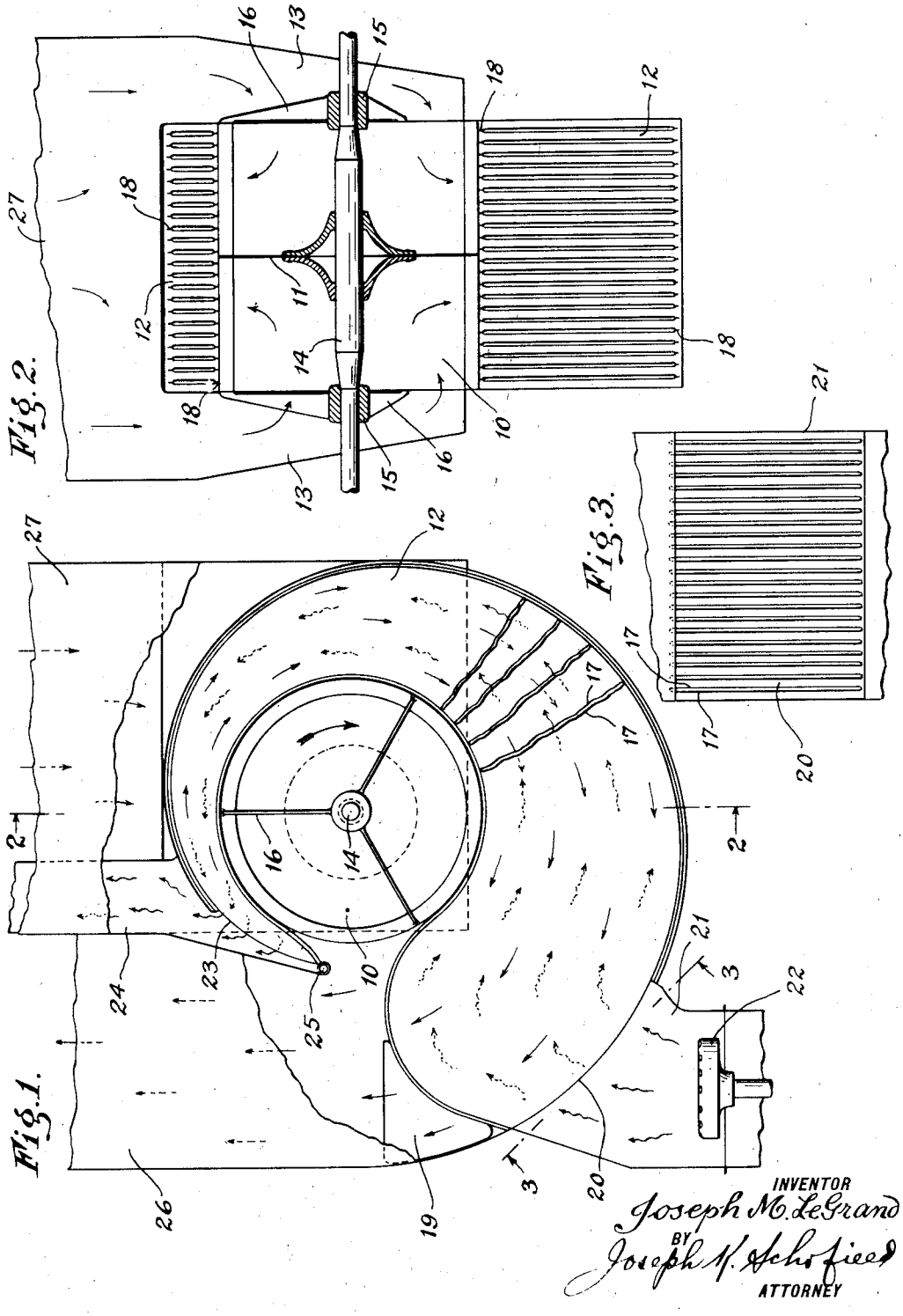
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AIR CONDITIONING BLOWER

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AIR CONDITIONING BLOWER

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This invention relates to air conditioners and particularly to a conditioner adapted to efficiently heat or cool large quantities of air by passing it through a fan or blower of the ventilating or circulating type.

A primary object of the invention is to provide a simple self-contained conditioning and circulating unit which will permit circulation of air through a centrifugal or other type of blower or fan, means being provided to simultaneously heat or cool the air to any desired temperature.

Another object of the invention is to provide a blower having a rotary impeller, the space surrounding that within which the impeller operates being in the form of a discharge volute through which the air delivered by the impeller of the blower may be forced, the space within the volute being subdivided by a plurality of plates extending generally in the direction of flow of the air being discharged, one set of these passages being provided for the admission and circulation of liquid or gas for treating the air, the other set of spaces being maintained entirely separate therefrom and traversed by the air delivered by the impeller.

Another object of the invention is to provide a combined blower and temperature changer for air, the heating or cooling elements of which may be made up principally of thin sheets of metal of similar shape and size, all of which may be placed permanently in position within the blower assembly during manufacture so that the unit may be completely built before being placed in operating position in which place it is only necessary to connect conduits thereto for delivery of the air, and the connections for admitting and removing the heating or cooling gas, liquid or other element.

And finally it is an object of the invention to provide a conditioning and conveying or circulating means for air within the discharge volute of a blower in which the air being treated and the heating or cooling elements may pass closely adjacent to each other while being maintained separated by thin metallic plates, the air being treated and the conditioning elements preferably flowing in counterflow directions relative to each other.

With the above and other objects in view, my invention includes the features of construction and operation set forth in the following specification and illustrated in the accompanying drawing.

In the accompanying drawing annexed hereto and forming a part of this specification, I have shown my invention embodied in a balanced type double intake centrifugal blower fan, but it will be understood that the invention can be otherwise embodied and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawing:

Figure 1 is a side elevation of a complete air circulating blower provided with the present invention, parts being shown in section to more clearly indicate the construction;

Fig. 2 is a cross sectional view of Fig. 1 taken upon the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary view looking in the direction of the arrows on line 3—3 of Fig. 1.

In the above mentioned drawing I have shown but one embodiment of the invention which is now deemed preferable but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

In the operation of blowers such as ventilating blowers and fans adapted to induce circulation of large quantities of air into and through a space desired to be maintained at a normal temperature, it is desirable to have as simple form of treating means as can be efficiently operated. The present invention, therefore, has for its general object the provision of an efficient ventilating fan or blower having contained within it means to treat the air being passed through the blower, these treating means being in the form of passages through which the treating elements may flow entirely separated from the passages within the discharge for the air being heated. It is contemplated that the treating elements for these means may comprise steam

or hot gases, such as products of combustion of a gas burner, or a liquid or gaseous refrigerant, which may be directed through elongated passages within the blower.

Referring more in detail to the figures of the drawing, I provide a ventilating or other type of blower with a rotary impeller 10. This impeller 10, as shown, may be of the double or balanced intake type, the air being admitted to the impeller 10 from opposite sides of the central portions 11 of the impeller and thrown radially outward by the impeller vanes into a volute discharge passage 12 surrounding the space occupied by the impeller 10. The intake conduits 13 leading to the impeller 10 in the embodiment of the invention enclose opposite sides of the blower. This type of ventilating blower or fan is standard and well-known so that further description is thought to be unnecessary. It will be sufficient to state that the impeller 10 may be driven from any suitable outside source of power by means of a central shaft 14 supported within the pump enclosure upon bearings 15 on frames 16. The impeller 10 and its vanes may be secured in any preferred manner to the shaft 14 for rapid rotation therewith.

The space within the discharge volute 12 of the fan or blower, which, in the usual type of blower such as described is entirely open for the passage of the air delivered by the impeller, is provided with a plurality of plates 17 generally conforming in shape to the cross sectional form of the volute or discharge passage and having their arcuate edges fastened together in pairs as indicated at 18 in Fig. 2. At the ends of these plates 17 adjacent the delivery end 19 of the volute 12 the plates are left separated and the spaces between them are closed by a suitable header or plate 20 having elongated slots therein to the edges of which the plates 17 are welded, brazed, or otherwise fastened. This end of the plates 17 is enclosed by a passage 21 connected to and having an opening leading directly through this header 20 into the spaces between the plates. Within this passage 21 may be mounted a burner 22 or other form of heater or supply for a refrigerant element, the gases, etc., of which may flow through the passage 21 and the header 20 into the narrower spaces between the welded pairs of plates 17. The opposite portions of these plates 17 adjacent the opposite end of the volute are similarly left spaced apart and secured to a suitable header 23 so that gases passing through the spaces between the plates 17 may be exhausted into a separate gas passage 24. The course of these gases, or steam, etc., forming the conditioning element is indicated by the wavy arrows. At the end of the volute may be provided a pipe 25 forming a drain for carrying away any condensate that may form within the upper portions of the spaces for the heating gases.

From the above it will be seen that the volute 12 comprises a plurality of small separated spaces divided by the plates 17, heated or cooled gases passing through alternate spaces comprising one set of the spaces and the air being heated or cooled passing through the remaining spaces, the two sets of spaces being maintained entirely separated by the joining together of the edges of the plates along their arcuate form and by the headers 20 and 23 at their end portions. By this means air being treated may pass through the preferably slightly wider spaces as indicated in Fig. 2 and the products of combustion, or other heated gases, cooling element, etc., may pass between the narrower spaces formed between the surfaces of the plates 17 secured together at their edges.

The direction of rotation of the impeller 10 is such that the air being treated passes in one direction within its spaces within the volute 12 indicated by the substantially straight arrows and the gases for treating this air may pass in the opposite direction therethrough as indicated by the wavy arrows. A counterflow action between the circulated air and treating elements is therefore provided to cause efficient heat interchange.

In the embodiment illustrated the discharge end of the volute 12 for the air being heated is directly connected to a conduit 26 enabling the treated air delivered by the blower to be conveyed to any point desired. Similarly, the intake passages 13 for the air to be treated are connected to a suitable conduit 27 so that the air to be heated or cooled may be taken from any desired position.

While I have shown and described a specific form of the invention designed primarily as a heating means for air, it will be understood that it is only necessary to substitute a refrigerant element for the heating element in order to utilize the blower to cool the circulated air. The blower would act in the same manner whether heating or cooling the circulated air. In either case the conditioning element would pass through the same spaces and flow in the same direction.

If desired there may be enclosed within the conditioning unit a form of humidifier indicated in the drawing as an open water tank 19. This tank 19 may be located as shown, directly over the spaces occupied by the incoming gases or liquids through the narrower spaces between the plates 17. The surface of the water within this tank 19 is constantly open to the air passing through the unit at a point after the air has passed through the unit and is about to be discharged into the delivery conduit 26. The air therefore will be constantly subjected to a humidifying agent after the heat exchange effected by the unit is complete and the temperature of the

treated air is substantially constant. Any means may be employed to supply water to this tank at any desired temperature and maintain a constant level therein.

What I claim is:

1. A combined blower and conditioner for air comprising in combination, a rotary blower having a volute discharge, conditioning means housed within said volute, each element of said means having a form substantially that of a cross-section of the volute, and means to admit and exhaust air conditioning fluids to and from said means.

2. A combined blower and conditioner for air comprising in combination, a rotary blower comprising a volute discharge, conditioning means within said volute having heat exchange elements in a plurality of planes substantially perpendicular to the center line of the blower, forming a plurality of passages in shape substantially identical with a cross-section of the volute, and means to admit and exhaust conditioning fluids to and from said means.

3. A combined blower and conditioner for air comprising in combination, a rotary blower having a volute discharge, plates secured together at their peripheries forming separated spaces enclosed within said volute, said plates forming a series of partitions within the volute of a conformation equivalent to that of the volute and means to change the temperature of said plates whereby air discharged by said blower into said volute and contacting with the plates will have its temperature changed thereby.

4. A combined blower and conditioner for air comprising in combination, a rotary blower having a volute discharge, plates forming elongated enclosed spaces within said volute for circulation of fluids therein whereby air discharged by said blower will contact with the plates and have its temperature affected thereby but will be prevented from mingling with the fluids therein, said plates forming a series of passages within the volute, the passages being free throughout the volute and having a cross-section equal to that of the volute.

5. A combined blower and conditioner for air comprising in combination, a rotary impeller having a central intake and peripheral discharge, and plates in pair secured together along their edges enclosed within said peripheral discharge forming spaces extending parallel to the direction of flow of the air within said discharge whereby fluids may be circulated within the spaces between said plates to affect the temperature of the air circulated by said impeller said plates forming passages within the volute having a cross-section equal to that of the volute.

6. A combined blower and conditioner for air comprising in combination, a rotary impeller having a central intake and peripheral discharge, plates in pairs secured together along their edges and enclosed within said peripheral discharge to form spaces extending parallel to the direction of flow of the air within said discharge whereby fluids may be circulated within the spaces between said plates to treat the air circulated by said impeller, means for circulating fluids between said plates in a counter direction to that of air circulating in the passages formed by the plates, said plates and passages having a cross-section substantially equal to that of the volute.

7. A combined blower and conditioner for air comprising in combination, a rotary blower having a volute discharge and conditioning means within said discharge, and an open evaporating tank within said discharge whereby air passing through said discharge may be humidified.

8. A combined blower and conditioner for air comprising in combination, a rotary blower having a volute discharge, plates forming elongated enclosed spaces within said discharge for circulation of fluids therein whereby air discharged by said blower will contact with said plates and have its temperature affected thereby, and means within said discharge for humidifying said discharged air.

In testimony whereof, I hereto affix my signature.

JOSEPH M. LE GRAND.