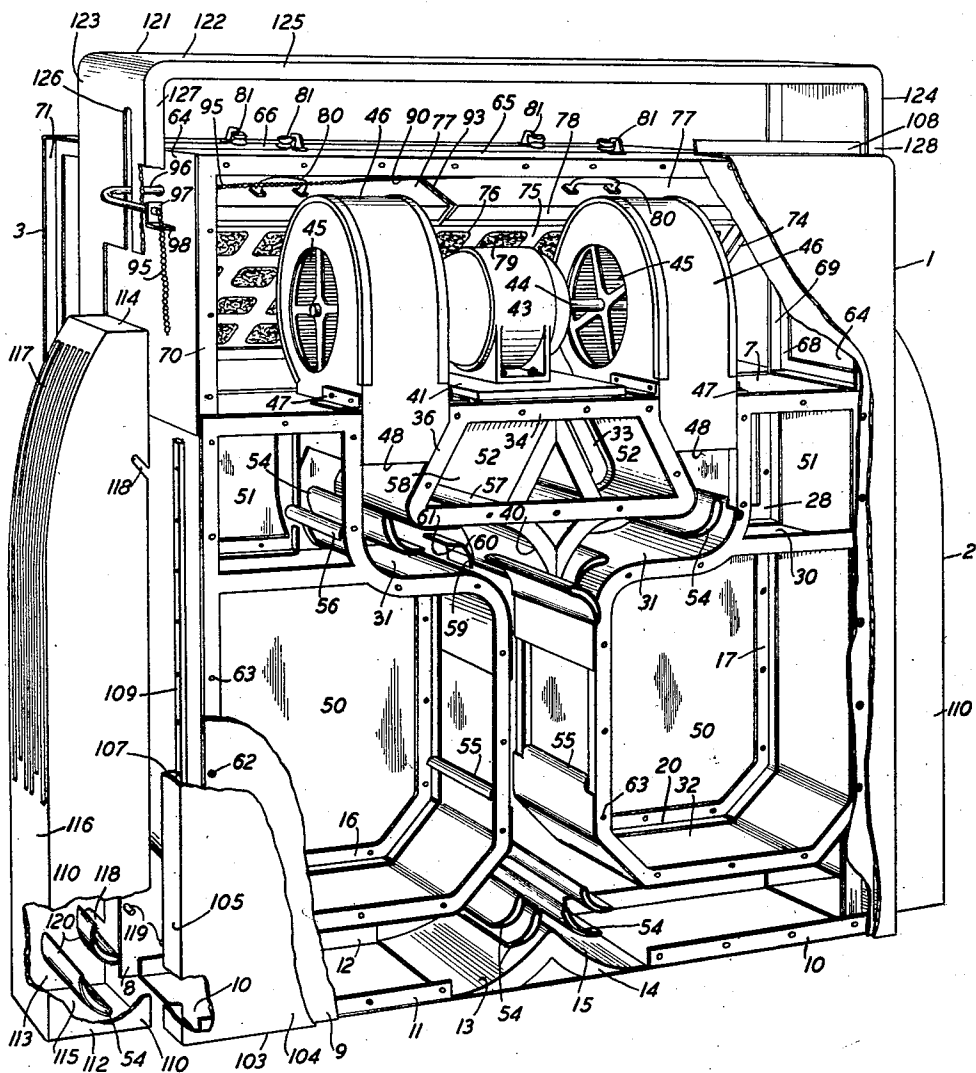
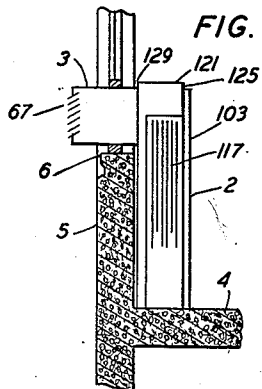


FIG. 7



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FIG. 8

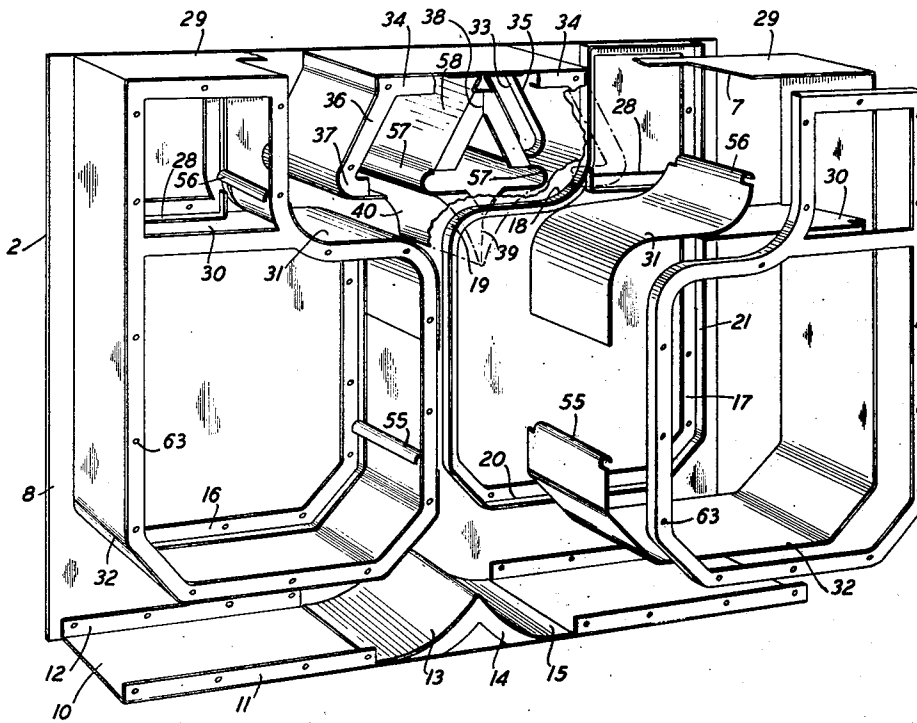
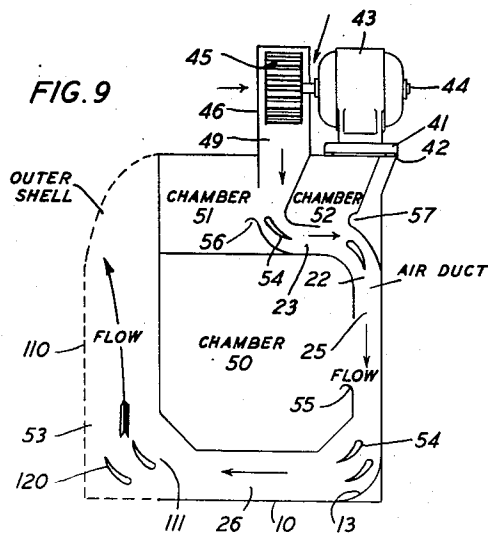


FIG. 9



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## UNITED STATES PATENT OFFICE

2,086,112

## VENTILATOR

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Application November 23, 1935, Serial No. 51,238

4 Claims. (Cl. 98—39)

This invention relates to ventilators and more particularly to ventilators for supplying air to the interior of a building.

The object of this invention is to provide means for supplying air to a room, the air being conditioned and regulated in a required manner before it is released into the room.

A feature of this invention resides in a sound attenuating filter.

Another feature resides in a shutter for regulating the flow of air through the ventilator.

Another feature resides in air foils provided in the structure.

Other features residing in the form and arrangement of the various parts will be subsequently pointed out in the specification.

In the drawings:

Fig. 1 is a front face view in perspective of the ventilator;

Fig. 2 is a view in perspective and partly in section of the ventilator as shown in Fig. 1 with some portions of the front wall and other walls removed to disclose inner parts of the structure;

Fig. 3 is a schematic of the arrangement of air passageways and sound attenuating chambers found in the structure, shown in reduced scale relative to Figs. 1 and 2, and viewed from the front of the ventilator;

Fig. 4 is a side view, partly in section, of some of the upper portion of the structure shown in Figs. 1 and 2, drawn on an enlarged scale relative to Figs. 1 and 2, and viewed from the right of these figures;

Figs. 5 and 6 are views corresponding to Fig. 4 drawn on a smaller scale relative to Fig. 4 and showing two positions of a shutter contained in this portion of the apparatus;

Fig. 7 is a view in section of a portion of a building and the ventilator in the position it occupies relative to a floor, a wall of the building and a partially opened window. Fig. 7 is shown in reduced scale relative to the other figures;

Fig. 8 is a view in perspective of a vertical lower portion of the ventilator and showing a development of the structure; and

Fig. 9 shows a schematic of a modification of the arrangement shown in Fig. 3.

In offices, factories and other building structures it is a desideratum that the various rooms therein be properly ventilated and supplied with a sufficient quantity of fresh air to make them suitable for occupancy by the occupants thereof. It is also of particular advantage in some cases to provide, in the ventilating and air supplying apparatus, means to prevent the introduction of

noise into the room. This is particularly desirable in supplying air to telephone central offices where street noises if introduced through the ventilating and air supplying apparatus would materially interfere with the work of attendants in the office. Air outside of a building is often so laden with dust particles as to make it undesirable for introduction into a building. It is therefore desirable to provide, in the means for supplying air to a building, some means for removing the dust particles from the air before the air is introduced into the building.

The ventilator herein described and claimed will furnish to a room a regulated supply of fresh clean air free of street noises.

The ventilator comprises an inverted L-shaped casing 1 of sufficient width to fit a window opening in a building. The casing 1 is divided into two main parts, namely a vertical lower portion 2 and a horizontal upper portion 3. The vertical lower portion 2 as shown in Fig. 7 rests on the floor 4 of a building, and extends upwardly from the floor 4 and adjacent the inner surface of a wall 5 of the building to the window ledge 6. The top of the vertical lower portion 2 of the casing 1 serves as a shelf 7, shown in Fig. 2, which is on an even plane with the surface of the window ledge 6. The horizontal upper portion 3 of the casing 1 rests on the window ledge 6 and extends outwardly across the window ledge 6 to the outside of the building. The horizontal upper portion 3 of the casing 1 serves as an air inlet portion of the ventilator and also as a housing for certain apparatus to be subsequently described. The vertical lower portion 2 of the casing 1 contains air passageways and a sound filter arrangement.

The vertical lower portion 2 of the casing 1, as shown in Figs. 2 and 8, comprises a back plate 8 and a front plate 9. The back plate 8 extends upwardly from the floor 4 of the building and adjacent an inner surface of the wall of the building to the level of the window ledge 6 and is of substantially the full width of the casing 1. Extending normal to the back plate 8 and inwardly of the room and resting on the floor 4 is a rectangular floor plate 10. The floor plate 10 has upwardly turned edges forming flanges 11 and 12. The flanges 11 and 12 do not extend the full length of the floor plate 10, but are broken in the center leaving a space to accommodate an air guide 13. The air guide 13 comprises two inverted V-shaped truss members 14, the upper edges of the leg portions being cut concave to provide a long radius sweep from the base por-

tions of the legs to the apex. The truss members 14 are attached to the upper surface of the floor plate 10 in alignment with the flanges 11 and 12 and support an inverted V-shaped plate 15 which conforms to the concave portions of the legs of the truss members 14.

Supported on the back plate 8 are two frames 16 and 17 which may, for instance, be formed of metal strips L-shaped in cross-section. Each of the frames 16 and 17 is in the form of a loop, comparatively narrow at the top and enlarged at the bottom, and comprising a series of straight and curved portions. The frame 17 at the right side of the casing, as shown in Fig. 8, starts near the right side of the back plate 8, extends horizontally along the top edge of the plate toward the left for a short distance, then turns downwardly at right angles for a short distance and sweeps in a long radius bend 18 toward the left, then turns downwardly in a long radius bend 19, and vertical for a comparatively long distance, then turns toward the right at an angle of 45 degrees, then further toward the right in another angle of 45 degrees forming a bottom portion 20 extending in a plane parallel to the plane of the shelf 7, shown in Fig. 2. The frame 17 then turns upwardly and toward the right at an angle of 45 degrees, then vertically upward at another angle of 45 degrees and continuing in a comparatively long vertical straight portion 21 to the point of beginning. When the frame 17, above described, is attached to the back plate 8 it defines the shape of one of the two main portions of the sound attenuating arrangement. Spaced from the frame 17 is the frame 16 of like contour to the frame 17 and positioned on the left side of the back plate 8. The frames 16 and 17 are spaced from each other on the same face of the back plate 8 and cooperate with other parts to be later described to form a Y-shaped channel 22, as shown in Fig. 3, having rather widely separated legs 23 and 24 at the top leading downwardly into an air passageway 25 which leads into and joins comparatively long horizontally extending legs 26 and 27 at the bottom. The bottoms 20 of the frames 16 and 17 are spaced from the floor plate 10. Extending inwardly from the long vertical side of the frame 16 and parallel with the top to the beginning of the long radius sweep 18 is a horizontally disposed flanged metal strip 28 which is secured by one of its flanges to the back plate 8 and at its ends to the adjacent portions of the frame 16. This divides the frame 16 definitely into two sections. A like metal strip 28 divides the frame 17 into two sections. Welded or otherwise secured to the frames 16 and 17 and extending normal from the flat surface of the back plate 8 are wall members 29, 30, 31 and 32. The wall members are secured to the frames 16 and 17 at spaced intervals and follow the contour of the frames to serve in cooperation with these and other parts to form sound attenuating chambers and air passageways in the ventilator. The wall members 29 form the shelf 7. A metal frame 33 is disposed between the upper arms of the frame members 16 and 17 and secured to the back plate 8 beneath the shelf 7. The frame 33 has a horizontal top portion 34, which is visible only in a spaced and cooperating frame, terminating at the ends in diverging and downwardly extending legs 35 and 36 joined at their lower ends by a horizontal lower portion 37. The horizontal lower portion 37 is in parallel with the top portion 34 and is spaced therefrom. An

inverted V-shaped truss 38, illustrated by a like and spaced member of the same form, is provided in the center of the frame 33. The truss 38 is welded or otherwise secured to the respective top and bottom portions 34 and 37 of the frame 33. The truss 38 is formed of flanged metal strips and has one of its flanges secured to the back plate 8. Extending downwardly from the base of the frame 33 is a V-shaped support 39 having long radius concave sides. The V-shaped support 39 serves as a supporting frame for a V-shaped wall 40 which follows the shape of the concave sides of the V-shaped support 39. Frames, truss members and supports identical in form and size with the frames, truss members and supports, above described, are spaced from those located on the back plate and the wall members 29, 30, 31 and 32 are positioned normal to the back plate 8 and the front plate 9 between the cooperating supporting means thus formed and are suitably attached thereto. The frames, truss members and wall members 29, 30, 31 and 32 in cooperation with the back plate 8 and the front plate 9 form the air passageways and sound attenuating chambers opening on the air passageways.

Centrally supported, as shown in Figs. 2 and 3, on the top of the shelf 7 by means of a base plate 41 supported on cushion 42 is a motor 43 having a shaft 44 extending through the rotor and beyond each end of the rotor. On each end of the shaft 44 is a rotary type fan 45. The fans 45 are enclosed in housings 46—46 each of which is in communication with an adjacent aperture in the shelf 7. The housings 46—46 are secured to the top surface of the shelf 7 by means of brackets 47 to which they may be welded. A downwardly extending skirt 48 of each housing 46 extends below the shelf 7 for a short distance.

The arrangement of the motor and fans relative to other parts and the air passageways and sound attenuating chambers formed in the structure can be traced by referring to Fig. 3 in which 7 is the shelf, 49—49 are the apertures therein, 43 is the motor, 45—45 are the fans, 46—46 are the housings for the fans. The arrangement of air passageways and sound attenuating chambers in the ventilator is also shown schematically in Fig. 3. In this figure it will be noted that the sound attenuating chambers are arranged in three pairs and that each pair is of different size relative to the others. The sound attenuating chambers are designed to attenuate sound vibrations of three different bands all of which are in a comparatively low frequency range. The comparatively large sound attenuating chambers 50—50 indicated in the lower portion of the casing attenuate sound vibrations of a comparatively low frequency. The smaller sound attenuating chambers 51—51 in the upper right and left portions of the casing attenuate sound vibrations of a somewhat higher frequency than the first mentioned. The sound attenuating chambers 52—52 in the upper central portion of the casing attenuate sound vibrations of a somewhat higher frequency than the other two. The course of the air taken in by the ventilator from the outside of a building and delivered through the ventilator to a room is indicated by the arrows in Fig. 3. The arrows pointing to the fans 45—45 indicate that air flows into the fans 45—45 from two sides of the hoods 46—46. The air is then driven downwardly through the aper-

tures 49 in the shelf 7 and through the legs 23—24 of the Y-shaped air passageway toward the bottom of the ventilator where it is separated into two streams by means of the air guide 13 and directed along the air passageways 26—27 into the outlet shells 53—53 from whence the air flows through suitable openings into the room.

Located at each turning point in the air passageways are air foils 54 to guide the air in a smooth flowing stream in the required directions. The air foils 54 are streamlined to prevent the development of eddy currents in the air stream and are supported by means to be subsequently described. The walls along the air passageways are suitably apertured to provide communication between the air passageways and the sound attenuating chambers so that noise producing air vibrations in the air taken into the ventilator may be attenuated and absorbed in the sound attenuating chambers. To prevent the development of eddy currents at the apertures between the air passageways and the sound attenuating chambers the wall portions at the edges of the apertures are turned inwardly of the sound attenuating chambers at the points facing the direction from which the air is flowing. This arrangement is shown at the points 55—55 for the comparatively large sound attenuating chambers 50—50 and at the points 56—56 for the next smaller size sound attenuating chambers 51—51. The same effect is obtained in the smallest size sound attenuating chambers 52—52 by the rounded portions 57—57 of the wall 58, in the walls held by the inverted V portion of the truss 38.

The air foils 54 are hollow metal members shaped and streamlined as shown in Figs. 2 and 3 and are equal in width to the distance between the back plate 8 and the front plate 9. To support the air foils 54, in the required positions, curved sheet metal members 59 having a plurality of flat sides 60 are set up edgewise on the surface of the back plate 8 as shown in Fig. 2 and are secured thereto in a suitable manner, for instance by welding the parts together. The general form of the sheet metal members 59 conforms to the shape of the air foils 54. The air foils 54 are slipped over the sheet metal members 59 and are frictionally held in place thereby by reason of the frictional engagement between the ends of the sheet metal members 59 and the corner points formed therein at 61 and the continually curved formation of the air foils 54. One of the air foils 54 is shown in Fig. 2 removed from its supporting sheet metal member 59.

As above mentioned, the frames, truss members and supports described are made in pairs, one each of which is secured to the back plate 8. The corresponding frame truss members and supports of each pair are attached to the outer edge portions of the wall members 29, 30, 31 and 32 and are located directly behind the front plate 9. The front plate 9 is preferably apertured to accommodate screws 62 or other removable fastening means which enter threaded apertures 63 in the outer frames and flange 11. The front plate 9, therefore, may be removed from the outer frames and the floor plate 10 when access to the various sound attenuating chambers and air passageways is required.

The horizontal upper portion 3 of the casing 1, as shown in Figs. 2, 4, 5 and 6, comprises a rectangular metal box having spaced end walls 64—64, a top 65, a removable cover plate 66 at the top and air inlet louvres 67 in the back portion facing outward of the building. To stiffen

the structure and to support the end walls 64—64 two spaced inverted U-type frames 68—68 are provided. The spacing between the inverted U-type frames 68—68 is equal to the depth of the shelf 7. The leg portions 69 of the frames 68 at each end are bridged by flanged strips 70 extending transversely between the two leg portions 69 and secured thereto. The metal strips 70 rest on the shelf 7. The end walls 64—64 and the top 65 are attached to the frames 68—68 preferably by welding the parts together. The end walls 64—64 and top 65 extend through a partially opened window to the outside of the building and some distance beyond the outer edge of the window ledge. Rectangular frames 71 are attached to the outer wall surfaces of the end walls 64—64 beyond the outer wall surface of the building to add rigidity to the portions of the casing overhanging the outer edge of the window ledge and to bear against the outer wall surface of the building to prevent accidental displacement of the ventilator inwardly of the room and away from the window opening. The top 65 at the overhanging portion of the ventilator extends over the rectangular frames 71 and is suitably secured thereto. The arrangement of the rectangular frames 71 on the outer wall surfaces of the end walls 64—64 of the upper portion of the casing leaves the inside surfaces of the end walls 64—64 free of obstructions which might interfere with the operation of a shutter to be subsequently described. The bottom wall 72 of the upper portion of the casing extends inwardly from the outer extremity of the upper portion of the casing to the outer edge of the window ledge and has an edge flange 73 turned over the upper edge of the back plate 8 and against the inner surface of the back plate 8 to which it is suitably secured. Extending diagonally down the inner wall surface of each end wall 64—64 of the upper portion of the casing and rearwardly of the rearmost legs of the frames 68 is a downwardly sloping ledge 74. The ledges 74 may be straight lengths of angle iron secured by one of their flanges and suitable fastening means to an adjacent inner wall surface of the end walls 64—64. Extending across the upper portion of the casing from one sloping ledge 74 to the other is a latticework frame 75 having comparatively large openings 76 therein. The latticework frame 75 serves as a rest for a plurality of dust screens 77. The dust screens 77 are boxes with latticework wall members 78 corresponding in pattern to the latticework frame 75 and are filled with glass wool 79 or material somewhat similar and impregnated or coated with oil or some like substance that will catch and hold dust particles in air passing through the screen 77. The dust screens 77 may be provided with handles 80 to facilitate removal of the dust screens 77 from the casing. A removable cover 66 in the top of the casing is provided to permit removal and replacement of the dust screens 77. The cover 66 is removably secured to the top of the casing by suitable clamps 81 which may be, for instance, a plurality of window latches of a common and well-known type in which paired parts are provided to hold two adjacent members together. A hook 82 of the window latch 81 may be secured to the top of the casing and a rotatable cam 83 to engage the hook 82 may be secured to the cover plate 66. When the hook 82 is engaged by the rotatable cam 83 and the cam 83 is manually rotated to move the cam further into the hook, the cover plate 66

is pressed tightly down in place over an aperture provided in the top of the upper portion of the casing. Secured to the inner face of the end walls 64—64 of the upper portion of the casing and extending downwardly above the upper faces of the dust screens 77 are guides 84 for a shutter 85 to slide on. The guides 84 may be comparatively short lengths of angle iron having a flange secured to the inner face of the end walls 64 of the casing. The shutter 85 comprises an upper flat leaf 86 of sheet metal and a lower flat leaf 87 of sheet metal hingedly attached to each other at adjacent edge portions as shown at 88. The upper flat leaf 86 is pivotally supported in the upper portion of the casing at 89. A cord 90 is attached at 91 to the upper surface of the lower leaf 87 and is led through a pulley 92 secured in the upper portion of the casing. The cord 90 then leads through a separation 93 between the upper edges of the dust screens 77 and around a pulley 94 located in the top of the casing. The cord 90 is then attached to a bead chain 95 which is led through a bent tube 96 extending through an aperture in one of the end walls 64 of the casing and outside of the casing. An apertured bracket 97 having a forked free end 98 is attached to the outer end of the bent tube 96. The bead chain 95 passes from the outer end of the bent tube 96 and between the fingers of the forked end 98 of the bracket 97. By pulling outwardly on the bead chain 95 the shutter 85 may be folded upwardly against the undersurface of the top of the casing. The bead chain 95 may then be pressed between the fingers of the forked end of the bracket 97 to be engaged by the fingers to hold the shutter 85 in an adjusted position. The shutter 85 as shown in Fig. 4 is normally maintained in partly folded position to prevent any dead centering of the hinge point of connection 88 between the two leaf parts of the shutter 85. The shutter 85, as shown in Fig. 4, is in a position for closing off the air intake of the ventilator. The lower leaf 87 of the shutter rests on the guides 84—84 and extends downwardly almost into contact with an inner edge of the lowermost louver 67 in the casing.

To move the shutter 85 to permit the flow of air into the casing the bead chain 95 is manually drawn outwardly of the bent tube 96. This results in pulling up of the cord 90 and the folding of the leaves 86—87 of the shutter 85 toward each other and upwardly toward the top of the casing. In Fig. 5 the leaves 86—87 are partly folded toward each other and have been moved toward the top of the casing. In this position a limited supply of air will be admitted through the louvres 67 and into the casing. In Fig. 6 the leaves 86—87 of the shutter 85 have been moved almost against each other and are drawn upwardly almost into contact with the top of the casing. In this position a greater quantity of air will be admitted to the casing than in the position shown in Fig. 5. The shutter leaves 86—87 are indicated in Fig. 6 as being in the extreme upper position obtained by manual operation of the bead chain 95. The maximum amount of air supplied to the ventilator may be obtained with the shutter 85 in this position.

A retracting spring may be employed to insure return of the shutter 85 to a position for closing the air inlet portion of the casing. A retracting spring 99 for the purpose above mentioned is shown in the lower portion of the air inlet portion of the casing. The retracting spring 99 is secured at one end to a lug 100 in the

bottom wall of the air inlet portion of the casing. A cord 101 is attached to the other end of the retracting spring 99 and is led through a pulley 102, the pulley 102 being attached to the lower wall of the upper portion of the casing. The cord 101 extends upwardly from the pulley 102 to the lower leaf 87 of the shutter 85 to which it is suitably attached, preferably at about a central part of the lower leaf 87 of the shutter. The cord 101 in passing upward from the pulley 102 to the lower leaf 87 of the shutter 85 passes between ends of the paired dust screens 77, the screens being spaced apart a sufficient distance to permit cord 101 to pass between them. When the shutter 85 is raised, tension is developed in the spring 99. When the shutter 85 is released, the spring 99 draws it down again to the position shown in Fig. 4. The spring 99, therefore, forms a positive means for returning the shutter 85 to normal closed position. It is not essential, however, to have the spring return means for the shutter since the shutter when released will fall to closed position by reason of the weight of the leaf members 86—87.

To insure clearance of the louvres 67 by the lower end of the lower leaf 87 of the shutter 85 when the shutter is being drawn upwardly toward the top of the casing, the point of attachment of the cord 90 to the lower leaf 87 of the shutter is made outwardly offset from the point of suspension of the pulley 92. If the pulley 92 were located directly above the point of attachment of the cord 90 to the lower leaf 87 of the shutter, the lower end of the shutter 85 would engage the inner edges of the louvres 67 when the lower leaf 87 of the shutter 85 was drawn upwardly. Having the pulley 92 located inwardly of the casing with respect to the point of pull on the lower leaf 87 of the shutter, as shown in Figs. 4, 5 and 6, insures sufficient backward sliding movement of the lower leaf 87 of the shutter 85 to clear the inner edges of the louvres 67 when the shutter 85 is being folded upwardly toward the top of the casing. When the cord 90 is pulled, the lower leaf 87 of the shutter 85 first slides inwardly of the casing along the guides 84—84 to a point where the lower edge of the lower leaf 87 is sufficiently clear of the inner edges of the lower louvres 67 to permit raising of the lower leaf 87 without interference from the louvres 67. The lower leaf 87, in sliding inwardly, swings the upper leaf 86 inwardly of the casing on the point of suspension 89 of the upper leaf 86. Further pulling on the cord 90 causes further inward movement of the leaves 86—87 of the shutter 85 and also causes the upward swinging movement of the leaves 86—87 of the shutter. The hinged point of connection 88 between the leaves 86—87 of the shutter 85 describes an arc about the suspension point 89 of the upper leaf of the shutter 86 when the leaves 86—87 of the shutter 85 are being moved inwardly and upwardly within the casing. The leaves 86—87 of the shutter are gradually pulled toward each other until they reach the position shown in Fig. 6. To hold the shutter 85 in this position or any required position of open or partial opening of the shutter 85, the bead chain 95 may be manually pressed between the fingers of the fork-shaped bracket 97 so that the fingers of the bracket 97 pass between beads in the bead chain 95. To return the shutter 85 from the completely raised or a partially raised position to normal position the bead chain 95 is manually removed from the fork-shaped bracket 97 and the pull on 75



the cord 90 is released. The leaves 86—87 of the shutter 85 will then swing downwardly and in the direction of the louvres 67 to the position shown in Fig. 4.

5 The front plate 9 of the casing extends from the floor to the top of the upper horizontal portion of the ventilator and completes the closing in of the sound attenuating chambers 50—50, 51—51 and 52—52, the air passageways, and the upper portions of the casing in which the motor 43 and fans 45—45 are located. The front plate 9 is removably attached to the outer flanges of the outer frames which form part of and support other parts of the walls defining the sound 10 attenuating chambers and the air passageways. The front plate 9 is also removably attached at its upper portion to the outer flanges of the frame 68 of the upper portion of the casing.

A front cover 103 is applied to the casing to 20 cover the front plate 9. The front cover 103, as shown in Figs. 1 and 2, comprises a front wall 104, side walls 105—105 and the top wall 106. The side walls 105—105 have flanged edges 107 turned parallel to the front wall 104 and inwardly toward the sides of the casing. The top wall 106 has an upwardly turned edge 108 extending upwardly and normal to the plane of the top of the casing. There is no flange on the bottom of the front cover 103. Attached to the 30 sides of the lower portion of the casing are straight metal strips 109 to be engaged by the flanged edges 107 of the side walls 105 of the cover 103. In applying the cover 103 to the casing, the cover 103 is raised above the upper ends of the metal strips 109 and moved toward the casing to bring the flanged edges 107 of the side walls 105 back of the metal strips 109. The cover 103 is then lowered so that the flanged edges 107 pass downward along the back of the metal strips 40 109. The cover 103 by reason of the engagement of the flanged edges 107 with the metal strips 109 cannot be accidentally removed from the casing.

On each side of the casing an outlet shell 110 45 is provided through which air taken in through the ventilator is supplied to the room or other interior portion of the building. Each outlet shell 110 has one open side adjacent the side walls of the casing. The lower portion of the open side of the outlet shell 110 has communication with the opening 111 indicated in Fig. 3, in the side of the casing defined by the lowermost wall section of the sound attenuating chamber system, the floor plate 10 and the front and back 55 plates 8 and 9 of the casing. The outlet shell 110 comprises front and back wall members 112 and 113, a top wall 114, a bottom wall 115 and the side wall 116. The front and back wall members 112 and 113 are curved along the outer edge near the top 114. The side wall 116 follows the form of the front and back wall members 112 and 113 and curves inwardly toward the side of the casing. A plurality of elongated apertures 117 are 65 provided in the side wall 116 to serve as air outlets in the structure. The outlet shells 110 are removably attached to the casing and the cover 103 by means of diagonal slots 118 in the free edges of the front and back walls 112 and 113 of the outlet shells and pins 119 which project from the back plate 8 of the casing and the flanged 70 side edges 107 of the cover 103. One of the pins 119 is shown in the lower left corner of the back plate in Fig. 2. This pin 119 receives the slot 118 shown in the lower section of the back wall of the outlet shell 110. A pin 119 and slot 118

arrangement, not shown, is also provided to hold the upper portion of the outlet shell 110 in place. A pin 119 extending rearwardly from the flanged edge 107 of the cover 103 engages the slot 118, 5 not shown, in the front wall of the outlet shell 110 and of like character to the slot 118 shown to engage the pin 119 in the lower section of the back plate 8. A pin 119, not shown, but located in the upper portion of the flanged edge 107 of the cover 103 engages slot 118 in the upper portion of the front wall of the outlet shell 110. The outlet shell 110 shown on the left side in Fig. 2 is slightly projected from the side of the casing to provide sufficient showing of the pin 119 and the slot 118 arrangement to illustrate the struc- 15 ture described. The lower portion of the outlet shell 110 is also broken away to show the location and position of air foils 120 located in the outlet shell 110 and which correspond in structure to the air foils 54 located in the air passage- 20 ways in the casing. When the front cover 103 is applied to the casing and the outlet shells 110 are attached, the front walls of the outlet shells 110 as shown in Fig. 1, are immediately adjacent the flanged edges of the cover 103. The pin 119 25 and slot arrangement 118 for holding the outlet shells 110 in place are therefore not visible when the apparatus is completely assembled.

To complete the structure an inverted U-shaped cover 121 of channel cross-section is ap- 30 plied across the top of the casing. The inverted U-shaped cover 121 is shown in Fig. 2 as projected above the top of the casing and comprises the top wall 122 and the leg portions 123—124. The front edge flange 125 along the top of the inverted U-shaped cover 121 overlaps and en- 35 engages the upturned edge 108 on the top of the cover 103 when the cover 103 is in normal position as shown in Fig. 1. The leg portions 123—124 are cut out along one side to accommodate 40 the top of the outlet shell 110 and the leg portion 123 has an open ended slot 126 to receive the bent tube 96 holding the bead chain 95. The edge flanges 127—128 along the front of the leg portions 123—124 are immediately adjacent the up- 45 per portions of the flanged edges of the cover 103 when the apparatus is completely assembled as shown in Fig. 1. The edge flanges 129 along the back of the cover 121 rise above the lower edge of the lower and partly opened sash of the win- 50 dow when the bottom of the sash rests on the top of the upper portion of the casing.

When the ventilator is placed in a partially opened window, as shown in Fig. 7, air from the outside of the building is admitted to the ven- 55 tilator through the louvres 67. When the fan motor 43 is started and the shutter 85 is partially raised, as shown in Fig. 5, or fully raised as shown in Fig. 6, air from outside the building is drawn through the dust screens 77—77 and 60 into the fans 45—45. As shown by the arrows in Fig. 3, the air enters the fans 45—45 from the two open sides of the hoods 46—46. The air, screened of dust particles by means of the dust screens 77—77, is then driven by the fans 45—45 65 downwardly through the respective air passageways 23—24 and into the common air duct 25, the air being guided in its course by the walls defining the sound attenuating chambers 50, 51 and 52 and by the air foils 54. As the stream of 70 air passes the various sound attenuating chambers 50, 51 and 52 sound vibrations in the air taken into the ventilator from the outside of the building and sound vibrations set up by the fans 45—45 are absorbed and attenuated by the 75

sound attenuating chambers 50, 51 and 52. The amount of attenuation of the sound vibrations and the frequency bands attenuated depends on the size and arrangement of the sound attenuating chambers 50, 51 and 52. To cover a fairly large range of frequency bands three comparatively different sizes of sound attenuating chambers are shown as being included in the structure. The largest chambers will attenuate comparatively low frequency sound vibrations, the medium sized chambers those of somewhat higher frequency and the smallest, those of a still higher frequency. When the air flowing in the air passageways has passed the lowermost sound attenuating chambers it is directly by means of the air foils 54 in the lower central portion of the casing and by means of the air guide 13 and various wall members in the lower portion of the ventilator along the air passageways 26-27, thence through the openings 111 and into the outlet shells 110-110. The air foils 120 in the lower portions of the outlet shells 110 direct the air upwardly through the outlet shells 110 and toward the elongated apertures 117 in the outlet shells 110. The air then enters the room by way of the elongated apertures 117 in the outlet shells 110. The quantity of the air delivered to the interior of a building depends on the deliverance capacity of the fans 45-45 and the position of the shutter 85. The air supply may be regulated as required by changing the position of the shutter 85 and/or the speed of the motor 43 driving the fans 45-45.

Although the description of this invention has, for the sake of clearness, been confined chiefly to the structure including two sound attenuating chambers of each size, two fans and a Y-shaped system of air passageways, it is obvious that the arrangement might be reduced by half as shown in Fig. 9, if a ventilator of half the deliverance capacity of the structure shown in the other figures is all that is required. Fig. 9 comprehends having a single motor driven fan, a single sound attenuating chamber of each size and the various air passageways arranged accordingly.

It is also to be noted that where some means are required for automatically rendering the ventilator ineffective to produce drafts in a room as in the case of a fire occurring, that a fusible link might be provided in the cord holding the shutter so that melting of the link would cause release of the shutter to stop the flow of air through the ventilator. Some comparatively low melting point element might also be used in connection with the source of current supplied to the motor to cause discontinuance of operation of the motor upon the occurrence of a predetermined temperature in the room.

What is claimed is:

1. A ventilator comprising in combination, a casing, an apertured wall in said casing dividing the casing into upper and lower portions, a motor driven fan supported on said apertured wall in the upper portion of the casing, louvers in the upper portion of said casing defining air inlet apertures, partition walls in the lower portion of said casing defining, in cooperation with the walls of said casing, air passageways and sound filter chambers, removable dust screens supported in the upper portion of said casing between said louvers and said fan, a foldable shutter supported in the upper portion of said casing between said louvers and said dust screens, manually operated means to operate said shutter, and removable outlet shells supported against the

sides of the lower portion of said casing, said outlet shells having apertures formed therein to serve as outlet ports of the ventilator.

2. A ventilator comprising in combination, a casing, an apertured wall in said casing dividing the casing into upper and lower portions, a motor driven fan supported on said apertured wall in the upper portion of the casing, louvers in the upper portion of said casing defining air inlet apertures, partition walls in the lower portion of said casing defining, in cooperation with the walls of said casing, air passageways and sound filter chambers, removable dust screens supported in the upper portion of said casing between said louvers and said fan, a foldable shutter supported in the upper portion of said casing between said louvers and said dust screens, said shutter comprising an upper leaf member and a lower leaf member hingedly attached together, spaced sloping guides attached to inner surfaces of the walls of the upper portion of said casing, said lower leaf member sliding forwardly on said guides when the shutter is coming to a final resting position and sliding backwardly on said guides when first moving from normal position, a cord attached to the lower leaf member of said shutter, a pulley for said cord supported in the upper portion of said casing above said lower leaf member and inward of said casing relative to the point of attachment of said cord to said lower leaf member of the shutter, said shutter normally resting in a position where the upper leaf member extends inwardly of the casing relative to the point of support of the upper leaf member and the lower leaf member extends outwardly relative to the hinge point of connection between the two leaf members, a guide for said cord extending outward of said casing, and a holding member for said cord attached to said guide and adapted to receive said cord to hold said shutter in an adjusted position.

3. A ventilator comprising in combination, a casing, an apertured wall in said casing dividing the casing into upper and lower portions, a motor driven fan supported on said apertured wall in the upper portion of the casing, louvers in the upper portion of said casing defining air inlet apertures, partition walls in the lower portion of said casing defining, in cooperation with the walls of said casing, air passageways and sound filter chambers, removable dust screens supported in the upper portion of said casing between said louvers and said fan, a foldable shutter supported in the upper portion of said casing between said louvers and said dust screens, said shutter comprising an upper leaf member and a lower leaf member hingedly attached together, spaced sloping guides attached to inner surfaces of the walls of the upper portion of said casing, said lower leaf member sliding forwardly on said guides when the shutter is coming to a final resting position and sliding backwardly on said guides when first moving from normal position, a cord attached to the lower leaf member of said shutter, a pulley for said cord supported in the upper portion of said casing above said lower leaf member and inward of said casing relative to the point of attachment of said cord to said lower leaf member of the shutter, said shutter normally resting in a position where the upper leaf member extends inwardly of the casing relative to the point of support of the upper leaf member and the lower leaf member extends outwardly relative to the hinge point of con-

nection between the two leaf members, an operating chain attached to the free end of said cord, a guide for said chain extending outward of said casing, and a holding fork attached to said guide and adapted to receive said chain to hold said shutter in an adjusted position.

5 4. In a ventilator, a casing, a back wall forming part of said casing, spaced wall members in said casing defining in cooperation with walls of said casing air passageways and a system of sound attenuating chambers, spaced curved plates secured at their edge portions to the back

wall of said casing and extending normal to the plane of the back wall, said plates having a plurality of flat sides and corner and edge portions, and curved hollow air foils slipped over said spaced curved plates and frictionally held in place by said curved plates, the inner surfaces of said hollow air foils frictionally engaging the corner and edge portions of said curved plates, said air foils being located in said air passageways and serving to direct the flow of air in required directions.

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