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2 Sheets-Sheet 1

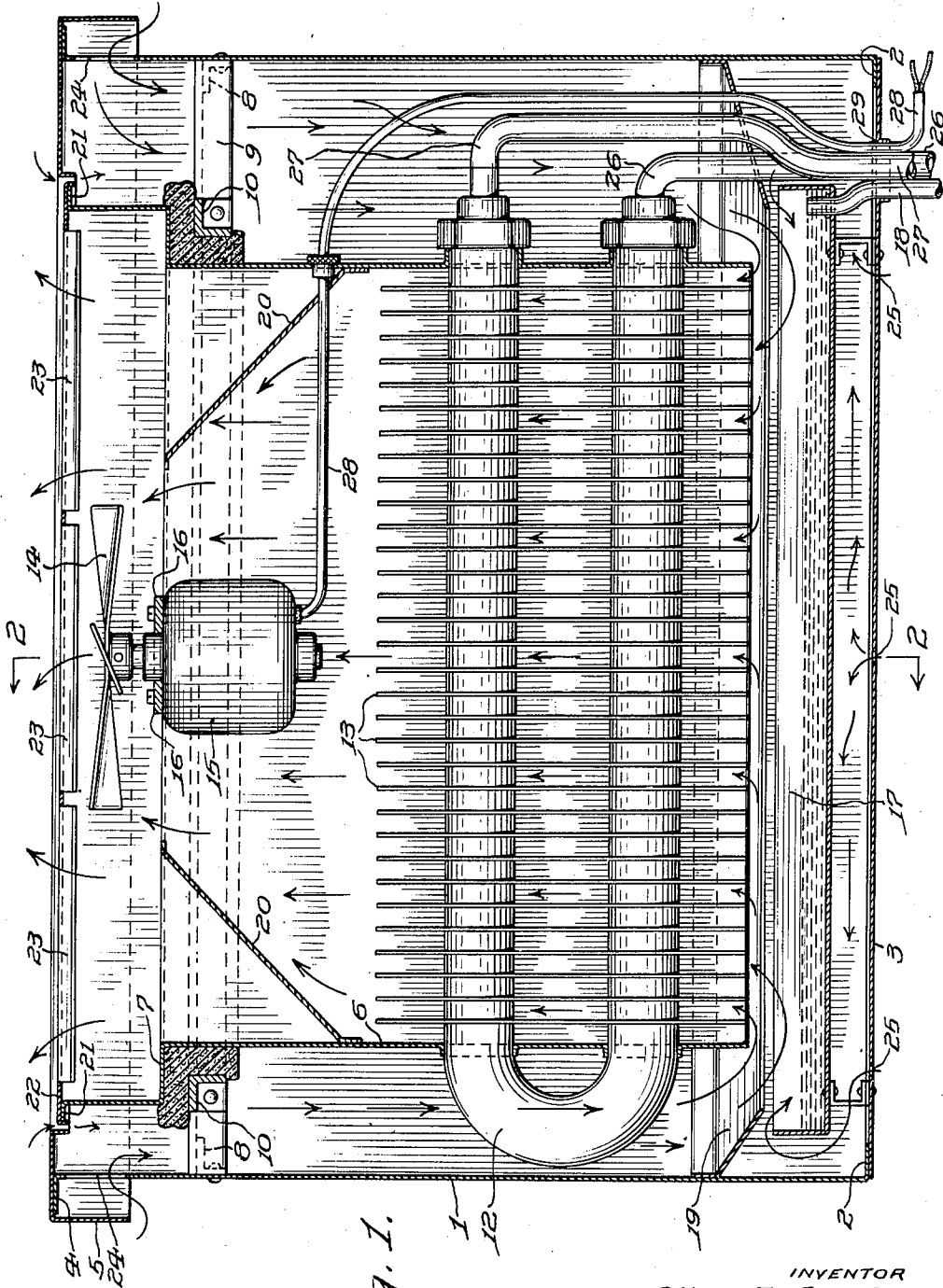


Fig. 1.

WITNESS
H. J. Hartman.

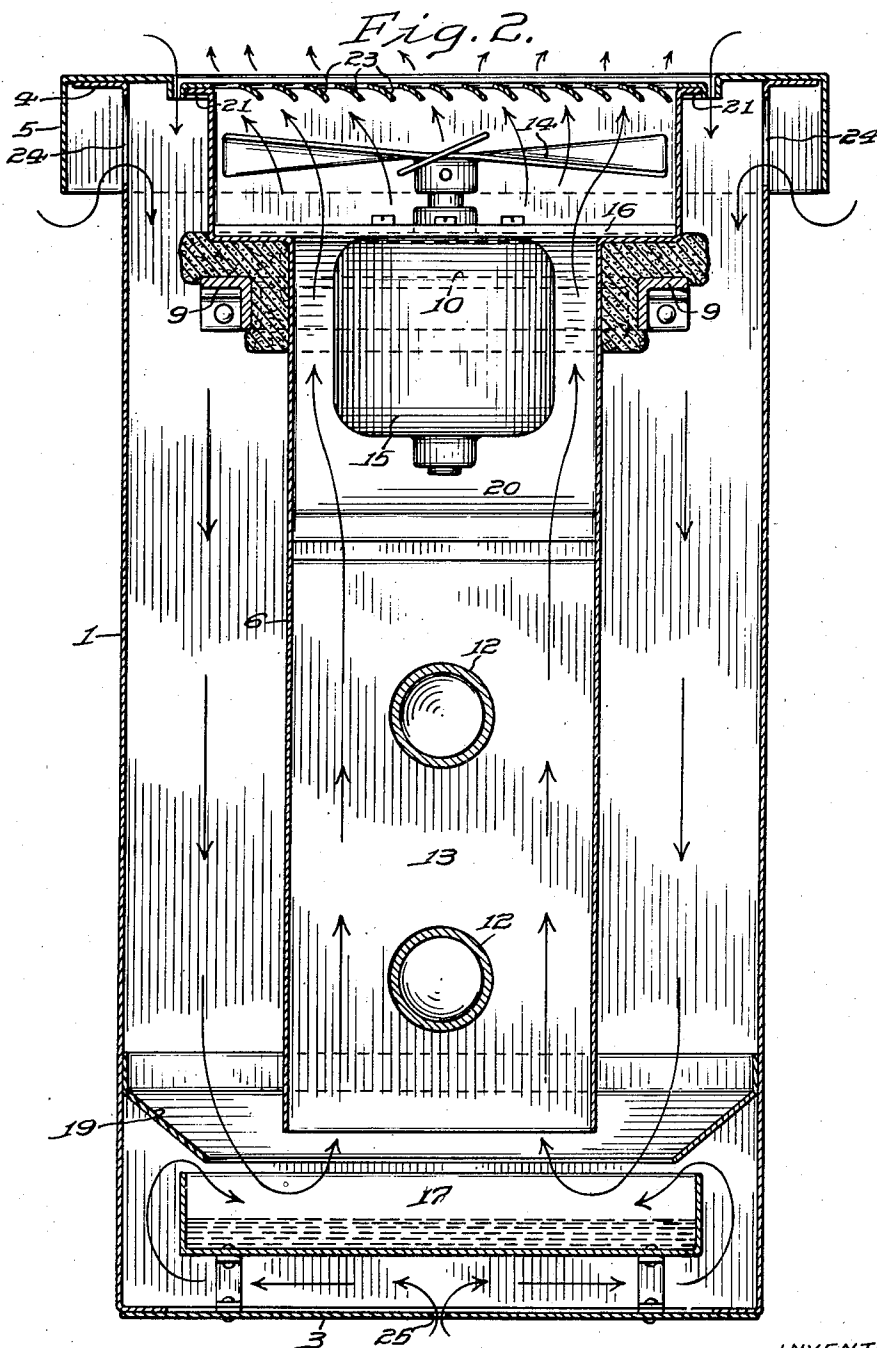
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AIR COOLING CABINET AND METHOD FOR PREVENTING CONDENSATION OF MOISTURE THEREON

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In air cooling cabinets employed for cooling one or more rooms of a building or for other purposes, difficulty is frequently encountered in preventing the condensation of moisture upon the exposed outer surfaces of the walls of such cabinets on account of the low temperature to which the walls of the cabinets are subjected by reason of the refrigerating or cooling unit within the cabinet. When such a device is in operation there is a continual transfer of heat from the walls of the cabinet to the interior thereof, with the result that the outer surfaces of the cabinet walls are reduced in temperature to or below the point at which moisture from the external air condenses thereon.

Under certain conditions of temperature and humidity, as is well known, this condensation or "sweating" may be insufficient to cause other than an accumulation of moisture upon the walls of the cabinet. Under other conditions, the moisture condenses in such an amount as to accumulate and run down the walls and drop upon the floor or other supporting surface. In either case this condensation on the exterior surfaces of the walls of the cabinet is objectionable for the reason that it is unsightly and injurious to the walls and the finishes ordinarily employed thereon, and for the reason that excessive condensation dropping upon the floor or other supporting surface is unsightly and insanitary and may seriously damage the same in the course of time.

In order to obviate this condensation of moisture on the exterior of the cabinet, the walls thereof may be so constructed as to utilize any well known insulating material therein. To a certain extent this may be accomplished by the use of a double wall construction with a layer of insulating material, such as cork, felt, wool, etc. therebetween. Insulating constructions of this character have heretofore been used and are known to be expensive to manufacture, and bulky and

add materially to the weight of air cooling cabinets.

The value of air as an insulating medium is well recognized, and it has long been known that it offers many advantages for this purpose when suitably controlled. Appreciating that a moving column or current of air offers exceptional advantages if used as an insulating medium where it is desirable to prevent the condensation of moisture upon the outer surface of the walls of an air-cooling or other similar cabinet, I have devised a method for avoiding this condensation and for insulating such a cabinet by utilizing for the insulating medium of the cabinet the air which I desire to cool, and I have also devised a cooling cabinet so constructed that condensation of moisture from the external air on the exterior of the cabinet may be substantially prevented without the use of any insulating means other than the current or column of air which is to be cooled.

An important object of the invention disclosed hereby is, therefore, to prevent the condensation of moisture on the outer surfaces of the walls of a cooling cabinet. It is also an object of my invention to utilize as the insulating medium for such a cabinet, the column or current of air which is to be cooled. A further object is to simplify and improve the construction of a cabinet of this character and decrease the cost of its manufacture and its weight by the utilization of insulating means of a kind and in a manner not heretofore employed. A still further object of my invention is to provide a simple, novel method for cooling the air in the room or rooms of a building or other structure.

With the above and other objects in view, the invention combines the method and the several steps and the relation thereof to each other, as hereinafter set out, and the features of construction, combination of elements and arrangement thereof, exemplified by the device hereinafter disclosed.

Referring to the accompanying drawings, in which similar reference numerals indicate similar parts throughout the several views:

Fig. 1 is a longitudinal sectional view of one embodiment of a cooling cabinet for carrying out my invention.

Fig. 2 is a transverse sectional view thereof taken on line 2—2 of Fig. 1.

In carrying out the present embodiment of my method for preventing the condensation and deposit of moisture on the exterior surface of the walls of an air cooling cabinet, I utilize as the insulating medium for the cabinet the current of air which I desire to cool. This air is usually "inside air", that is, it is air within the room or rooms that are to be cooled. The temperature of this air before it is cooled will depend somewhat upon the conditions under which the cooling system is being used. Ordinarily, however, this temperature will be considerably above the condensation point of the air which is to be cooled, and consequently, the surfaces of any objects or furnishings located within this air and in contact therewith will have substantially the same temperature as the air. The temperature of the surfaces of such objects being above the condensation point of the surrounding air, there will be no condensation or deposit of moisture thereon.

I take advantage of this fact in the air cooling system which I have devised, and so arrange the cooling or refrigerating unit that a current of the air which is to be cooled thereby is caused to circulate about the outside of the unit before it is passed over the unit in order that it may be cooled. By confining this current to a passageway which substantially surrounds the cooling unit, and by causing it to move at sufficient velocity through the passageway, the outer stratum of the current, in its course through the passageway, will not be lowered in temperature to the condensation point of the moisture carried thereby.

The inner stratum of the current of air to be cooled, in the course of the current through the passageway, will have its temperature lowered on account of its contact with the refrigerating unit or the confining walls surrounding the same. It is essential, therefore, that the passageway be so proportioned as to length and depth, and that the velocity of the current be such that the outer stratum of the current, in its course through the passageway, is not lowered in temperature sufficiently to reduce the temperature of the outer surface of its confining wall to the condensation point of the room air. If this passageway is made of such length and the velocity of the current of air in its travel therethrough is sufficiently low, or if the passageway is of insufficient depth, the outer stratum of the current of air and the outer walls of the passageway may be cooled to

such a degree, by transfer of heat therefrom to the refrigerating unit, that the temperature of the outer surfaces of these walls will be below the condensation point of the air within the room. Under such conditions there would be condensation of moisture from the air in contact with the outer surfaces of the outer walls of the passageway, and this moisture would either accumulate upon these surfaces or drop upon the floor or other support for the cabinet.

When the conditions under which an air cooling system of the kind devised by me is used are such that there is no objection to unusual bulk or size of the apparatus utilized for carrying out my improved method, the thickness or depth of the insulating current of air may be considerable, and the velocity of the current may be substantially lowered without detriment to the proper operation of the system. Under other circumstances, it may be desirable to decrease the bulk of the apparatus to every extent that is possible consistent with the satisfactory operation of the system. In such cases the thickness of the insulating current may be materially reduced so long as the length of this current and its velocity are suitably proportioned to prevent the outer surfaces of the outer walls of the passageway from being cooled to a temperature at or below the condensation point of the surrounding air. It will thus be seen that considerable variation is permissible in the size and arrangement of the apparatus with which my cooling system is practiced so long as the various factors, such as the length, thickness and velocity of the insulating air current are so proportioned as to avoid a temperature for the outer surfaces of the outer walls of the passageway for this current at or below the condensation point of the surrounding air.

The particular cooling cabinet which I have devised for carrying out my invention consists of an outer casing 1 substantially rectangular in cross-section. The lower edge of the vertical wall of this casing is turned inwardly to provide a flange 2 to which the bottom 3 thereof may be secured in any suitable way. The upper edge of the side walls of the casing 1 is turned outwardly for the purpose of providing a flange 4 for supporting a cornice 5 hereinafter described.

Suspended within the outer casing 1 is an inner casing 6 of substantially the same shape in cross-section as the outer casing 1. The casing 6 is enlarged near its upper end to provide a shoulder 7 which serves to support the inner casing upon supporting bars resting upon angle iron or other suitable brackets 8 secured to the end walls of the outer casing 1. These supporting bars consist of a pair of angle irons 9 extending from end to end of the outer casing 1, and cross

bars 10, likewise made of angle iron, extending between the longitudinal bars 9. The two pairs of supporting bars 9, 9 and 10, 10 are so positioned with respect to each other as to loosely surround the inner casing 6 just below the enlargement or shoulder 7 on the inner casing. Preferably a pad of soft rubber or other vibration insulating material is interposed between the shoulder 7 and the supporting bars 9, 9 and 10, 10.

Within the inner casing 6 is arranged a cooling or refrigerating coil 12 provided with radiating fins 13 of any well-known construction. It will be understood that the cooling coil 12 is to be connected to any suitable refrigerating device whereby a refrigerating fluid may be caused to circulate through the coil when the cooling cabinet is in use.

Supported within the inner casing 6, preferably near the upper end thereof, is a fan 14 driven by an electric motor 15 or other suitable motive means. The fan is carried by a support 16 consisting of a plate or bar arranged transversely of the casing 6 upon the shoulder 7 formed near the upper end thereof.

Suitably supported in the bottom of the outer casing 1 and beneath the inner casing 6 is a drip pan 17 provided with the usual drain 18. The purpose of this drip pan is to serve as a receptacle for the water which condenses upon the inner and outer surfaces of the casing 6 from the moisture in the air which is being cooled.

In order to deflect the current of air passing downwardly through the passage formed between the outer casing 1 and the inner casing 6, so that this current may more readily pass upwardly over the cooling unit in the inner casing, a deflector 19, inclined inwardly and downwardly, is secured about the inner wall of the outer casing 1 adjacent the lower end of the inner casing 6. Deflectors 20 may also be provided at the ends of the upper part of the casing 6 for directing the previously cooled air current inwardly toward the fan 14.

The upper edge of the casing 6 may be turned outwardly to form a flange 21 upon which is supported a grille or lattice work 22, serving as a protection for the fan 14. The grille or lattice work 22 may be in the form of a louver with inclined slats 23 which serve to direct the current of cool air in any direction in which it may be desired.

It will be noted that the flange 21 on the upper edge of the casing 6 and the grille or louver carried thereby are so constructed as to be out of contact with the outer casing 1. This construction, together with the arrangement whereby the inner casing 6 is supported by rubber or other vibration insulating means, thus effectively prevents the transmission to the outer casing 1 of any undesirable vibra-

tions emanating from the fan 14 or the motor 15.

Adjacent its upper edge the casing 1 is provided with a series of openings 24, serving as inlets for the air to be cooled. These openings are so constructed and arranged with respect to the cornice 5 as to be effectively concealed thereby.

The bottom wall 3 of the outer casing 1 is preferably provided with a number of openings 25, located beneath the drip pan 17. These openings serve as inlets for warm air which circulates between the drip pan and the bottom 3.

The bottom 3 may also be provided with an opening 29, preferably located near one end of casing 1, and of such a size as to receive the drain 18, inlet and outlet pipes 26 and 27, respectively, for the refrigerating fluid, and the wiring 28 for the electric motor 15.

In the operation of the room cooling cabinet described herein the fan 14 functions to create a current of air entering the device through the openings 24 and, to some extent, through the openings 25 and the openings between the cornice 5 and the upper edge of inner casing 6. The air which enters the device through the openings 24 and the openings between the cornice and the upper edge of the casing 6 passes downwardly through the passageway between the inner and outer casings, thence into the lower end of casing 6 and upwardly over the cooling unit, whereupon it is forcibly thrown outwardly into the room by means of the fan 14. Warm air also enters the device through openings 25 and is directed around the drip pan 17, between the bottom of the same and the bottom 3 of the casing 1. This particular current joins that coming downwardly between the inner and outer casings to pass upwardly in the inner casing over the cooling unit.

The air which enters the inlet openings hereinbefore referred to, is of room temperature, that is, it is at such a temperature with respect to the conditions under which the cooling cabinet is employed as to maintain the outer surface of the walls of the casing 1 above the condensation point of the outer air, and the velocity of the air current passing downwardly between casing 1 and casing 6 is such as to prevent the walls of casing 1, particularly the exterior surface thereof, from becoming cooled to the condensation point of the room air. The temperature of the walls of the inner casing 6, however, will be lowered sufficiently that moisture from the air in process of being cooled condenses thereon, and when this condensed moisture accumulates to a sufficient degree it will run off and drop into the pan 17.

While I have described one embodiment of a device by which I may practice my method for preventing the condensation of moisture on the exterior surfaces of an air cool-

ing cabinet, it is to be understood that various changes may be made therein without departing from the spirit of my invention. I have, for example, shown the insulating
5 current of air passing downwardly around the cooling unit, thence upwardly over the unit. The insulating current might be made to pass upwardly around the cooling unit, thence downwardly over the unit. In other
10 cases it might be desirable to so arrange the system that the insulating current passes through the device in a horizontal direction, or in any direction other than that which I have particularly disclosed. In the particu-
15 lar embodiment of apparatus which I have disclosed I have shown a construction in which the insulating current of air is made to pass downwardly across the four side walls of the casing inclosing the cooling unit. It
20 will be understood that there may be circumstances under which it may not be necessary or desirable to pass this current across all four walls, and my invention may be practiced in such cases by passing the current of
25 air to be cooled across one or more of the walls, or across portions thereof.

I have shown the fan for producing a forced current of air through my cooling system located in the top of the device, at the
30 outlet for the cooled air. Other locations for the fan may be preferred under certain circumstances and may be utilized without departing from my invention.

Having thus described my invention, I
35 claim and desire to protect by Letters Patent of the United States:

1. The method of preventing the condensation of moisture upon the outer surfaces of the
40 outer walls of an air cooling cabinet which consists in passing the air to be cooled over the inner surfaces of the walls and maintaining such temperature for the stratum of air next to said walls that the temperature of the
45 outer surfaces of the walls is above the condensation point of the outside air.

2. The method of preventing the condensation of moisture upon the outer surfaces of the outer walls of an air cooling cabinet which
50 consists in passing a current of the air to be cooled over the inner surfaces of the walls and maintaining the temperature of the stratum of the current next to said walls so that the temperature of the outer surfaces of
55 the walls is above the condensation point of the air to be cooled.

3. The method of preventing the condensation of moisture upon the outer surface of the
60 outer wall of an air cooling cabinet which consists in passing a current of the air to be cooled across the inner surface of said wall, maintaining said current in confined relation with respect to said wall, and maintaining
such a temperature for the stratum of the
current next to said wall that the temperature

of the outer surface of the wall is above the condensation point of the outside air.

4. The method of insulating the cooling unit of an air cooling cabinet from the exterior air which consists in passing alongside
70 the cooling unit a current of the air to be cooled, maintaining said current in confined relation between the cooling unit and the exterior air, and passing the current over the
75 cooling unit.

5. The method of cooling air which consists in passing a current of the air alongside a
cooling unit while maintaining said current in confined relation between the cooling unit
80 and the exterior air, then passing the current over the cooling unit.

6. An air cooling cabinet comprising inner and outer casings spaced to form an air
passage therebetween, the outer casing having
85 an air inlet to the passage adjacent one end thereof, communicating means between the opposite end of said passage and the interior of the inner casing, a cooling unit within the inner casing, and means for causing circulation
90 of air through said air inlet, said passage and said inner casing to the open air.

7. An air cooling cabinet comprising an outer casing, an inner casing spaced there-
95 from to provide an air passage in communication with the open air adjacent one end thereof and in communication with the interior of the inner casing adjacent its opposite end, a cooling unit within the inner casing, and means for circulating air through
100 said passage and over said cooling unit.

8. An air cooling cabinet comprising an outer casing open at one end, an inner casing substantially open at both ends and supported within the outer casing in spaced relation
105 thereto to form an air passage, a cooling unit within the inner casing, and means for causing air to circulate through said passage and over said cooling unit.

9. An air cooling cabinet comprising an
110 outer casing in communication with the open air adjacent one end, an inner casing spaced therefrom to provide an air passage therebetween, said inner casing being in communication with said passage at one end and in
115 communication with the open air at its opposite end, air cooling means within the inner casing, means for causing circulation of air through said passage and over said cooling means, and a drip pan beneath said inner
120 casing.

10. An air cooling cabinet comprising an outer casing having a closed bottom provided
125 with an air inlet therein, an inner casing supported within the outer casing and spaced therefrom to form an air passage therebetween, air cooling means within the inner casing, a drip pan associated with the inner casing, and means for causing air to circulate
130 through the inlet in the bottom of the outer

casing, around said drip pan and over said cooling means.

11. An air cooling device comprising an outer casing, an inner casing spaced therefrom and supported thereby, air cooling means within the inner casing, means carried by the inner casing for forcing air over said cooling means, and means between said casings to prevent the transfer of vibrations from the inner to the outer casing.

12. An air cooling device comprising an outer casing, an inner casing supported within the outer casing and spaced therefrom to provide an air passage between the walls of the two casings, means on the outer casing for supporting the inner casing therein, air cooling means within the inner casing, means carried by the inner casing for forcing air over said cooling means, and means between the inner casing and its supporting means to prevent the transfer of vibrations from the inner casing to the outer casing.

13. An air cooling device comprising an outer casing closed at one end an open-ended inner casing enlarged near one end to provide a shoulder thereon, means on the outer casing with which the shoulder on the inner casing engages for supporting the inner casing in spaced relation to the outer casing to provide an air passage between the walls of the casings and into the end of the inner casing adjacent the closed end of the outer casing, air cooling means within the inner casing, a fan carried by the shoulder on the inner casing, and means between the shoulder on the inner casing and the support for the inner casing to prevent the transfer of vibrations from the fan to the outer casing.

In testimony whereof, I have signed my name to this specification.

ALBERT L. LAMBERT.