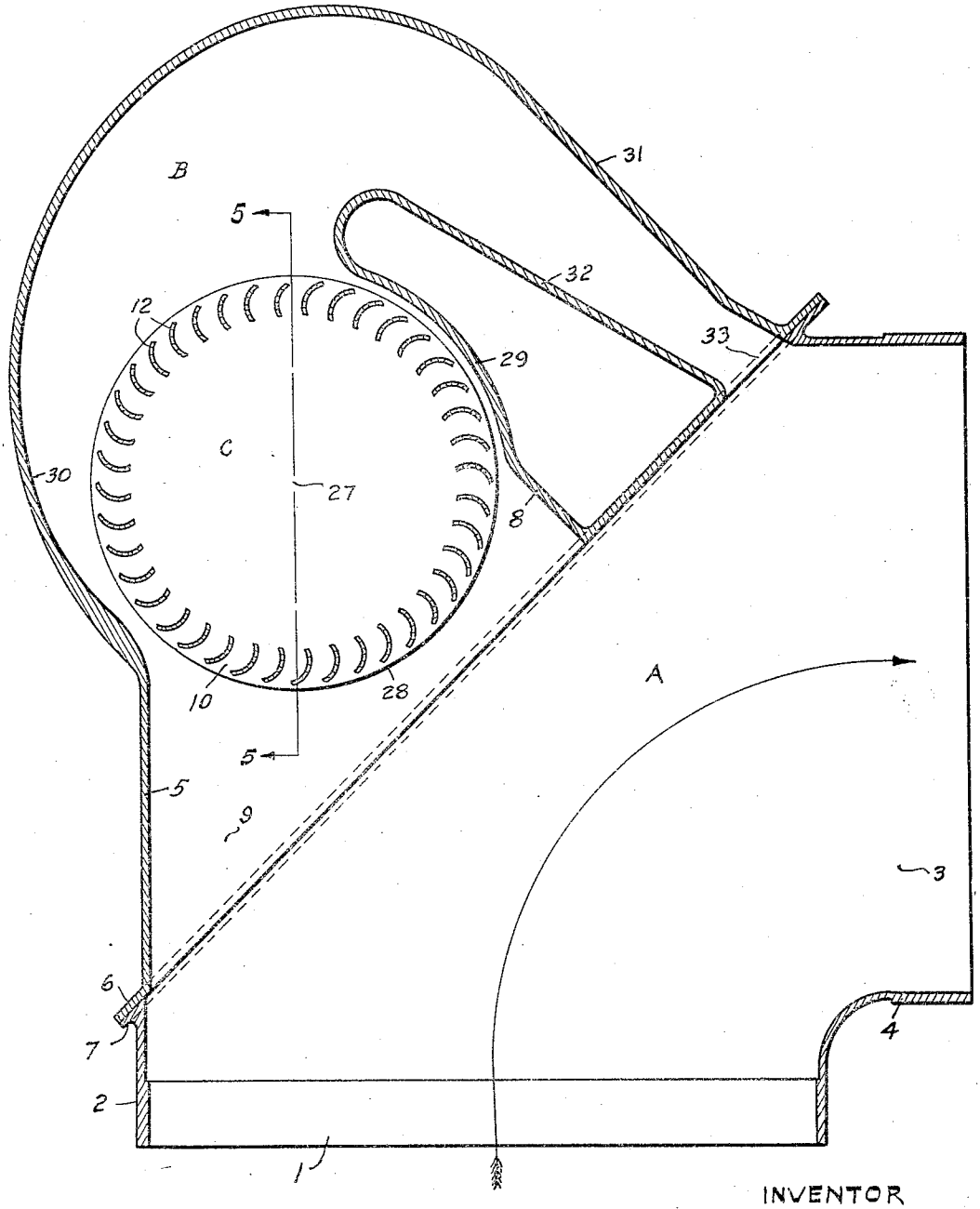
Nov. 8, 1932. E. L. ANDERSON 1,886,513

ANGULAR FLOW FAN

Filed Jan. 2, 1931 5 Sheets-Sheet 1

FIG. 1



INVENTOR

EDWARD L. ANDERSON.

BY Lauhain & Lauhain

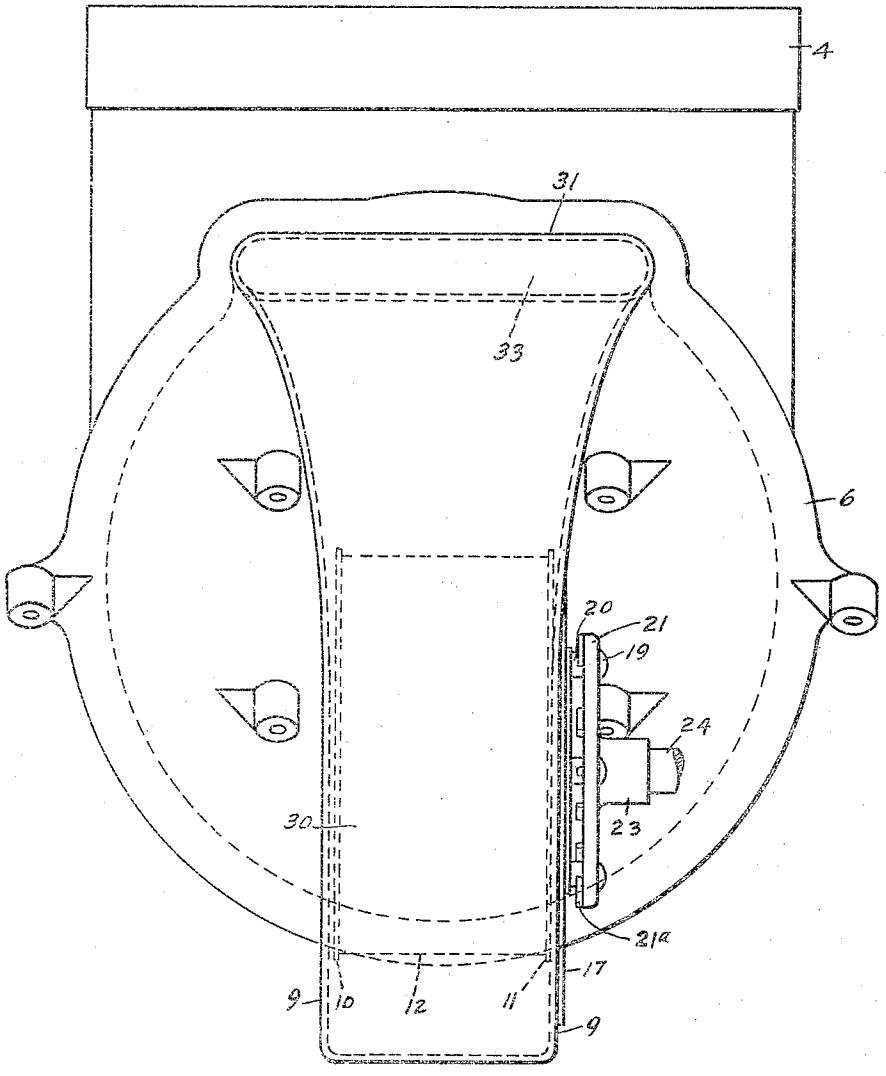
ATTORNEYS

Nov. 8, 1932. E. L. ANDERSON 1,886,513

ANGULAR FLOW FAN

Filed Jan. 2, 1931 5 Sheets-Sheet 2

FIG. 2



INVENTOR

EDWARD L. ANDERSON.

BY Taubman & Taubman

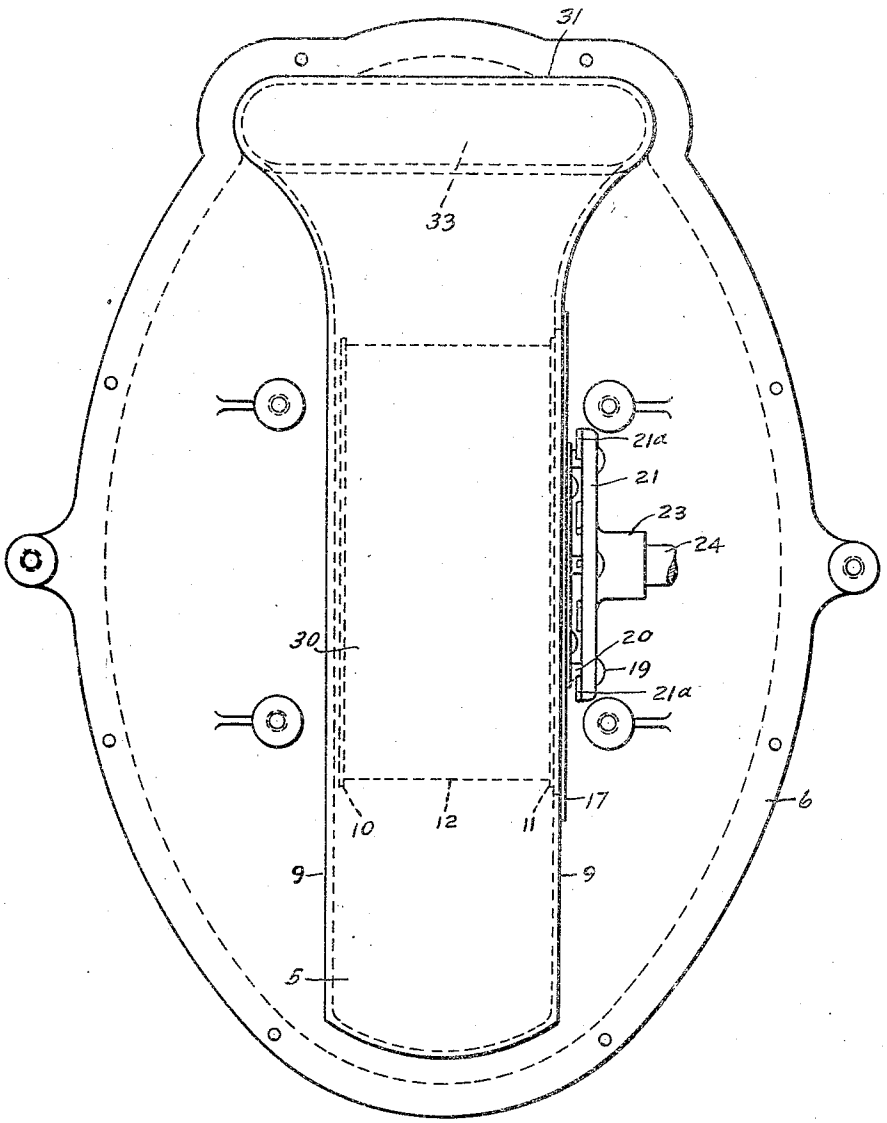
ATTORNEYS

Nov. 8, 1932. E. L. ANDERSON 1,886,513

ANGULAR FLOW FAN

Filed Jan. 2, 1931 5 Sheets-Sheet 3

FIG. 3



INVENTOR

EDWARD L. ANDERSON.

BY Toulmin & Toulmin

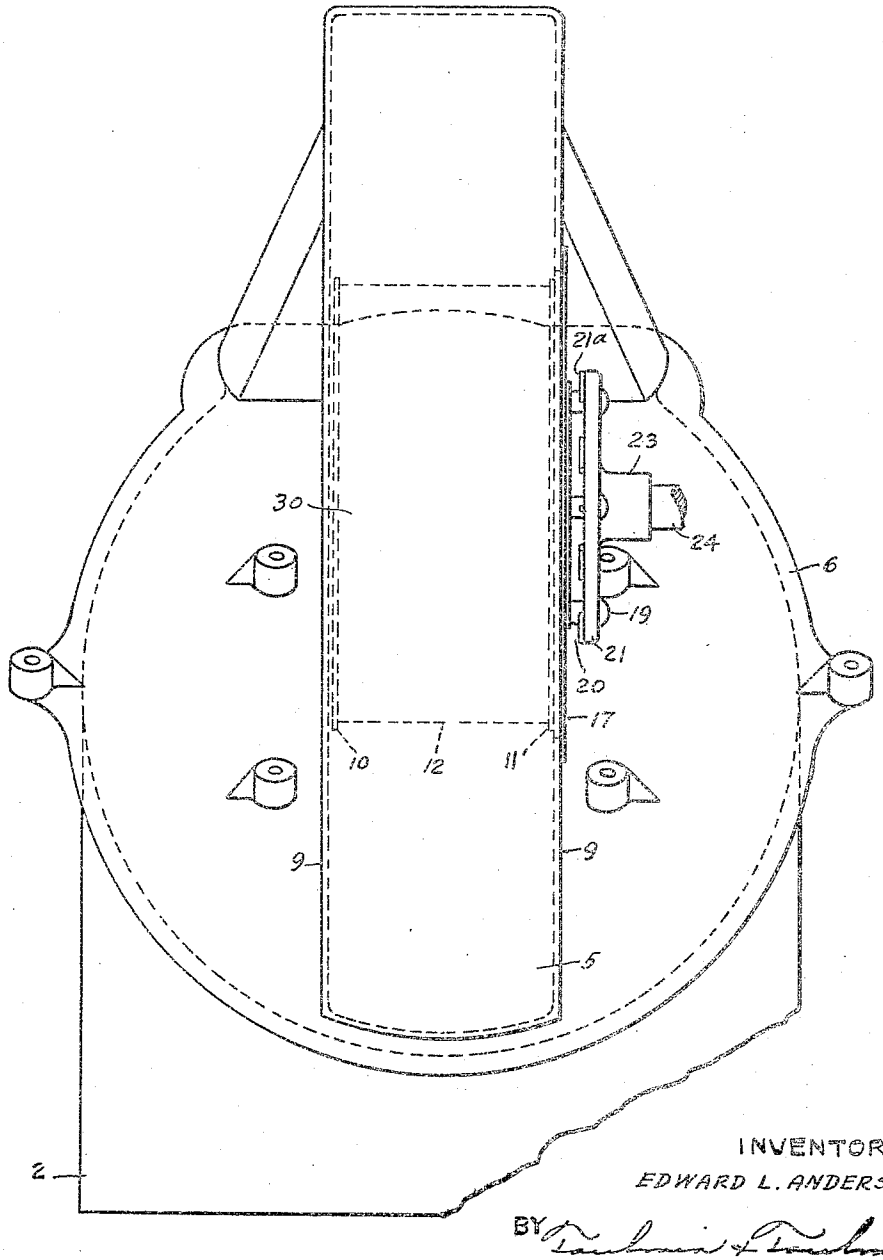
ATTORNEYS

Nov. 8, 1932. E. L. ANDERSON 1,886,513

ANGULAR FLOW FAN

Filed Jan. 2, 1931 5 Sheets-Sheet 4

FIG. 4



INVENTOR
EDWARD L. ANDERSON.

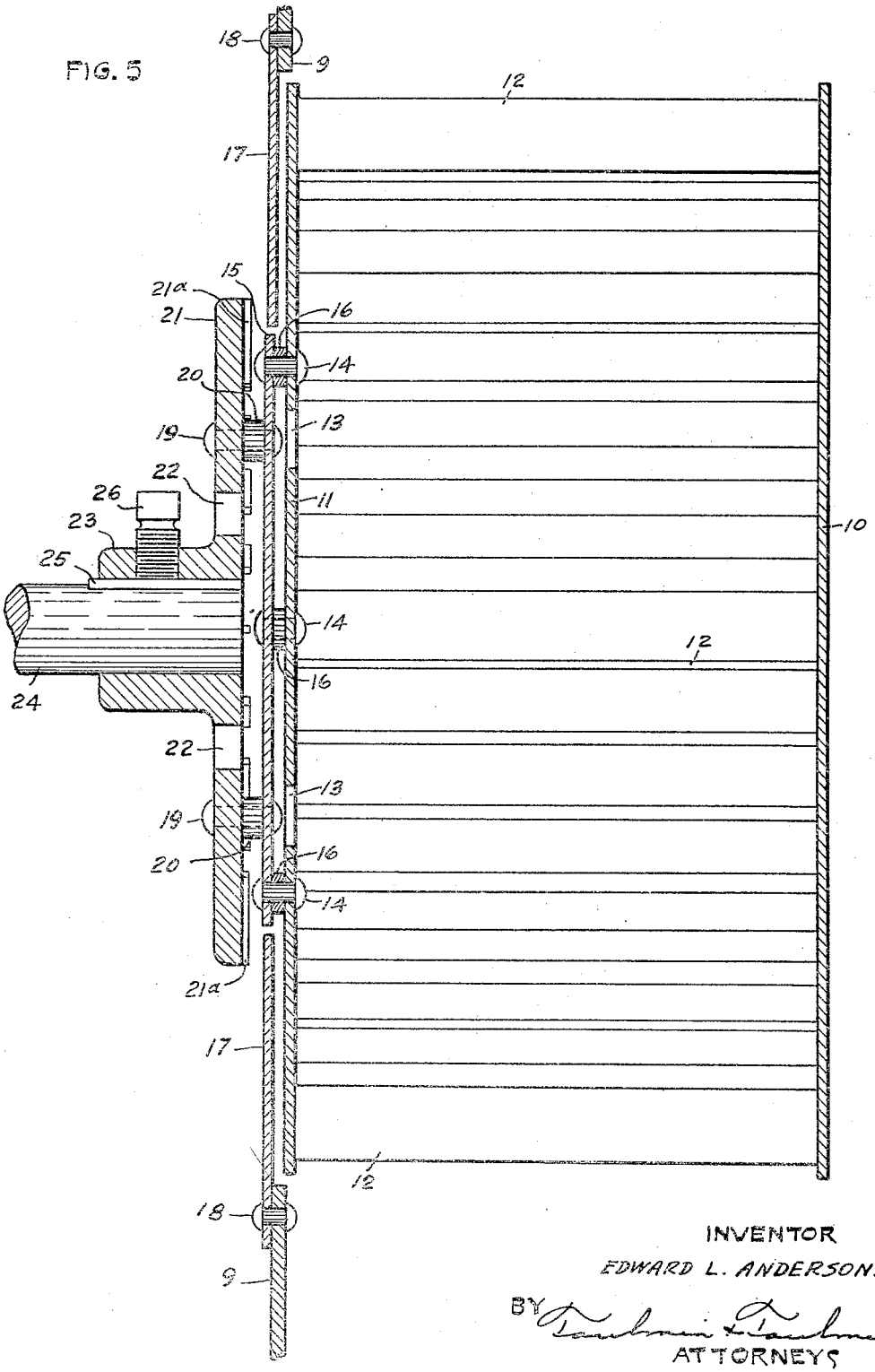
BY Taylor & Taylor
ATTORNEYS

Nov. 8, 1932. E. L. ANDERSON 1,886,513

ANGULAR FLOW FAN

Filed Jan. 2, 1931 5 Sheets-Sheet 5

FIG. 5



INVENTOR

EDWARD L. ANDERSON.

BY Taubman & Taubman

ATTORNEYS

Patented Nov. 8, 1932 1,886,513

UNITED STATES PATENT OFFICE

EDWARD L. ANDERSON, OF GROSSE ILE, MICHIGAN, ASSIGNOR TO AMERICAN BLOWER CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE

ANGULAR-FLOW FAN

Application filed January 2, 1931. Serial No. 506,057.

My invention relates to angular, injector-type, line-flow fans.

It is my object to provide means of moving air by extracting a portion of the air, moving it through a line flow fan and ejecting it in a stream back into the main circuit of air to induce the flow of the main body of air.

It is particularly my object to provide such a means to move air from one direction to another.

It is a further object to provide a line-flow fan of this combination in which all of the gases passing through the fan pass from side to side and do not enter through the end of the fan.

It is a further object to provide a screen for the returning portion of the fan so as to prevent the returning fan blades, returning from the exit side to the inlet side, from disturbing the air already discharged into the injector.

It is particularly my object to provide a fan mechanism and injector in connection with hot gases, as from boiler stacks, and to provide means of cooling the several parts of the mechanism.

It is also my object to provide a cool injector and a construction for cooling the connection of the fan with the motive power, such as the electric motor.

Referring to the drawings:

Figure 1 is a section through the line-flow fan injector and angular main supply pipe;

Figure 2 is a top plan view thereof;

Figure 3 is an end elevation thereof at an angle of 45 degrees thereto;

Figure 4 is a side elevation;

Figure 5 is a detail section on the line 5—5 of Figure 1.

Referring to the drawings in detail, 1 is the entrance opening of an entrance passageway 2, through which gases flow and then turn at right angles and proceed as indicated by the arrow through the passageway A out of the exit opening 3 formed by the passageway 4. The main body of the gases follows the arrow through the passageway A. A portion of these gases is withdrawn from the main stream and enters the fan housing 5, which has a diagonally disposed bottom 6 engaging with the diagonal upper face 7 of the main passageway casing. The wall 8 and side walls 9 provide the remainder of the inlet passageway to the line-flow fan, which consists of a front plate 10 and a back plate 11, which have between them the arcuate blades 12. The back plate 11 is provided with a plurality of apertures 13 which accommodate the insertion of the rivets 19. It is mounted upon a series of studs or rivets 14 upon the center plate 15 and is spaced therefrom by the washers 16. The back plate 11 is also spaced from the annular plate 17 mounted by the rivets 18 on the wall 9 for the introduction and removal of the fan. The center plate 15 is supported on a hub plate 21 by supporting studs or rivets 19 and in spaced relationship thereto by the washers 20 on the studs or rivets 19. The studs or rivets 19 are mounted in the hub plate 21, which has ventilation apertures 22. This hub plate 21 is mounted upon the hub 23; which in turn is supported by the motor armature shaft or other driving axle 24, which is attached by the key 25 and set screw 26.

It will be noted that, due to the spacing between the center plate 15 and the annular plate 17 and the spacing between the back plate 11 and the center plate 15 and between the hub plate and the center plate, it is possible to cause a dissipation of the heat from the fan. Fan blades 21*a* may be formed on the hub plate to facilitate the radial movement of air. The blades thus mounted on the hub plate near the periphery thereof will cause air to enter through the openings 22 and be thrown off radially from the hub, thereby increasing the flow of air at this point.

The center 27 of the line-flow fan is eccentric to the passageway in which it is located. The periphery 28 of the fan is closely adjacent to the screen wall 29. The opposite wall 30 diverges outwardly and upwardly from the fan to form the chamber B to give the air full opportunity to escape from the line-flow fan through the interior of the fan in the area C. Thereupon, the wall 30 is directed laterally and downwardly as at 31, and a companion wall 32 is extended from the screen 29 laterally and downwardly in converging rela-

tionship to the wall 32 to form an injector which discharges at high velocity the air from the fan through the opening 33 into the main passageway A to induce the angular flow of air therethrough. The jet of air issuing through the mouth 33 from between the walls 31 and 32 issues at an angle to the axis of flow through the pipe 4; and, in the event of any cessation of flow through the opening 1, pipe 2, passageway 3 and pipe 4, this jet of air acts as a damper or valve in itself and prevents any back flow of air from the duct towards the source.

Thus I accomplish these things: First, I economize on fan capacity and horsepower to drive the fan by only handling a portion of the air or gas; second, I utilize a portion of the air handled as a high speed injector stream delivered at a different angle and in a different plane from that of the entry of air into the fan, thereby inducing the flow of the main body of air or gas at an angle to its initial direction of movement; third, I cool the connection between the fan and its driving source by the movement of the fan itself; fourth, I extract the air from the main body of air without turbulence, increase its velocity and redeliver in a fine stream the induced air without turbulence; fifth, I provide means for the circulation of outside air around the injector and the fan and reduce the heat on the moving parts as they operate; sixth, I provide means of utilizing an angular jet of air to the main flow, which acts as a damper to prevent back flow of air while inducing forward flow.

It will be understood that I desire to comprehend within my invention such modifications as may be clearly embraced within the scope of my claims and invention.

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

1. In combination, an angular line-flow air pipe, a by-pass, and means in the by-pass to extract air from one arm of the angular pipe and discharge it into one side of the other arm in the general direction of the line of flow therein.

2. In combination, an angular line-flow pipe, a by-pass adapted to extract air from one side of one arm of the angular pipe and discharge it into one side of the other arm, a fan in said by-pass and an injector in said by-pass.

3. In combination, an angular main-flow pipe, an arcuate by-pass mounted on the exterior angle thereof on a diagonal line of division therefrom, a fan in the inlet of said by-pass and an injector at the outlet of said by-pass directing air into the pipe at one side.

4. In combination, an angular main-flow pipe, an arcuate by-pass mounted on the exterior angle thereof on a diagonal line of division therefrom, a fan in the inlet of said by-pass and an injector at the outlet of said by-pass, said by-pass being of progressively less diameter from inlet to outlet.

5. In combination, a main-flow angular pipe, an angular by-pass having an inlet in line with the flow in the main pipe on one side of the angle thereof and an outlet at an angle to the line of flow on the other side of the angle thereof and means for inducing the flow of air through said by-pass.

6. In combination, a main-flow angular pipe, an angular by-pass having an inlet in line with the flow in the main pipe on one side of the angle thereof and an outlet at an angle to the line of flow on the other side of the angle thereof, means for inducing the flow of air through said by-pass and an injector at the outlet of said by-pass directing the by-passed air into the side of the pipe.

7. In combination, a main-flow pipe, a by-pass extending from and back again at spaced points on said pipe, a line-flow fan in the inlet of said by-pass, an injector at the outlet of said by-pass and a screen adjacent said line flow fan formed by one wall of the by-pass over those portions of the blades of the fan returning from the outlet of the fan to the inlet.

8. In combination, a main-flow pipe, a by-pass pipe communicating there with at diverse points, comprising a pipe with a restricted throat, a line-flow fan interposed in said throat, said by-pass having a reduced exit portion at one side of the main-flow pipe where the air in the by-pass is redelivered to the main pipe.

9. In combination, angular main-flow pipe, a U-shaped by-pass having therein a screen forming one side of the by-pass communicating with the respective sides of the angle of the pipe, said by-pass having a line flow fan in the entrance thereof and a restricted passageway to form an injector stream at the exit thereof.

10. In combination, an angular main-flow pipe, an inverted U-shaped by-pass mounted on the exterior corner thereof, a line-flow fan therein, said by-pass being arranged with a progressively smaller diameter from inlet to outlet and a screen formed by one wall of the by-pass adjacent the line flow fan on that portion of the fan where the blades return from the outlet to the inlet of the fan.

In testimony whereof, I affix my signature.

EDWARD L. ANDERSON.