April 12, 1932. A. H. BATES 1,853,333

HEATER FOR MOTOR VEHICLES

Filed March 5, 1929

Fig. 2.

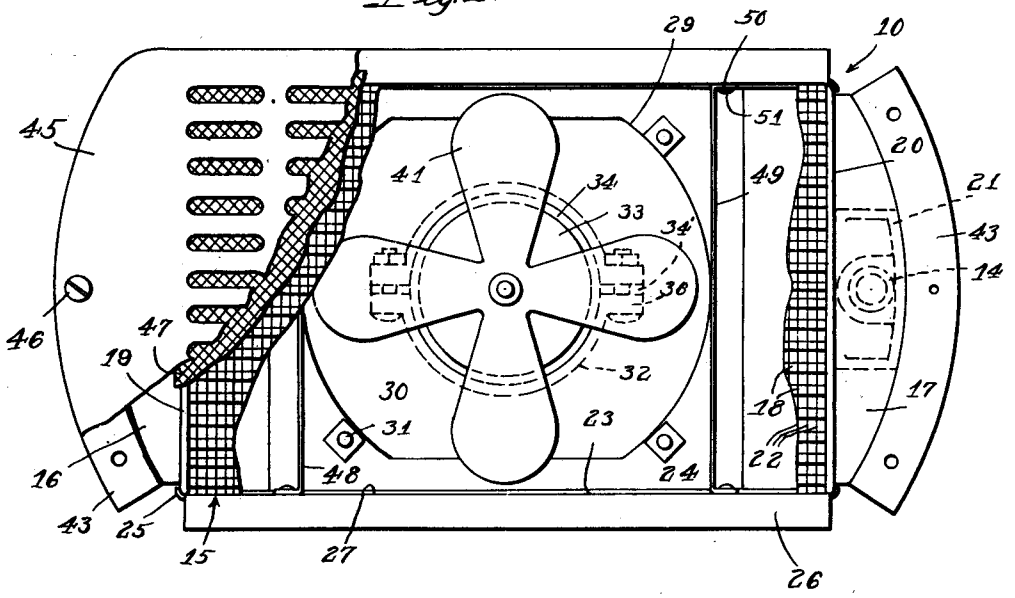
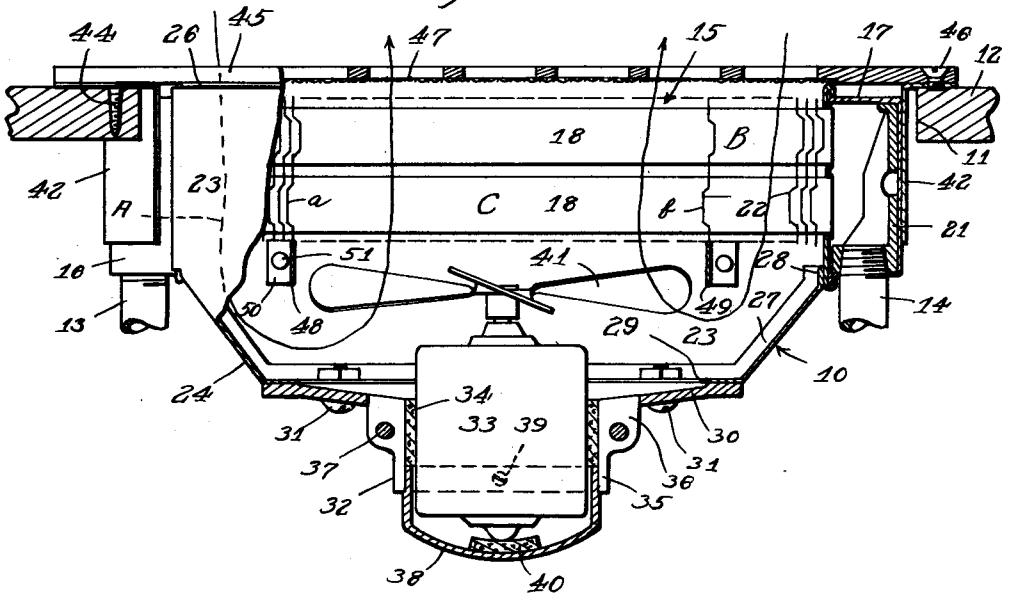


Fig. 1.



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UNITED STATES PATENT OFFICE

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HEATER FOR MOTOR VEHICLES

Application filed March 5, 1929. Serial No. 344,144.

This invention relates to heaters and more particularly a heater designed and adapted for use in motor vehicles, and of a type utilizing the heat in the water of the engine cooling system.

The principal object of my invention is to provide a practical rear seat installation for a hot water type air heater depending for its draft upon the use of an electric motor-driven fan. Heaters of that description have heretofore been available only for use under the cowl, that is, as front seat heaters.

Among the features of the heater of my invention are the following:

(1) The provision of a heater unit consisting of a radiator core, an electric motor-driven fan mounted behind the same, and an air-tight enclosing shell or casing for the motor and fan on the back of the radiator preventing the admission of air from behind the radiator, but permitting the drawing in of air from in front of the same to be forced through the radiator by the fan.

(2) The provision of a heater as set forth above having baffles in the radiator core serving to define a passage through the middle portion of the core for the outgoing heated air and two other passages through the end portions of the core for the incoming cold air, this arrangement involving a double flow of the air through the core for maximum heat exchange between the hot water flowing through the core and the air passing therethrough. Incidentally, I also prefer to provide auxiliary baffles on the back of the radiator core at least partially enclosing the fan, these auxiliary baffles being in the nature of extensions of the other baffles and serving better to define the passages for the incoming and outgoing air so that all of the incoming air is given the full benefit of the action of the fan whereby to insure most efficient circulation of heated air.

(3) The provision in a heater of the kind described, of an extremely practical, serviceable, and sound-deadening mounting for the fan motor in the casing, metal to metal contact between the motor and the casing being entirely avoided, whereby to produce extremely quiet operation.

(4) The provision of a heater of the kind described having brackets for suspending the same from the floor of an automobile, or on any wall, by the headers communicating with the opposite ends of the radiator core. Also the provision, especially in the case of a floor installation, of a grating covering the radiator and preferably detachably secured to the aforesaid brackets together with a screen under the grating, the removal of the grating and screen permitting the same to be inverted to dislodge any dirt that may have collected in the grating on top of the screen.

The invention is fully described hereinafter by reference to the accompanying drawings, wherein—

Figure 1 is a view partly in elevation and partly in central vertical section through a heater made in accordance with my invention, and

Fig. 2 is a plan view thereof with the grating and screen partly broken away.

The same reference numerals are applied to corresponding parts in the two views.

The heater, designated generally by the reference numeral 10, is shown mounted in an opening 11 in a wall 12 which in this instance happens to be the floor of the body of an automobile, but might, however, be any wall, such for example as a partition wall between the front and rear seats or for that matter, a wall of any enclosure to be heated. The suspension of the heater in an opening in the floor is ideal for a rear seat installation and applicable to practically any make of car but, of course, the application is not particularly limited to rear seats inasmuch as some may prefer that sort of installation for front seat heating. Furthermore, heaters of this kind would be suitable for installation

in motor busses, where one could be installed in front of each seat, all being connected in parallel so as to be supplied with the circulating liquid heating medium from the same source. With this sort of installation the heater is obviously easily removable if that is ever desired. Pipes 13 and 14 leading to and from the heater are extended beneath the floor 12 from beneath the hood of the car, supply pipe 13 having connection preferably through a stop cock with a pipe tapped into the water jacket of the motor at a point where the water attains the highest temperature and where it also gets hot immediately upon starting of the motor, namely, in the head of the motor, and the return pipe 14 having connection with a hose tapped into the lower outlet hose connection of the radiator of the car, between the latter and its water pump, as, for example, is illustrated in my application Serial No. 311,032, filed October 8, 1928. From this much description it will be evident that hot water, or whatever cooling fluid is used, is supplied to the radiator 15 of the heater 10 from the motor through the supply pipe 13, and that it flows through the radiator from the header 16 to the header 17, and thence back to the motor through the return pipe 14. In warm weather, the heater may be entirely shut off by simply closing the cock in the supply line. A heater of this sort, installed in front of the rear seat, may constitute the sole heating means for the car, or the same may be provided in conjunction with a front seat heater of the same type or one like that shown and described in my application above referred to, in which latter event, the supply and return pipes 13 and 14, respectively, may be branched off from the same connections with the corresponding pipes of the other heater.

The radiator 15 may be of any other suitable or preferred type, but is herein illustrated as having what is known as a turbo-tube core consisting of two or more banks of horizontally extending, parallel, flat tubes 18 connected at their opposite ends with the headers 16 and 17 through header plates 19 and 20, the latter being of sheet metal and flanged and swedged snugly about the flanged rims of the headers, and soldered or otherwise secured thereto for a water-tight connection. Cast brackets 21 mounted inside the headers and suitably welded in place have threaded holes therein for connection with the headers of the pipes 13 and 14. Transverse radiating fins 22 are provided on the tubes 18 to furnish the desired amount of radiation surface. The core is entirely enclosed, except for the top or front thereof, in a sheet metal shell or casing comprising side walls 23 and a bottom or back wall 24. The sides 23 are flanged at their ends, as at 25, to fasten onto the header plates 19 and 20 and have outwardly projecting flanges 26 extending lengthwise of the top thereof arranged to overlie the sides of the opening 11 in which the heater is mounted. The sides 23 are fastened to the bottom 24 through the medium of upwardly projecting flanges 27 formed on the lateral edges of the bottom, the latter having the ends overlying the inside of the header plates 19 and 20, as indicated at 28, for fastening thereto. The method of fastening in these various places is relatively unimportant, although I prefer welding. The casing has an opening 29 in the bottom thereof, the form of which is shown in full lines in Fig. 2 and permits the insertion therethrough of a four-blade fan of approximately the radius of the arcuate portions of said opening. A cast plate 30 crosses the opening and has the rim thereof fastened to the bottom 24, as by means of bolts 31. A cylindrical hub 32 is formed at the center of the plate 30 for the reception of an electric motor 33. A strip 34 of cork or the equivalent compressible sound-deadening material is wrapped about the motor 33 within the hub 32. The hub 32 is split diametrically, as appears at 35, and has ears 36 formed adjacent the split for the reception of bolts 37. The latter when tightened are arranged to contract the hub 32 enough to compress the cork 34 and also cork 34′ filling the opening at the split portion 35 of the hub, and clamp the motor 33 in place, thus resulting in good support for the motor without any metal to metal contact. A removable cap 38, held in place in the end of the hub 32 by means of a pin or screw 39, affords access to the motor for the purposes of inspection and oiling. A pad 40, likewise of cork or other equivalent sound-deadening material, is interposed between the cap 38 and a projecting part of the motor 33 to avoid metal to metal contact. The complete insulation of the motor 33 from the casing insures extremely quiet operation. The motor 33 has a fan 41 mounted on the projecting end of the armature shaft, as shown, slightly below the radiator core. Heavy sheet metal brackets 42, welded or otherwise suitably secured to the headers 16 and 17, have outwardly directed flanges 43 arranged to rest on the floor about the opening 11 to support the heater, screws 44 being entered through holes therein to fasten the heater in place. The tops of the flanges 26 and 43 lie in the same plane, and a grating 45 is arranged to rest thereon and be fastened by means of screws 46 to the flanges 43. A screen 47, either secured to the bottom of the grating or clamped in place thereby, is removable with the grating so as to permit the same to be inverted to dislodge any dirt that may collect on the top thereof.

In operation, when the fan 41 is driven, the fins 22 approximately tangent to the fan circle, namely, the fins *a* and *b*, constitute

baffles defining two passages A and B through end portions of the radiator core for incoming cold air and another passage C through the middle portion of the core for outgoing heated air. As a result, air to be heated is caused to flow through the core twice; it passes through the core in the passages A and B in one direction, as indicated by the arrows, and thereafter passes through the core again through the passage C, in the opposite direction, as indicated by the arrows. There is, therefore, bound to be maximum efficiency in the matter of heat exchange between the hot water flowing through the tubes 18 of the core and the air passing through the core between the fins 22. Auxiliary baffles 48 and 49 are preferably provided inside the casing directly beneath the radiator core and contiguous with the lower edges of the fins marked *a* and *b*. These baffles, which are suitably formed of sheet metal strips bent at the ends, as indicated at 50, and riveted to the sides 23, as at 51, at least partially enclose the fan 41 and serve better to define the separation of the passages A and B from the middle passage C, so that all of the incoming air is bound to be given the full benefit of the action of the fan. Thus, there is a constant circulation and recirculation of air as the heated air is continuously discharged from the middle portion of the radiator and cold air is drawn in through the end portions, and of course, the heat distribution is proportionately effective.

It is believed that the foregoing description conveys a clear understanding of all of the objects and advantages of my invention, and while reference has been made in the description to various specific details of construction, it should be understood that the invention is not to be regarded as limited thereby, inasmuch as many changes might be made without seriously affecting the advantages enumerated. For example, the direction of rotation of the fan 41 might be reversed so as to draw in air at C and discharge air at A and B, although, of course, I prefer to have the heater operated as above described. Nevertheless, the expressions "discharged from" and "drawn into" should be regarded as purely relative terms and not as definite limitations in construing the claims. The appended claims have been drawn with a view to covering not only the specific embodiment illustrated, but all legitimate modifications and adaptations and they should be accordingly construed.

I claim:

1. In a heater the combination of a radiator having means for passing a heating fluid therethrough, a casing enclosing the radiator with the exception of the front thereof, the said radiator extending uninterruptedly across the entire front of the casing, an electric motor mounted in the back wall of said casing, and a fan mounted on an armature shaft thereof inside the casing closely behind the radiator, said casing having at least one portion of the open front thereof constituting an air inlet opening through which air is arranged to be drawn in the operation of the fan, the air drawn in being discharged by the fan past the radiator to be heated by the latter.

2. In a heater the combination of a radiator having means for passing a heating fluid therethrough, a casing enclosing the radiator with the exception of the front thereof, and a power driven fan in said casing behind the radiator, and a baffle on the radiator so stationed with respect to the fan as to define at least one air inlet passage open at the front of the casing through which air is arranged to be drawn into the casing over a portion of the radiator in the operation of the fan, the air in this contact with the radiator being partially heated, and an air discharge passage likewise open at the front of the casing through which the partially heated air is discharged over another portion of the radiator and thereby further heated, and an auxiliary baffle in said casing behind the radiator serving as an extension of the other baffle and causing the incoming air to be delivered behind the fan.

3. In a heater the combination of a radiator having means for passing a heating fluid therethrough, a casing enclosing said radiator excepting the front thereof, an electric motor mounted in the back wall of said casing intermediate the ends of the radiator and having a fan mounted on the armature shaft thereof inside the casing and closely behind the radiator, and baffle means segregating the one portion of the radiator through which air is arranged to be discharged by the fan in the operation of the latter from the rest of the radiator through which air is arranged to be drawn into the casing in the operation of the fan, the incoming and outgoing air both having contact with the radiator so as to abstract heat therefrom.

4. A heater as set forth in claim 3 including auxiliary baffle means in side the casing behind the radiator and at least partially enclosing the sides of the fan whereby to insure the delivery of the incoming air behind the fan.

5. In a heater the combination of a radiator core comprising a series of tubes having means for passing a heating fluid therethrough, and a series of transverse radiating fins disposed in substantially parallel relation and providing radiation surfaces for the tubes, a casing enclosing said core excepting the front thereof, and a power driven fan in said casing behind the core, said fan in operation being arranged to discharge air through a portion of the core between said fins to abstract heat therefrom, air being

drawn in due to the operation of the fan through the rest of the core between the radiating fins thereof and being thereby given an initial heating.

6. A heater as set forth in claim 5 including an auxiliary baffle in said casing behind the core serving to direct the incoming air for delivery behind the fan.

7. In a heater the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough and headers at opposite ends of said core adapted to have communication with supply and return pipes respectively for the delivery and discharge of the heating fluid, means for mounting the heater in a wall opening comprising bracket parts on the headers, a casing enclosing the core between the headers leaving the front of the core open for the discharge of heated air therefrom, and an electric motor mounted in the back wall of said casing having a fan mounted on the armature shaft thereof inside the casing and closely behind the core whereby to discharge air through a portion of the core.

8. In a heater the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough and headers at opposite ends of said core adapted to have communication with supply and return pipes respectively for the delivery and discharge of the heating fluid, means for mounting the heater in a wall opening comprising bracket parts on the headers, a casing enclosing the core between the headers leaving the front of the core open for the discharge of heated air therefrom, an electric motor mounted in the back wall of said casing having a fan mounted on the armature shaft thereof inside the casing and closely behind the core whereby to discharge air through a portion of the core, and one or more baffles segregating said portion of the core from the rest of the core, air being arranged to be drawn through the rest of the core in the operation of the fan and thereby given an initial heating preliminary to the heating given the same when it is discharged through the core by the fan.

9. A heater as set forth in claim 8 including one or more auxiliary baffles inside the casing immediately behind the core serving to direct the incoming air for delivery behind the fan.

10. In a heater the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough and headers at opposite ends of said core adapted to have communication with supply and return pipes respectively for the delivery and discharge of the heating fluid, means for mounting the heater in a wall opening comprising bracket parts on the headers, a casing enclosing the core between the headers leaving the front of the core open for the discharge of heated air therefrom, an electric motor mounted in the back wall of said casing having a fan mounted on the armature shaft thereof inside the casing and closely behind the core whereby to discharge air through a portion of the core, and a grating covering the front of the radiator preferably detachably secured to the aforesaid bracket parts.

11. In a floor type heater the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough and headers at opposite ends of said core adapted to have communication with supply and return pipes respectively for the delivery and discharge of the heating fluid, means for mounting the heater in a floor opening, a casing enclosing the core between the headers leaving the front of the core open for the discharge of heated air therefrom, and an electric motor mounted in the back wall of said casing having a fan mounted on the armature shaft thereof inside the casing and closely behind the core whereby to discharge air through a portion of the core, a grating covering the front of the radiator, and an air filtering screen between the grating and the radiator and protected by the grating while serving to exclude dirt from the radiator dropped off the grating.

12. In a heater of the character described, the combination of a rectangular elongated casing open at the front thereof, a power operated fan mounted in said casing approximately at the middle thereof in a plane approximately parallel with the open front of the casing, and a substantially rectangular heating element in said casing having two sections thereof at opposite ends of the casing outside the fan circle, whereby in the operation of the fan air is forced to circulate in predetermined paths through the opposite ends of the casing and the said heating element sections in one direction and through the middle portion of the open front of the casing in the opposite direction.

13. In a heater of the character described, the combination of a rectangular elongated casing open at the front thereof, a power operated fan mounted in said casing approximately at the middle thereof in a plane approximately parallel with the open front of the casing, and a substantially rectangular heating element in said casing occupying the entire open front thereof, the middle portion of said heating element being within the fan circle but the end portions being outside the fan circle, there being means for segregating the middle portion of the heating element from the end portions thereof to define separate passageways for air, whereby in the operation of the fan air is forced to circulate in predetermined paths in one direction through the end portions and in the opposite direction through the middle portion for double heating of the air.

14. In a heater, the combination of a heating element, a casing enclosing the same so as to leave the front thereof exposed, a power driven fan in said casing disposed in an intermediate position with respect to the opposite end portions of the heating element, means serving as baffles at opposite sides of the fan circle arranged to define a passage in the casing through which air is circulated in one direction in the operation of the fan, there being two other passages thereby defined in the casing through which air is arranged to be circulated in the opposite direction in the operation of the fan, the air in circulating through the last mentioned passages being arranged to abstract heat from the end portions of the heating element, and auxiliary baffle means on one face of the heating element also at opposite sides of the fan circle and serving to further segregate the first passage from the other passages.

15. In a heater, the combination of a radiator having means for passing a heating fluid therethrough, a casing enclosing the radiator with the exception of the front thereof, a power driven fan in said casing for producing forced circulation of air, a baffle on the radiator so positioned with respect to the fan circle to define an air passage on one side thereof open at the front of the casing through which air is arranged to pass over the radiator in one direction in the operation of the fan and another air passage on the other side thereof through which air is arranged to pass in the opposite direction in line with the fan in the operation thereof, and an auxiliary baffle projecting from the radiator in line with the first mentioned baffle to further segregate the one passage from the other.

16. In a heater, the combination of a radiator having means for passing a heating fluid therethrough, a casing enclosing said radiator excepting the front thereof, an electric motor mounted in said casing at the back wall thereof intermediate the ends of the radiator and having a fan mounted on the armature shaft thereof inside the casing and in a predetermined relation to the radiator, and baffle means segregating the end portions of the radiator through which air is arranged to pass in one direction in the operation of the fan, the air being arranged to flow in the opposite direction at the middle of the radiator in line with the fan.

17. In a heater, the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough, and headers at opposite ends of said core adapted to have communication with supply and return pipes, respectively, for the delivery and discharge of the heating fluid, the heater being supported mainly by the headers, a casing enclosing the core leaving the front thereof open for the discharge of heated air, and an electric motor supported in said casing at the back wall thereof having a fan mounted on the armature shaft thereof inside the casing in a predetermined relation to the core whereby to force air through a portion of the core.

18. In a heater, the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough, and headers at opposite ends of said core adapted to have communication with supply and return pipes, respectively, for the delivery and discharge of the heating fluid, the heater being supported mainly by the headers, a casing enclosing the core leaving the front thereof open for the discharge of heated air, an electric motor supported in said casing at the back wall thereof having a fan mounted on the armature shaft thereof inside the casing in a predetermined relation to the core whereby to force air through a portion of the core, and one or more baffles segregating said portion of the core, air being arranged to be drawn in on one side of said baffles and discharged on the other side thereof.

19. In a heater, the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough, and headers at opposite ends of said core adapted to have communication with supply and return pipes, respectively, for the delivery and discharge of the heating fluid, the heater being supported mainly by the headers, a casing enclosing the core leaving the front thereof open for the discharge of heated air, an electric motor supported in said casing at the back wall thereof having a fan mounted on the armature shaft thereof inside the casing in a predetermined relation to the core whereby to force air through a portion of the core, one or more baffles segregating said portion of the core, air being arranged to be drawn in on one side of said baffles and discharged on the other side thereof, and one or more auxiliary baffles projecting from the radiator in line with and constituting extensions of the other baffles to further segregate the incoming and outgoing air streams.

20. In a heater, the combination of a radiator comprising a core adapted to have a heating fluid passed therethrough, and headers at opposite ends of said core adapted to have communication with supply and return pipes, respectively, for the delivery and discharge of the heating fluid, the heater being supported mainly by the headers, a casing enclosing the core leaving the front thereof open for the discharge of heated air, an electric motor supported in said casing at the back wall thereof having a fan mounted on the armature shaft thereof inside the casing in a predetermined relation to the core whereby to force air through a portion of the core, and a grating covering the front of the radiator.

21. In a heater the combination of a rectangular heating element, an elongated rectangular casing enclosing said element, and a power operated fan in said casing, said heating element having opposite end sections thereof on opposite sides of said fan extending across cold air inlets at said ends of the casing, said fan when operated being arranged to draw air inwardly through said inlets for heating by said sections before discharge outwardly from the intermediate portion of the casing.

22. In a heater the combination of a rectangular heating element, an elongated rectangular casing enclosing said element and having the same occupying the entire open front thereof, and a power driven fan in said casing behind an intermediate portion of the heating element arranged in operation to draw in air into the ends of the casing for initial heating by passage past the end portions of the heating element and to discharge the same from the intermediate portion of the casing past the intermediate portion of the heating element whereby the same is given a second heating.

23. In a heater the combination of a heating element, a casing enclosing said element on all sides except the heat delivery side, the said heating element comprising tubes for circulation of the heating medium extending transversely relative to the heat delivery side of the casing, a power driven fan in said casing behind the heating element and disposed in an intermediate position with respect to the ends of the latter, and means comprising radiating fins on said tubes extending crosswise thereof serving as baffles arranged to define a discharge passage through which air is arranged to be discharged from the casing past the heating element in the operation of the fan, and air inlet passages through which air is arranged to be drawn into the casing past the heating element in the operation of the fan, the air in passing the heating element both in entering and leaving the casing being arranged to abstract heat therefrom.

24. In a heater the combination of a heating element, a casing enclosing said element on all sides except the heat delivery side, a power driven fan in said casing behind the heating element and disposed in an intermediate position with respect to the ends of the latter, and means serving as baffles arranged to define a discharge passage through which air is arranged to be discharged from the casing past the heating element in the operation of the fan, and air inlet passages through which air is arranged to be drawn into the casing past the heating element in the operation of the fan, the air in passing the heating element both in entering and leaving the casing being arranged to abstract heat therefrom, and auxiliary baffle means in said casing behind the heating element and at least partially enclosing the sides of the fan whereby to insure the delivery of the incoming air to the back of the fan.

25. A heater comprising a heating element, a casing therefor enclosing the element on all sides excepting the heat delivery side, means for supporting the heater in a wall opening, and an electric motor mounted in said casing on the back wall thereof having a fan mounted on the armature shaft thereof inside the casing in a predetermined relation to the heating element whereby in operation to cause air to be drawn into said casing and discharged therefrom for heating purposes, and vibration absorbing means between the motor and the back wall of said casing for preventing the transmission of vibration through the casing to said wall.

26. A heater comprising a heating element, such as a radiator core, a casing rigid with and enclosing said element on all sides excepting the heat delivery side, the back wall of said casing being spaced from the back of the heating element, an electric motor mounted on the back wall having a fan on the armature shaft thereof disposed in a predetermined relation to the back of the heating element whereby in operation to cause air to be drawn into said casing and discharged therefrom for heating purposes, and vibration absorbing means between the motor and the back wall of said casing for preventing the transmission of vibration from the motor to the back wall of said casing and thence to the rest of the heater.

27. A heater comprising a heating element, such as a radiator core, a casing rigid with and enclosing said element on all sides excepting the heat delivery side, the back wall of said casing being spaced from the back of the heating element, and having a substantially central opening provided therein, an electric motor mounted in said opening and projecting from the casing, the motor having a fan mounted on the armature shaft thereof inside the casing in a predetermined relation to the back of the heating element whereby in operation to draw air into the casing and discharge the same therefrom for heating purposes, and cushioning material interposed between the motor and the back wall of the casing in said opening serving to prevent the transmission of vibration from the motor to said wall and also serving to seal the casing at said opening.

28. A heater comprising a heating element, such as a radiator core, a casing rigid with and enclosing said element on all sides excepting the heat delivery side, the back wall of said casing being spaced from the back of the heating element, and having a substantially central opening provided therein, an electric motor mounted in said opening and projecting from the casing, the motor having a fan mounted on the armature shaft

thereof inside the casing in a predetermined relation to the back of the heating element whereby in operation to draw air into the casing and discharge the same therefrom for heating purposes, and cushioning material interposed between the motor and the back wall of the casing in said opening serving to prevent the transmission of vibration from the motor to said wall and also serving to seal the casing at said opening, and a removable cap to enclose the projecting portion of the motor.

In witness of the foregoing I affix my signature.

ALBERT H. BATES.