Jan. 2, 1940. E. L. ANDERSON 2,185,718

FAN

Filed June 24, 1936 2 Sheets-Sheet 1

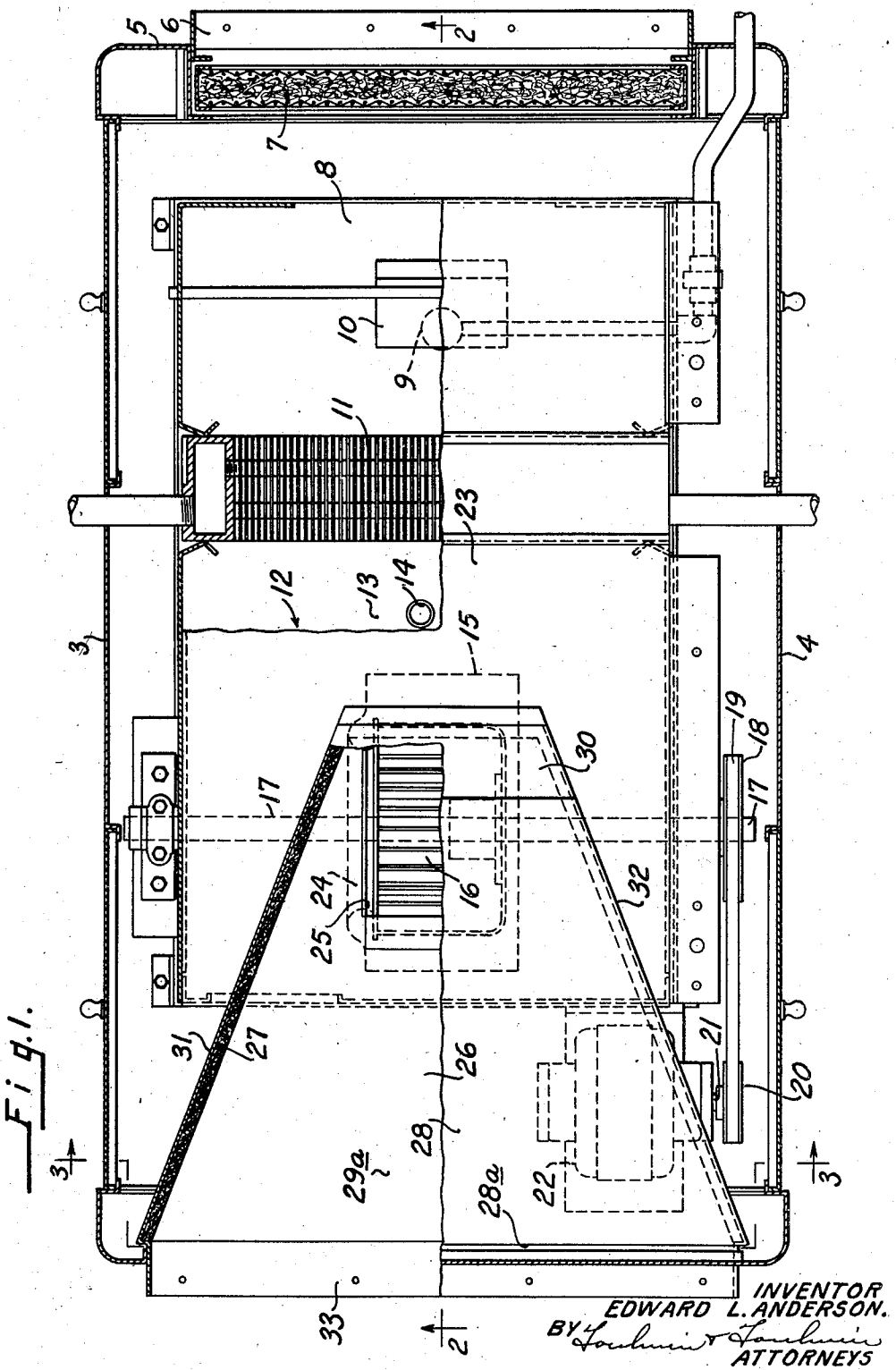


Fig. 1.

INVENTOR
EDWARD L. ANDERSON.
BY Lauhuin & Lauhuin
ATTORNEYS

Jan. 2, 1940. E. L. ANDERSON 2,185,718

FAN

Filed June 24, 1936 2 Sheets-Sheet 2

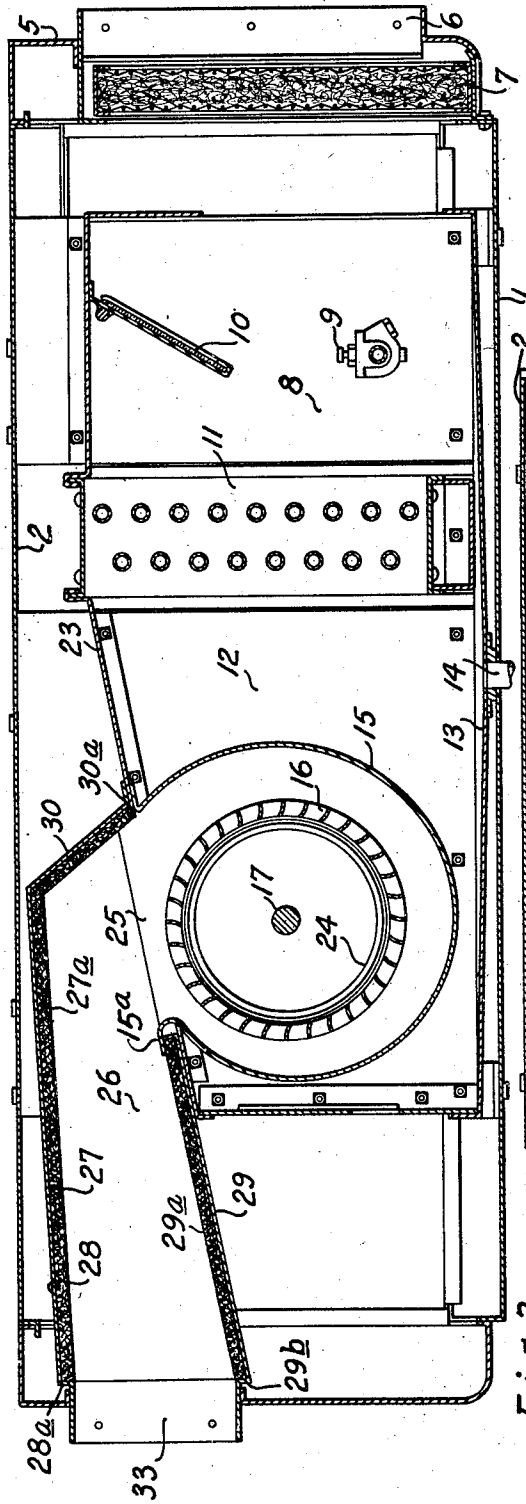


Fig. 2.

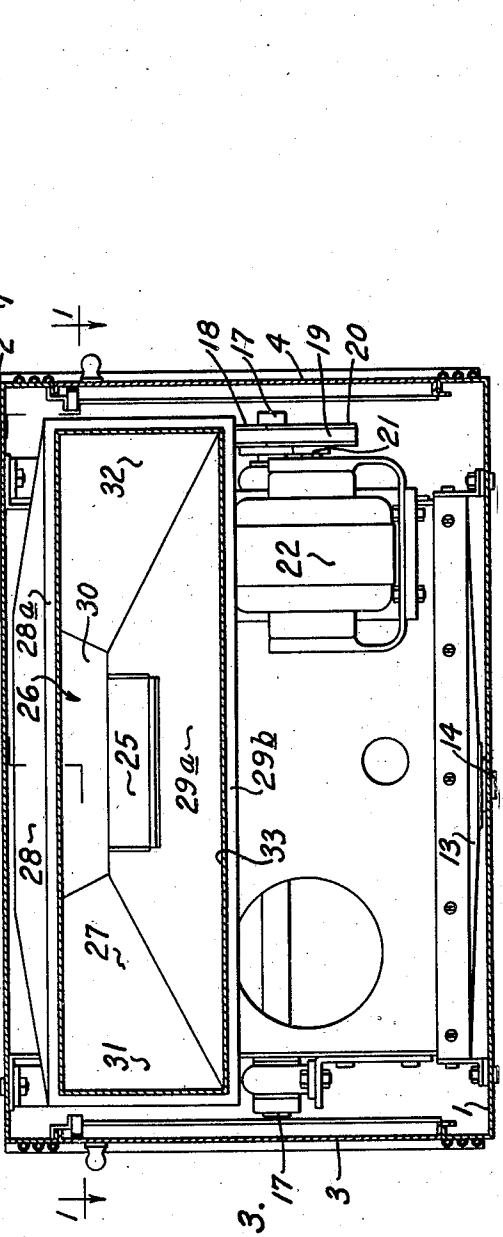


Fig. 3.

INVENTOR
EDWARD L. ANDERSON.
BY Lonsdale & Lonsdale
ATTORNEYS

Patented Jan. 2, 1940 2,185,718

UNITED STATES PATENT OFFICE

2,185,718

FAN

Edward L. Anderson, Detroit, Mich., assignor to American Blower Corporation, Detroit, Mich., a corporation of Delaware

Application June 24, 1936, Serial No. 87,032

18 Claims. (Cl. 230—233)

My invention relates to air handling apparatus and in particular to a means and method of sound absorption of air handling fans, casings and ducts associated therewith.

It is my object to provide in a unit adapted to heating, cooling and humidification, a fan having a sound absorbing outlet.

It is my object to provide a form of outlet which reduces the sound from the apparatus, particularly when used in connection with metal casings. It is understood that such fans used in units and other similar installations in connection with enclosures such as homes, theatres, schools and churches must be as nearly noiseless as possible.

It is the object of my invention to provide a fan having a high speed and relatively high velocity outlet of air that will be noiseless, while at the same time permitting the fan to travel at its most efficient speed.

Referring to the drawings:

Figure 1 is a top plan view of a unit embodying my invention with the metal enclosing casing in section, a portion of the radiator in section, and a portion of the fan outlet chamber in section. The section of Figure 1 is taken on the line 1—1 of Figure 3.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 looking in the direction of the arrows of Figure 1.

Referring to the drawings in detail, 1 designates the bottom of a metal casing which has the top 2 and sides 3 and 4. An end 5 is provided with an air inlet 6 in which is located a filter 7. The air passes through the filter and then through the humidifying chamber 8 having a humidifying spray nozzle 9 and baffle plate 10. The air then passes through the radiator 11, which may either be for cooling or heating purposes, and thence into the fan chamber 12. The bottom of this chamber is inclined at 13 so that any entrained moisture may drain away through the pipe 14.

Within the air inlet chamber 12 is mounted the fan casing 15 in which is located a fan 16 mounted on the shaft 17 that carries a pulley 18 which is driven by a belt 19 from a smaller pulley 20 on the armature 21 of an electric motor 22. The lateral dimensions of this vortex fan casing 15 are small in comparison with the lateral dimensions of the chamber 12. The cover of the chamber 12 is inclined as at 23.

The sides of the fan casing 15 are provided with air inlet openings 24 through which the air enters and is then delivered by the fan 16 from the casing 15 tangentially through the outlet opening 25 into the outlet passageway 26.

This passageway is lined with a sound deadening material 27. The passageway expands vertically and laterally as indicated by the positioning of the upper wall 28 and lower wall 29, which progressively are further apart as the air progresses away from the fan 16. The angular wall 30 acts as a baffle wall for directing the air into the passageway 26.

The side walls of the passageway 31 and 32 likewise are progressively further apart towards the air outlet 33. These side walls are likewise insulated with the sound deadening material 27.

The course of the air is first through the filter 7 after entering through the passageway 6, thence through the humidifying chamber 8, radiator 11, into the relatively large chamber 12, whence the air enters through the air inlet opening 24 into the eye of the fan and is discharged from the casing 15 through the opening 25 into the sound insulated, vertically and laterally expanding passageway 26, whence it leaves through the opening 33.

Despite the fact that this fan is operating within a thin sheet metal casing which emphasizes any noise and handles a large volume of air with an air discharge at a substantial velocity, nevertheless the operation of the unit is substantially noiseless. This is due to the arrangement of the parts, particularly the air outlet.

The insulation 27 which is parallel to the rear wall 30 is held in position as it rests upon the flange 30*a* at its bottom and against the adjacent edge at its top of the top lining 27*a*. The forward end of the top lining 27*a* engages with the wall 28*a*, which forms a recess for receiving the lining 27*a*. The lower covering of insulation on the wall 29, which insulation is designated 29*a*, is likewise inserted behind the shoulder 29*b* at its forward end and is overlapped and engaged at its rear end by the lip 15*a* of the fan casing 15 which is suspended from the top 23 of the air inlet chamber 12.

It will be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In combination, a fan and surrounding fan casing, and an extended air outlet separate from

said fan casing and having a sound deadening lining material therein and disposed in part between portions of said air outlet and said fan casing and providing support for a part of said fan casing on said air outlet.

2. In combination, a fan and fan casing, and an extended air outlet with progressively expanding side, top and bottom walls and having a sound deadening lining material therein, said outlet being arranged at an acute angle to the line of discharge of the air from the fan casing, and having an angular positioned baffle wall for directing air into said extended outlet.

3. In combination, a fan casing, a fan therein adapted to discharge upwardly through the top side of said casing, and an air outlet passageway disposed at an acute angle to the direction of fan discharge and communicating with said casing comprising top, bottom and side walls progressively expanding from the inlet to the outlet passageway to the outlet thereof and provided with an interior sound absorbent lining, said outlet passageway wall comprising a sound insulated annular section positioned adjacent said fan for directing the air discharged therefrom into said expanded outlet passageway.

4. In combination, an air inlet chamber a fan casing located therein and communicating therewith, a fan in said fan casing, a substantially horizontal discharge passageway communicating with said fan casing and disposed at an acute angle to the discharge of said fan, said discharge passageway being progressively larger from its inner end towards its outer end comprising a vertically and laterally expanding opening and having therein a lining of sound-deadening material.

5. In combination, an air inlet chamber, a fan casing suspended therein from the top thereof, said fan casing having an outlet opening communicating with an outlet opening in the top of said chamber and said fan casing having an air inlet opening communicating with said chamber, a discharge passageway provided with an interior sound absorbent lining and extending from said air outlet opening of the fan casing progressively larger laterally from the inlet end of the outlet passageway to the outlet end thereof, and a fan in said fan casing, a portion of said fan casing being supported by said discharge passageway and being insulated therefrom by a portion of said lining.

6. In combination, an air inlet chamber, a fan casing suspended therein from the top thereof, said fan casing having an outlet opening communicating with an outlet opening in the top of said chamber and said fan casing having an air inlet opening communicating with said chamber, a discharge passageway provided with a lining of sound absorbent material and extending from said air outlet opening of the fan casing progressively larger laterally from the inlet end of the outlet passageway to the outlet end thereof, and a fan in said fan casing, said outlet passageway being disposed substantially parallel to the line of flow of the air entering the first-mentioned air chamber and having the lining thereof supporting the forward edge portion of said fan casing.

7. In combination, an air inlet chamber, a fan casing suspended therein from the top thereof, said fan casing having an outlet opening communicating with an outlet opening in the top of said chamber and said fan casing having an air inlet opening communicating with said inlet chamber, a discharge passageway extending from said air outlet opening of the fan casing progressively larger laterally from the inlet end of the outlet passageway to the outlet end thereof, and a fan in said fan casing, said outlet passageway having a sound absorbent lining therein and being disposed substantially parallel to the line of flow of the air entering the first mentioned air chamber and at an angle to the line of discharge of the air by the fan from the fan casing and said fan casing having one edge supported by said outlet passageway and insulated therefrom by a portion of the lining thereof.

8. A new article of manufacture for use as a fan discharge passageway comprising a casing adapted to be horizontally disposed and having laterally diverging flat side walls and diverging flat top and bottom walls, with an air inlet opening in the bottom wall and a fixed wall portion diagonally disposed across the end of the casing over the air inlet opening thereto for directing the air into said fan discharge passageway.

9. A new article of manufacture for use as an air outlet passageway comprising a substantially horizontal passageway having diverging side walls and diverging top and bottom walls, said divergence taking place from the inlet to the outlet end of the passageway, said passageway having an air inlet opening on the bottom of the inlet end, a fixed wall portion diagonally disposed across the inlet end over the air inlet opening, and having an air outlet opening at the outlet end.

10. In combination, an air inlet chamber having an air inlet opening at one end, said chamber decreasing in size from the air inlet opening towards the air outlet opening and having an air outlet opening therein, a fan casing communicating with the air inlet chamber suspended in the air outlet opening of the air inlet chamber and communicating therewith, a fan in the fan casing, and an angularly disposed, expanding discharge casing associated with the fan casing outlet whereby the air discharged therefrom has its direction of discharge changed and is permitted to expand before it is discharged from the passageway.

11. A discharge casing for a wheel type blower having an impeller wheel, a housing including a spiral outer wall adjacent to the periphery of the wheel, and a discharge outlet lying in a plane approximately tangential to the periphery of the wheel, said casing including a side lying in the plane of said discharge outlet and an opposed side beginning substantially as a continuation of the spiral of said outer wall and extending as a plane surface, diverging from the first side at an acute angle with respect thereto, and two other sides, the last two sides being divergently disposed so as to form a rectangular conduit progressively increasing in cross-sectional area at a greater rate than that of the space between the periphery of said wheel and said housing, the length of said discharge casing with respect to the length of said discharge outlet being such that substantially all atmospheric vibrations within the sonic range originated by said impeller wheel impinge upon a side of the casing.

12. A discharge casing for a wheel type blower having an impeller wheel, a housing including a spiral outer wall adjacent to the periphery of the wheel, and a discharge outlet lying in a plane approximately tangential to the periphery of the wheel, said casing including a side lying in the plane of said discharge outlet, an opposed side

beginning substantially as a continuation of the spiral of said outer wall and extending as a plane surface diverging from the first side at an acute angle with respect thereto, and two other sides, the last two sides being divergently disposed so as to form a rectangular conduit progressively increasing in cross-sectional area at a greater rate than that of the space between the periphery of said wheel and said housing, the length of said discharge casing with respect to the length of said discharge outlet being such that substantially all atmospheric vibrations within the sonic range originated by said impeller wheel impinge upon a side of the casing at such angles that the majority of such vibrations may be reflected against another side of the casing.

13. A discharge casing for a wheel type blower having an impeller wheel, a housing including a spiral outer wall adjacent to the periphery of the wheel, and a discharge outlet lying in a plane approximately tangential to the periphery of the wheel, said casing including a side lying in the plane of said discharge outlet, an opposed side beginning substantially as a continuation of the spiral of said outer wall and extending as a plane surface diverging from the first side at an acute angle with respect thereto, two other sides, the last two sides being divergently disposed so as to form a rectangular conduit progressively increasing in cross-sectional area at a greater rate than that of the space between the periphery of said wheel and said housing, the length of said discharge casing with respect to the length of said discharge outlet being such that substantially all atmospheric vibrations within the sonic range originated by said impeller wheel impinge upon a side of the casing, and sound-absorbing material forming at least the inner surfaces of said sides.

14. A discharge casing for a wheel type blower having an impeller wheel, a housing including a spiral outer wall adjacent to the periphery of the wheel, and a discharge outlet lying in a plane approximately tangential to the periphery of the wheel, said casing including a side lying in the plane of said discharge outlet and an opposed side beginning substantially as a continuation of the spiral of said outer wall and extending as a plane surface diverging from the first side at an acute angle with respect thereto, two other sides, the last two sides being divergently disposed so as to form a rectangular conduit progressively increasing in cross-sectional area at a greater rate than that of the space between the periphery of said wheel and said outer wall, the length of said discharge casing with respect to the length of said discharge outlet being such that substantially all atmospheric vibrations within the sonic range originated by said impeller wheel impinge upon a side of the casing at such angles that the majority of such vibrations may be reflected against another side of the casing, and sound-absorbing material forming at least the inner surface of said sides.

15. In combination, a fan and fan casing, and an extended air outlet with progressively expanding side, top and bottom walls and having a sound deadening lining material therein to form sound deadening walls, said outlet being arranged at an acute angle to the line of discharge of the air from the fan casing, in which all lines of discharge from the fan intersect a sound deadening wall of the discharge passageway.

16. In combination, a fan rotor and fan casing having an extended air outlet with pairs of oppositely spaced progressively expanding sound deadening walls constituting an extended air outlet disposed at an acute angle to the line of discharge of air from the said fan casing and being arranged so that all lines of discharge from the fan intersect a sound deadening wall in said passageway.

17. In combination, a fan rotor and fan casing having an extended air outlet with sound deadening walls progressively expanding in all directions to form a passageway and constituting an extended air outlet disposed at an acute angle to the line of discharge of air from the said fan casing and being arranged so that all lines of discharge from the fan intersect a sound deadening wall in said passageway.

18. In combination, a fan rotor and a fan casing, an extended air outlet in the form of a hollow truncated pyramid having sound deadening walls, said fan and fan casing adapted to discharge therein and being located adjacent the apex end of said pyramid, said fan being so located with respect to the pyramid that all lines of discharge from the fan intercept a sound deadening wall of the pyramid.

EDWARD L. ANDERSON.