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COMBINATION AIR CONDITIONER-CONVECTOR

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Fig. 1.

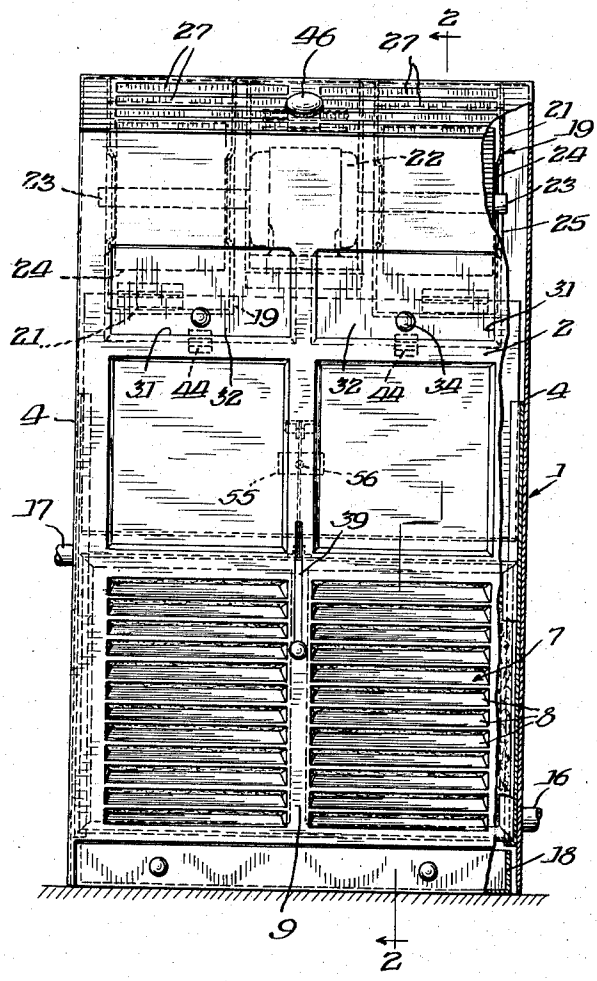
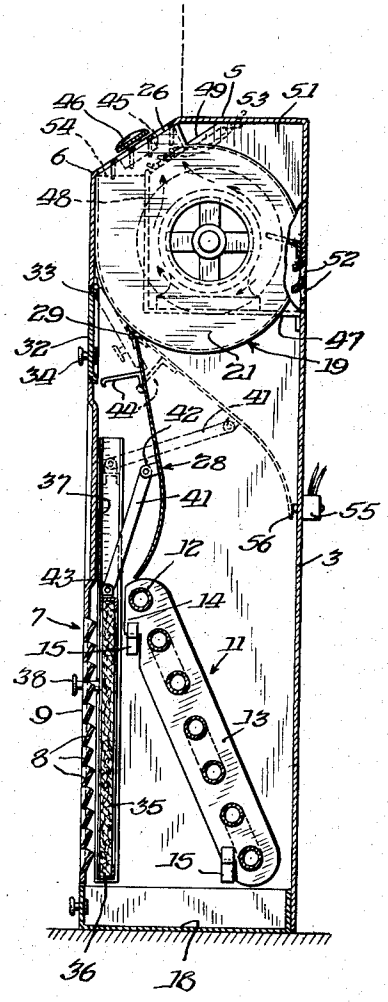


Fig. 2.



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COMBINATION AIR CONDITIONER-CONVECTOR

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6 Claims. (Cl. 257—300)

The invention relates generally to heat exchange structures and more particularly to a heating or cooling structure for enclosures and the like.

The use of convector structures which utilize the air flow resulting from convection is well known and in like manner heating and cooling structures utilizing forced flow air are in common use. The present invention is directed to a structure which may utilize either convection or forced air flow as may be desired, as for example, utilizing convection for heating functions and forced flow for heating or cooling functions.

The present invention therefore has among its objects the production of a heat exchange structure which is provided with means enabling its use as a convector or as a power actuated unit, the structure being so designed that it may be readily adjusted for either type of operation.

Another object of the invention is the production of a heat exchange structure having the above features, which may be provided with an air filter for forced air operation, the structure being so designed that a free air flow path is provided when the device is to be employed for convection operation, and which if desired may be provided with means which will prevent attempted operation as a convector or power unit until properly adjusted for the desired operation.

A further object of the invention is the production of such a heat exchange structure in which the adjustment of the damper structure and filter element may be effected simultaneously, thereby insuring that both are in the proper position for the desired operation, and in which the means for preventing attempted operation by convection may be actuated by the damper structure.

A further object of the invention is the production of such a heat exchange structure in which means may be provided for efficiently cooling the motor when the device is on power operation.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 a front elevational view of a heat exchange structure embodying the invention, with portions of the structure broken away to show details thereof; and

Fig. 2 is a sectional view taken approximately on the line 2—2 of Fig. 1, with other portions of the structure broken away to show the details of the motor compartment.

The present invention contemplates the utilization of a cabinet structure, somewhat similar to that employed in the usual convector or power unit, which may be provided with a heat exchange unit adjacent an air inlet opening at or near the bottom of the cabinet structure and an air outlet opening adjacent the upper portion of the structure forming a convection stack or duct, whereby air passing through the inlet and the heat exchange structure, upon being heated, will rise and be discharged from the discharge opening adjacent the top of the unit. Provision

is also made for moving air by means of a suitable power actuated structure through the air inlet and heat exchange unit, and discharged from a second air discharge opening suitably located in the cabinet structure, that illustrated being positioned in the upper portion of the cabinet above the air discharge outlet for the convector structure. It is also contemplated to provide air filtering means for use when the structure is operated as a power unit, the construction being such that a suitable unrestricted air inlet opening is provided for convector operation, this opening in the embodiment illustrated, being obtained by moving the air filter to a position whereby at least a portion of the air inlet is not obstructed by the filter.

Referring to the drawings, the reference numeral **1** indicates generally a cabinet structure having a front wall **2**, a rear wall **3**, side walls **4** and a top wall **5**, the latter having an inclined front portion **6**.

The front wall **2** may be provided with an air inlet indicated generally by the numeral **7**, across which extend louvers **8**, the latter being illustrated as divided into two series by a vertically extending central portion **9**. Extending substantially from side wall to side wall **4** and across the inlet opening **7** is a heat exchange structure indicated generally by the numeral **11**, the structure generally being a common type having a fluid conducting tube **12** bent back and forth upon itself to form a plurality of parallelly extending coils arranged in a common plane and provided with a plurality of transversely extending fins **13**, the exchange structure being provided with suitably supported end plates **14** adapted to engage upper and lower brackets **15** carried by each side wall **4** of the cabinet and by means of which the heat exchange structure **11** may be operatively supported.

In use the heat exchange element **11** may be operatively connected at its ends **16** and **17** to a suitable fluid source, as for example, steam or hot water in the case of heating, or chilled water or brine in the case of cooling. While the connections **16** and **17** of the heat exchanger **11** are illustrated as being positioned at opposite sides of the structure, obviously the structure **11** may be so designed as to bring the inlet and outlet thereof at any suitable point on the device. Likewise, any suitable type of heat exchange structure may be employed in conjunction with any suitable type of means for supporting the same in the cabinet structure. As illustrated, a suitable condensate tray **18** may be provided below the heat exchange structure **11** in which condensate from the latter, in the event the device is used for cooling, may be collected, the tray **18** being accessible from the front of the structure to permit ready removal and emptying of the tray when desired.

Positioned adjacent the top of the cabinet structure is a pair of suitable blowers indicated generally by the numeral **19**, having housing scrolls **21** positioned at opposite sides of a suitable power source such as a motor **22**, which is provided with a double ended drive shaft **23** carrying blower fans **24** thereon. The scrolls **21** may be provided with suitable air inlet openings **25** and air discharge openings **26**, the inclined portion **6** of the top wall of the cabinet being provided with two sets of louvers **27** through which air may be discharged from the outlets **26** of the blowers.

Positioned in the cabinet adjacent the blowers **19** is a damper element indicated generally by the numeral **28**, which may be pivoted on a horizontal axis by suitable means such as hinge structures **29**, illustrated as being supported by the blower scrolls **21**. The front wall **2** of the cabinet may also be provided with a pair of discharge openings **31**, having cooperable closure or damper members **32** by means of which the effective size of the discharge opening may be varied, the members **32** being pivoted on horizontal axes positioned above the openings

by suitable means such as hinge elements 33 suitably carried by the front wall 2.

When the structure is to be used for power operation, the damper member 28 may be positioned as illustrated in Fig. 2 to form a generally vertically extending front wall for the duct or passage operatively connecting the heat exchange element 11 with the blowers 19, and when the damper 28 is positioned as illustrated in dotted lines in Fig. 2, the duct to the blowers 19 will be closed and the heat exchange element 11 will be operatively connected with the discharge openings 31, so that upon rotation of the closure members or dampers 32 to the position illustrated in dotted lines in Fig. 2, a convection current may be created through the air inlet 17 and exchanger 11, the heated air being discharged through the openings 31, the amount of air discharged being controlled by the position of the closure members or dampers 32.

While it is desirable to provide air filtering means for power operation, when utilized for convection operation, even a low resistance air filter will usually sufficiently restrict air flow through the device to materially reduce the heat exchange efficiency of the convection structure. In the present construction an air filter 35 may be provided, the latter being illustrated as supported on a suitable frame member 36 which is slidably carried in guide members 37 disposed adjacent each side wall 4 so that the filter may be positioned as illustrated in Fig. 2 or moved to a raised or elevated position to provide an unrestricted air inlet adjacent the bottom of the cabinet. While the unrestricted opening could be obtained by providing additional inlet means which would render movement of the filter unnecessary, the movable filter achieves the desired result in a compact, simple structure.

As it is desirable to always raise the filter when the device is to be used as a convector unit, and in which case the damper 28 should be positioned as illustrated in dotted lines in Fig. 2, the air filter and damper may be simultaneously actuated by common means which, in the embodiment illustrated, comprises a handle or knob 38 suitably secured to the frame 36 and adapted to travel in a slot 39 in the central portion 9 of the front wall 2, the frame 36 being operatively connected to the damper 28 through a movable link 41 pivotally connected at its ends by suitable brackets 42 and 43 to the damper 28 and frame 36 respectively. Thus by actuating the handle 38 to elevate the filter 35, the damper 28 will be simultaneously moved from the position illustrated in Fig. 2 to the dotted position therein illustrated, and reverse movement will return the elements to their positions illustrated in Fig. 2.

To eliminate any possibility of an attempt to operate the structure as a convector unit, by opening the dampers 32, but inadvertently failing to properly shift the damper 28 and air filter 35, a suitable interlock between the damper 28 and dampers 32 may be provided. Such means, in the embodiment illustrated, comprises a pair of stop members 44 suitably mounted on the damper 28 and adapted to extend to adjacent the lower portion of respective damper members 32, when the damper 28 is in the position illustrated in Fig. 2 for power operation, whereby the members 44 prevent opening of the dampers 32. Consequently when it is desired to operate the unit as a convector, it is first necessary to shift the filter 35 and the damper 28 in order to permit the operator to open the damper members 32. As will be apparent from a reference to Fig. 2, the stop members 44, when the damper 28 is in convector position, are positioned out of the path of the damper members 32 and are thus inoperative to restrict movement of the latter.

The motor 22 may be suitably controlled, as for example, by means of a switch 45 having an actuating knob 46, illustrated as being positioned adjacent the inclined portion 6 of the top wall of the cabinet. However, if desired other means, as for example, thermostatic elements may be utilized to control the operation of the device.

In some cases it may be desirable to provide means for effecting adequate cooling of the motor 22, the latter being illustrated as suitably shielded by baffle means, as for example, a bottom wall 47, front wall 48, inclined top wall 49 and side walls 51 cooperable with adjacent portions of the top wall 5 and rear wall 3 to form a motor compartment. Suitable ventilation of the motor compartment may be provided, as for example, by forming suitable air inlets 52 and air discharge outlets 53 in the walls of the motor compartment, the openings 52 being formed in the rear wall 3 and the discharge openings 53 in the inclined wall 49. As illustrated in Fig. 2, the walls of the blower scrolls 21 adjacent the motor compartment may be cut away as indicated at 54, whereby the flow of air being discharged from the blowers will tend to inspirate air flow through the openings 53, creating an air current through the motor compartment.

Obviously the air ducts into and out of the motor compartment may be suitably constructed and arranged other than in the rear wall and top wall, depending upon particular applications. Likewise, various types of blower arrangements, as for example, fan structures, etc. might be employed in particular applications.

If desired, operation of the motor and blowers may be prevented, when the device is operated as a convector unit, such means in the embodiment illustrated, comprises a suitable switch 55 suitably mounted on the rear wall 3 and having an actuating button 56 extending into the cabinet, the switch 55 being so positioned that the damper 28 will operatively engage the button 56 and actuate the switch 55, when the damper is positioned for convector operation as illustrated in dotted lines in Fig. 2, the switch 55 being adapted to be operatively connected into the motor circuit to open the latter when the device is being operated as a convector, thereby eliminating improper operation of the switch 45 and the motor during such convector operation, or attempted power operation when the damper 28 is adjusted for convector operation.

It will be noted from the above description that I have provided a combination convector and power operated heat exchange structure which is relatively simple in construction, efficient in operation, and which may be so designed that it is fool-proof in operation and usage.

Having thus described my invention, it will be obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A combination heat exchanger for convection or forced air operation, comprising a cabinet having an air inlet adjacent the bottom thereof and an air outlet positioned above said inlet, a heat exchange element operatively positioned intermediate said air inlet and said air outlet, power actuated blower means positioned in said cabinet having an air inlet communicating with the interior of the cabinet structure and provided with an air outlet arranged to discharge air from the cabinet, means for directing the flow of air entering the air inlet opening to either said air outlet or the air inlet of said blower means, an air filter of a size to be interposed across the path of air entering said air inlet opening operative to filter such air, means for supporting said filter within the cabinet for movement therein from a filtering position to an inoperative position out of the path of air entering said cabinet to provide an air flow path unimpeded by such filter, means accessible from the cabinet exterior for effecting movement of said filter from one to the other of said positions, and means operatively connected to said

filter for preventing said directing means from directing air through said air outlet in the cabinet while said filter is in said filtering position.

2. A combination heat exchanger for convection or forced air operation, comprising a cabinet having an air inlet adjacent the bottom thereof and an air outlet positioned above said inlet, a heat exchange element operatively positioned intermediate said air inlet and said air outlet, power actuated blower means positioned in said cabinet having an air inlet communicating with the interior of the cabinet structure and provided with an air outlet arranged to discharge air from the cabinet, an air filter structure adapted to operatively extend across the air inlet of said cabinet, said filter structure being movable to expose a portion of said inlet and provide a free air path into said cabinet for convector operation, a movable damper structure carried by said cabinet and operatively interposed between the air outlet in the cabinet and the air inlet of said blower means, said damper structure being selectively movable to operatively extend between said heat exchange element and said cabinet air outlet to restrict air flow through the latter and direct air passing through the heat exchange element into said lower inlet or to direct such last mentioned air through said cabinet air outlet and operatively close the lower inlet, means operatively connecting said filter and damper structures for preventing the latter from directing air through said cabinet outlet when said filter structure is in position to filter the air passing through the cabinet air inlet, and means operatively connected to said filter and damper structures accessible from the cabinet exterior for effecting movement of such structures to their respective positions.

3. A heat exchange structure as defined in claim 2,

comprising a cabinet having a second air outlet therein through which said blower discharges, a closure structure supported by said cabinet and movable to close said first mentioned air outlet or permit the flow of air therethrough, and closure restricting means associated with said damper and closure structures for preventing movement of the latter to an open position when said damper structure is in a position to direct air into said blower inlet.

4. A heat exchange structure as defined in claim 3, wherein said closure restricting means associated with said closure and damper structures comprises a closure restricting member operatively carried by one of such structures and engageable with the other to prevent undesired opening movement of said closure structure.

5. A heat exchange structure as defined in claim 4, wherein said closure restricting member is carried by said damper structure.

6. A heat exchange structure as defined in claim 2, wherein switch means operative to control said power actuated blower means is operatively related to said damper and actuatable by the movement of said damper to render said power actuated blower means inoperable when said damper is in position for convection operation.

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