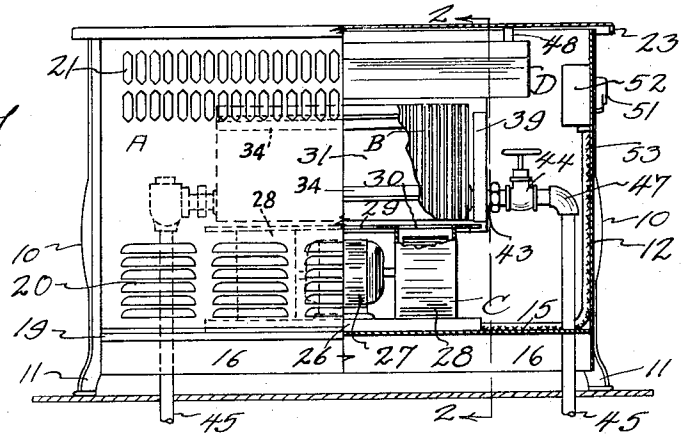
July 23, 1935. L. W. CHILD 2,008,945

REPLACEMENT HEATER

Filed Jan. 7, 1932

Fig. 1



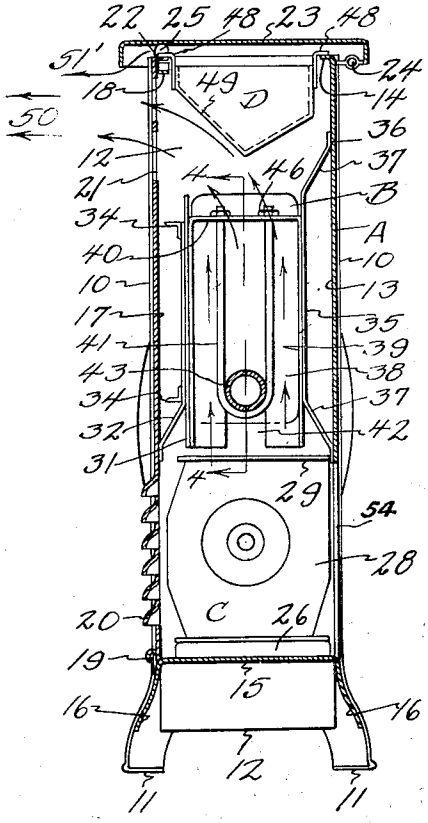
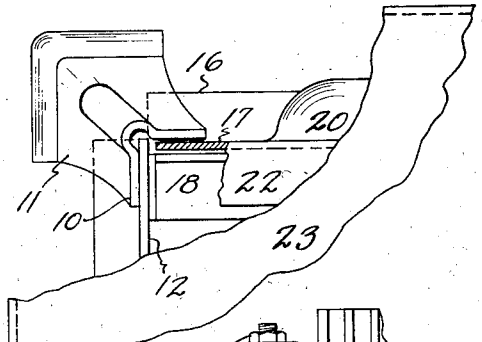


Fig. 2

Fig. 3



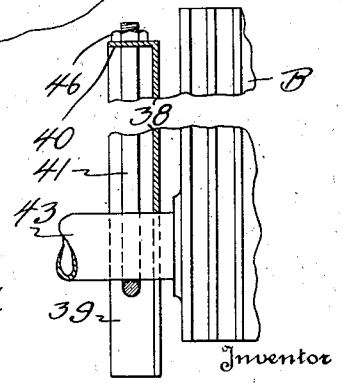


Fig. 4

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REPLACEMENT HEATER

Lachlan W. Child, Toledo, Ohio, assignor, by mesne assignments to Aeriet Air Conditioner Company, a corporation of Illinois

Application January 7, 1932, Serial No. 585,313

17 Claims. (Cl. 257—138)

My invention relates to heaters of the type employed in conditioning the air within dwelling houses, office buildings and the like.

More specifically, my invention relates to that type of heater wherein a blower produces a current of air which is passed over a steam heated radiating element and wherein the blower, radiator, and controls are housed within a cabinet which serves not only for housing purposes but also to direct the air stream so as to produce a substantially horizontal flow of heated air into the space to be conditioned.

An object of this invention is to produce a heater of this type which can be readily substituted for a common steam or hot water radiator of the type now commonly used for heating dwelling houses and office buildings. For this reason, the present invention has been entitled "Replacement heater". It is to be understood, however, that I do not intend in my claims to limit myself to heaters merely for replacement purposes inasmuch as the heater could also be employed in an initial installation.

An object of the invention is to so arrange the radiator and blower that the flow of air within the cabinet will be in an upward direction and furthermore, correlate the arrangement so that the steam connections may be entirely concealed and yet be made very simple, accessible, and not subject to trouble from expansion and contraction stress.

A further object is to provide a novel mounting for the heating element which is not only of extreme simplicity but also facilitates assembly and installation and serves to semi-insulate the heating element from the rear wall of the cabinet so as to minimize radiation losses from the rear of the heater.

A further object is to provide a novel cabinet construction including a front panel which can be removed for inspection and repair of the assembled units within the cabinet.

My invention further contemplates a compact arrangement including an evaporating pan in combination with the cabinet and the interiorly assembled units before mentioned.

A further object is to provide in the arrangement mentioned in the last paragraph, easy accessibility to said evaporating pan. This object is specifically achieved by the employment of a hinged cover member for the evaporating pan.

Another object is to provide a novel, durable and inexpensive cabinet construction including corner posts of angle iron terminating at their lower ends in upwardly flared legs and side and end walls secured to said corner posts with their end portions covered by the flanges of said corner posts, whereby a very sturdy yet ornamental construction is attained.

A further object is to provide an arrangement wherein the removable front panel carries a front insulator wall which cooperates with the rear insulator wall to form a restricted space in which the radiator is positioned and through which all of the air from the blower must pass, said front insulator wall, by virtue of its being carried by the front panel, being removable therewith to disclose the heating element from the front.

With these and other objects in view my invention consists in the combination construction and arrangement of the various parts thereof, whereby the objects contemplated are attained, as more fully set forth in the accompanying specifications, pointed out in my claims, and illustrated in the accompanying drawing, in which:

Fig. 1 is a front elevation of my replacement heater, parts being broken away to better illustrate the entire construction thereof.

Fig. 2 is a vertical sectional view through the heater taken on the line 2—2 of Fig. 1.

Fig. 3 is a detail plan view of one corner of the heater, parts being broken away to illustrate the sliding front panel construction.

Fig. 4 is a detail sectional view taken on the line 4—4 of Fig. 2.

I have used the reference character "A" to indicate generally the cabinet of the heater, the reference character "B" to indicate the radiator unit, the reference character "C" to indicate the blower unit, and the reference character "D" to indicate the evaporating pan.

The cabinet "A" includes corner posts 10 which are L shaped in cross section and which at their lower ends are flared outwardly to provide the legs 11.

End walls 12 are secured to the side flanges of the posts 10, and a rear wall 13 is secured to the rear flanges of the rear posts 10. The upper edge of the rear wall 13 is turned forwardly to provide a flange 14 which serves both to reinforce the rear upper edge of the cabinet and also to support one side of the trough "D".

A bottom wall 15 has the downwardly bent forward and rear skirts 16 which are secured to the forward and rear flanges of the forward and rear corner posts 10 respectively.

It will be understood that the skirts 16, the end walls 12, and the rear wall 13 are each respectively secured to one face of their respective post flanges being thereby covered at their ends by

said post flanges as indicated in Fig. 1. This produces a very sturdy and yet ornamental cabinet construction. The respective wall members are secured to their respective post flanges preferably by spot welding, although riveting might be employed.

The forward panel 17 is slidably mounted between the forward flanges of the forward posts 10 and a strut 18 connecting the upper forward corners of the end walls 12. The lower edge of the panel 17 is received behind a bead 19 secured to the skirt 16 and extending the full length of the cabinet.

Intake louvres 20 are pressed in the lower region of the panel 17, and discharge openings 21 are provided in the upper region thereof. The upper edge of the panel 17 is turned inwardly to form a flange 22 which serves not only for reinforcing purposes but also to support the other side of the evaporating pan "D".

A cover 23 is hinged at 24 to the rear wall 10 at its upper edge. The forward region of the cover rests upon cushioning buttons 25 secured to the flange 22 beyond the ends of the evaporating pan "D".

The blower assembly "C" includes a base 26 secured upon the bottom wall 15 of the cabinet, a motor 27, and centrifugal fan units 28 mounted coaxially at opposite ends of the motor 27. A top plate 29 connects the casings of the two fan units 28 and also serves to close from the bottom the space within which the radiator "B" is confined. That is, the said space is closed by the top wall 29 except for the discharge openings 30 in the top wall 29 registering with the discharge ports of the centrifugal fan units 28.

The front wall of the radiator compartment is formed by a front insulator wall 31 carried by brackets 38, hereinafter described. Longitudinal ribs 34 brace the front insulator wall construction.

The rear wall of the radiator compartment is defined by a rear insulator wall 35 secured at 36 to the rear wall 10. The insulator wall 35 is spaced from the rear wall 10 by means of the inclined portions 37 formed integrally with the insulator wall. The term "insulator" refers to the insulating properties of the air spaces formed between the walls 31 and 35, and the external walls of the cabinet.

A pair of radiator brackets include each a plate member 38, a side flange 39 formed integrally therewith and secured to the insulator wall 35, and a top flange 40 from which the U bolt hanger 41 is suspended.

A slot 42 in the lower end of the plate member 38 receives the nipple 43 by means of which the radiator "B" is attached to steam line 45.

The nipple 43 is suspended in the hanger 41 and the burrs 46, threaded on the upper ends of the hanger 41, serve to draw the nipple 43 into engagement with the upper ends of the slot 42 which determines the proper position of the radiator "B" with relation to the cabinet.

Should it be desired to drop the radiator lower, this may be accomplished by loosening the burrs 46.

In the steam line on one side of the cabinet, may be included a valve 44 for controlling the flow of steam through the radiator.

On both sides of the radiator, the steam line 45 extends downwardly through the bottom wall 15 of the cabinet and thence through the floor which supports the radiator. Connection may be made by attaching the vertical pipes to elbows 47, the latter forming part of the replacement heater assembly. The skirts 16 conceal the pipes 45 from view.

The evaporating pan "D" has the hanger brackets 48 which rest upon flanges 14 and 22 respectively. The cover 23 may be lifted to inspect or fill the pan "D".

Current is carried to the motor 27 through a four way switch 51, a transformer 52, and a system of transmitting wires enclosed in a cable 53. The motor 27 is a variable speed motor, and the four way switch and transformer control are a conventional unit used in connection with variable speed motors.

The combination of a variable speed blower with a steam heating unit and evaporating pan gives a number of distinct advantages, among which are the ability of regulating the distribution of heat from the heater and also the possibility of regulating the amount of humidification produced thereby. For instance, an increase in the speed of the blower will to some extent increase the amount of heat supplied to the evaporating pan, and the increased suction flow of air from the discharge openings 21 will produce a greater amount of suction and thereby draw off a greater quantity of the vapor from above the pan.

The increase in the amount of air passing through the heater will increase the amount of heat delivered from the heater for the reason that the larger volume of air will extract a greater amount of heat per unit of time from the radiator and the radiator will consequently draw a greater amount of heat from the steam passing through it. Any tendency of the radiator to cool under the greater withdrawal of heat by the air current will cause a contraction in the body of steam passing through the radiator and a resultant tendency to speed up the feeding of steam to the radiator owing to the reduced pressure within the radiator. In this way, the variable speed blower is particularly effective in connection with a steam unit in the variable distribution of heat.

When the device is in operation, the blower "C" will direct air through the louvres 20, pass it upwardly through the radiator compartment, between the insulator walls 31 and 39, and after the air has been heated, it will pass forwardly through the passage openings 21. It is to be noted in this connection that the forward side of the evaporating pan "D" is inclined as at 49, providing a baffle wall to deflect the air currents forwardly. Contact of the heated air with the pan will gradually evaporate the water therein, and the vapor thus produced will be aspirated by the air stream 50, as indicated by the reference numeral 51', owing to the passage of the stream 50 close to the space between the forward edge of the cover 23 and the upper forward edge of the panel 17.

The air flow is indicated in Fig. 2 by arrows 50.

The insulator walls 31 and 39 not only restrict the flow of air to a path which forces all of it to engage the radiator, but also intercept radiation to the front and rear walls of the cabinet thereby assuring that a maximum amount of heat will be transferred to the air current flowing through the heater.

The inclined portions 32—37 guide the air emerging from the blower, between the insulator walls 31—39.

The walls 31—39, and bracket plate 38, form a radiator compartment which restricts the air

flow so that substantially all of it will contact the radiator.

The panel 17 may be raised for inspection or repair of the internal parts of the heater, and in doing so, the forward insulator wall 31 is removed also.

I claim as my invention:

1. In a heat exchanger, a cabinet including four upright corner posts that are L shaped in cross section, end and rear walls secured to the inner faces of the respective flanges of said posts, a bottom wall including integrally formed depending skirts the end portions of which are secured to the inner faces of the forward and rear flanges of the respective posts.

2. In a heat exchanger, a cabinet including forward corner posts having forward flanges parallel to the front face of the cabinet, end walls, a strut secured between the upper forward corners of said end walls and spaced rearwardly from said flanges, and a forward panel vertically slidable between said strut and said flanges.

3. In a heat exchanger, a cabinet including four corner posts having flanges parallel to the forward and rear faces of the cabinet, end and rear walls secured to said corner posts, and a bottom wall provided with integral depending skirts secured respectively to said post flanges.

4. In a heat exchanger, a cabinet including fixed end and rear walls and a vertically slidable front panel, a radiator carried upon the rear wall and spaced rearwardly of the front panel, and an insulator wall spaced rearwardly of said front panel, positioned closely adjacent the forward extremity of said radiator.

5. In a heat exchanger, a casing including front and rear walls, a rear insulator wall supported upon and spaced from said rear wall, a pair of radiator brackets secured to said rear insulator wall and including end plates projecting forwardly therefrom, a forward insulator wall spaced from said forward wall and closely associated with the forward extremities of said end plates to form together with the end plates and the rear insulator wall a vertically extending confined space, a radiator suspended in said space and substantially filling the same horizontally, and a blower carried in the casing and positioned to deliver air to said confined space.

6. In a heat exchanger, a casing, a pair of radiator brackets including plate members positioned substantially parallel to the end walls of the casing, vertical slots in the lower regions of said plates, horizontal flanges formed at the upper extremities of said plates, U bolt hangers suspended from said flanges and registering with said slots, nipples extended through said slots and supported by said hangers, and a radiator suspended upon said nipples.

7. In a heat exchanger, a casing including front, end and rear walls, a radiator suspended within the casing intermediate the top and bottom thereof, a blower carried in the casing below said radiator, an intake opening in the lower region of the casing, a discharge opening in the upper region of the front wall of the casing, and an evaporating pan suspended within the cabinet above said radiator, the forward wall of said pan being inclined forwardly and upwardly and positioned to constitute a baffle to direct air forwardly from the upper region of the radiator and through said discharge opening.

8. In a heat exchanger, a cabinet including front, end and rear walls, a radiator suspended within the cabinet intermediate the top and bottom thereof, a blower carried in the cabinet below said radiator, an intake opening in the lower region of the cabinet, a discharge opening in the upper region of the front wall of the cabinet, an evaporating pan suspended within the cabinet above said radiator, the forward wall of said pan being inclined forwardly and upwardly and positioned to constitute a baffle to direct air forwardly from the upper region of the radiator and through said discharge opening, and a cover hinged to the cabinet and covering the top of the cabinet and said pan.

9. In a heat exchanger, a casing, a radiator suspended within the casing intermediate the top and bottom thereof, a blower carried in the casing below the radiator and adapted to direct a stream of air upwardly from the radiator, an evaporating pan positioned above the radiator in the path of the heated air discharged from said radiator, the front wall of the casing being provided with a discharge opening and said pan being positioned so that air discharged from the radiator may contact the pan and thence pass forwardly through said discharge opening.

10. In a heat exchanger, an elongated casing, a radiator suspended within the casing and spaced from both ends thereof, a blower below the radiator, and a steam line including pipes projecting upwardly through the bottom of the casing and thence projected horizontally to the radiator, said steam line occupying the spaces between the ends of the radiator and the ends of the casing.

11. In a unit heater, an upright casing, a circulating fluid radiator positioned therein intermediate the top and bottom thereof and substantially filling the space from front to rear of the casing to form two compartments, a humidifying means in one of said compartments and a variable speed blower in the other of said compartments, adapted to create a current of air through the casing which will first contact said radiator and thence contact the humidifying means for producing a stream of heat tempered, humidified air which is controllable.

12. In a unit heater, an upright casing, a heating element positioned therein intermediate the top and bottom thereof and substantially filling the space from front to rear of the casing to form two compartments, a humidifying means in one of said compartments and a variable speed blower in the other of said compartments, adapted to create a current of air through the casing which will first contact said heating element and thence contact the humidifying means for producing a stream of heat tempered, humidified air which is controllable.

13. In a unit heater, an upright casing, a circulating fluid radiator positioned therein intermediate the top and bottom thereof and substantially filling the space from front to rear of the casing to form two compartments, a humidifying means in one of said compartments and a blower in the other of said compartments, adapted to create a current of air through the casing which will first contact said radiator and thence contact the humidifying means for producing a stream of heat tempered, humidified air.

14. In a unit heater, an upright casing, a heating element positioned therein intermediate the top and bottom thereof and substantially filling the space from front to rear of the casing to form two compartments, a humidifying means in one of said compartments and a blower in the other of said compartments, adapted to create a current of air through the casing which will first

contact said heating element and thence contact the humidifying means for producing a stream of heat tempered, humidified air.

15. In a heat transfer device, an elongated casing, a radiator suspended within the cabinet and spaced from both ends thereof, and from the top and bottom thereof to form compartments above and below said radiator, a blower in one of said compartments adapted to draw a stream of air into contact with said radiator, and a heat transfer fluid line including pipes projecting upwardly from the bottom of the casing and thence projecting horizontally to the radiator, said heat transfer fluid line occupying the spaces between the ends of the radiator and the ends of the casing, the cabinet being provided with intake and discharge opening communicating respectively with said compartments.

16. In a heat transfer device, a casing including front and rear walls, insulator walls spaced inwardly respectively from the front and rear walls, a radiator unit suspended in the space between said insulator walls and substantially filling said space, and a blower positioned to deliver air to said space, the insulator walls serving to confine the air stream delivered from said blower so that substantially all of it will contact the radiator.

17. In a heat transfer device, a casing including front and rear walls, insulator walls spaced inwardly respectively from the front and rear walls, a radiator unit suspended in the space between said insulator walls and substantially filling said space and a blower positioned to deliver air to said space, the insulator walls serving to confine the air stream delivered from said blower so that substantially all of it will contact the radiator, and terminating in outwardly flared portions connecting the blower compartment with the radiator space.

LACHLAN W. CHILD.