May 16, 1933. A. H. BATES 1,909,144

HEATER

Filed May 29, 1930

Fig. 1

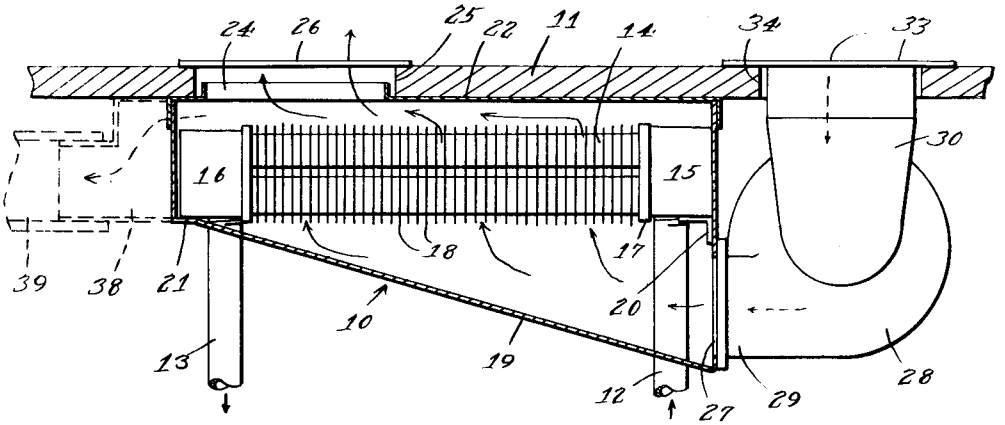
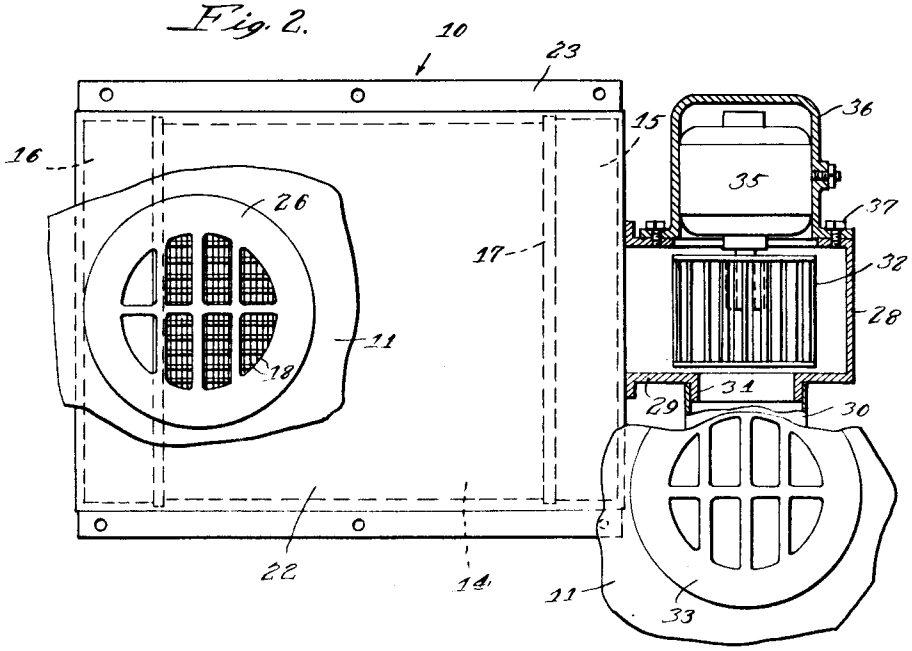



Fig. 2.




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# UNITED STATES PATENT OFFICE

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## HEATER

Application filed May 29, 1930. Serial No. 456,960.

This invention relates to heaters for motor vehicles and has particular reference to one utilizing the heat in the fluid of the engine cooling system.

The principal object of my invention is to provide a heater designed and adapted for installation on any enclosing wall of the compartment to be heated.

Briefly stated, the heater of my invention comprises a casing containing a radiator core through which the heating fluid is circulated, the casing being open on one side of the radiator to a hot air register on the floor or other wall of the compartment to be heated, and on the other side to the casing or conduit of a suitable blower, whose intake is through a cold air register also on the floor or other wall of said compartment. The registers are spaced sufficiently to promote good circulation of air in the compartment and thus insure uniform heating, and the inlet and outlet openings of the casing are so disposed with reference to the radiator core that there is a very efficient heat exchange.

The invention is illustrated in the accompanying drawing in which

Figure 1 is a longitudinal section in a vertical or horizontal plane, depending on whether the part to which the heater is shown attached is the floor or a wall of the compartment to be heated;

Fig. 2 is a face view of Figure 1 showing the floor or wall broken away so as to disclose the heater unit and showing a portion of the latter in section.

The heater designated generally by the reference numeral 10 is shown mounted on a wall 11 of the compartment to be heated. The wall 11 may be the floor, ceiling, or any other enclosing wall of the body of a motor vehicle, or for that matter, a wall of any enclosure to be heated. For example, the suspension of the heater from the floor would be ideal for a rear seat installation, where some other heaters would be unsuited, and, of course, it is obvious that the arrangement would be suitable for front seat heating. Furthermore, heaters of this kind are suitable for use in motor busses, trucks, etc. Pipes 12 and 13 leading to and from the heater outside the compartment to be heated are suitably connected with the engine cooling system, the supply pipe 12 having connection preferably through a stop cock with a pipe tapped into the water jacket of the motor at a point where the motor 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 13 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. From this much description it will be evident that the water or whatever cooling fluid is used, and which constitutes the heating medium for the heater, is supplied to the radiator core 14 of the heater from the motor through the supply pipe 12 and that it flows from the header 15 through the core to the header 16, and thence back to the motor through the return pipe 13. In warm weather the heater may be entirely shut off by simply closing the cock in the supply line. It is obvious that one or more of these heaters may be used in a given heating system, depending on the size of the compartment to be heated or upon whether more than one compartment is to be heated, or else one or more of these heaters may be provided in connection with a heater especially designed for, say, a front seat installation, the supply and return pipes 12 and 13 respectively, being suitably branched off from the same connections with the corresponding pipes of the other heater or heaters.

The radiator 14 may be of any 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 parallel flat tubes connected at their opposite ends with the headers 15 and 16 through suitable header plates 17. Transverse radiating fins 18 are provided on the tubes to furnish the desired amount of radiation surface and they define between them a series of air passages through which the air is caused to flow in substantially parallel paths as will presently appear. A substantially

rectangular metal shell or casing 19 of right triangular cross-section, as appears in Figure 1, constitutes an enclosure for the radiator and has the same supported therein by its headers 15 and 16 in any suitable or preferred manner. I have shown a bracket 20 cooperating with the header 15 and arranged to be welded or otherwise suitably secured to the wall of the casing and a shoulder 21 formed on the inside of the casing to cooperate with the header 16. The bracket 20 and shoulder 21 support the radiator in spaced parallel relation to the cover 22, suitably of sheet metal. The cover is flanged to fit about the sides of the casing and is suitably secured thereto as by welding or soldering. Longitudinal supporting brackets 23 are provided at opposite sides of the casing 19 and suitably welded or otherwise secured thereto to serve as a means of supporting the heater on the wall 11, holes being provided in said brackets as shown in Fig. 2 for the reception of screws or bolts. An outlet opening 24 is provided in the cover at one end of the casing defined by an upturned annular flange which projects into an opening 25 provided in the wall 11. A grating 26 covers the opening 25 and serves as the hot air register. If desired a screen may be provided under the grating 26, especially where the heater is installed under the floor, or wherever dirt is apt to get into the casing through the openings in the grating. Such a screen could be fastened in place on the wall 11 in the fastening of the grating. An inlet opening 27 is provided in the wall of the casing on the other side of the radiator and at the opposite end of the casing from the opening 24. Cold air to be heated is arranged to be supplied to the casing through the opening 27 in any suitable or preferred manner. I have shown the casing 28 of a blower having the discharge end 29 thereof directly abutting and attached to the wall of the casing 21 over the opening 27, although it will be evident that an intermediate conduit might be provided between the casing 28, and the casing 21. The casing 28 has one end of an elbow 30 fitting over a neck 31 provided on one side thereof substantially concentric with the rotary impeller or fan 32 of the blower disposed in the casing as shown in Fig. 2. The other end of the elbow fits on a similar neck provided on a grating 33 mounted over an opening 34 provided in the wall 11 and arranged to serve as a cold air register. Here again a screen may be provided under the grating 33 if desired. The impeller 32 is of the squirrel cage type with the blades thereof mounted substantially parallel with one another in circumferentially spaced relation, and is mounted on the armature shaft of an electric motor 35 disposed in a housing 36 fastened on the other side of the casing 28 opposite the neck 31, as by means of bolts 37.

In operation, the cold air is drawn in through the cold air register and delivered through the elbow 30 to the center of the impeller 32 and discharged tangentially from the impeller through the inlet opening 27 into the casing 19, substantially as indicated by the arrows in Figure 1. The air passes through the radiator core between the fins 18 in substantially parallel paths and, of course, abstracts heat therefrom. The hot air is discharged from the casing through the opening 24 and into the compartment through the hot air register. The fact that the outlet for the hot air is at the opposite end of the casing from the cold air inlet insures exposure of the entire radiator, that is, not only the full length of the core but the headers as well, for efficient heat exchange with the air passing through the casing. By virtue of the arrangement illustrated it is obvious that the size of the inlet and outlet openings imposes no restriction whatever on the size of the heating element that can be employed, and consequently very effective heating can be provided for by simply using the proper sized heating element. Furthermore, the fact that the cold air register is spaced appreciably from the hot air register avoids any likelihood of short circuiting of the hot air immediately upon discharge back to the cold air register, and insures good circulation of air in the compartment to be heated and uniform heating thereof. If desired, the hot air need not be discharged from the casing directly into the compartment to be heated. For example, an outlet elbow or header 38 may be provided on the casing 19 as indicated in dotted lines in Figure 1, having a conduit 39 communicating therewith and leading to any point where the hot air is to be discharged.

It is believed the foregoing description conveys a clear understanding of my invention and all of its objects and advantages. Certain variations of the construction and arrangement have been indicated and it is apparent that still other changes may occur to those skilled in this art as a result of this disclosure. The appended claims have been drawn with a view to covering all legitimate modifications and adaptations.

I claim:

1. In a heater, the combination of a casing, a radiator comprising headers and a core therebetween for the passage therethrough of heating fluid from one header to the other, said radiator being disposed entirely within said casing with the one header thereof at one side wall and the other header at the opposite side wall whereby to separate one chamber in said casing on one side of the radiator from another chamber

in said casing on the other side thereof, fins on the core to transfer heat to the air passing the same, the said fins serving also to direct the air in its passage through the core in a predetermined manner so as to have air contacting all portions of the core and the adjacent headers substantially uniformly, air in passing from one chamber to the other being arranged to pass through the core and in heat transferring relation with the headers whereby to abstract heat therefrom, means for supplying air to be heated to said casing at one end of one of said chambers, and means for discharging heated air from said casing from the other end of the other chamber.

2. In a heater of the character described, the combination with an enclosing wall of a compartment to be heated, the same having a warm air opening and a cold air opening in spaced relation to one another for the circulation and recirculation of air in the compartment, of a casing mounted outside the compartment on said wall having an opening in the wall thereof at one end of the casing communicating with the warm air opening, a heating element disposed endwise in said casing, the cross-sectional area of the last mentioned opening being only a fraction of the cross-sectional area of the heating element and the latter being spaced from said opening to permit the passage of air from remote portions thereof in said casing to said opening, the said heating element being also spaced from the opposite wall of said casing to provide a chamber for the passage of air therebetween, and means having communication with the aforesaid cold air opening for supplying air to be heated from the compartment to the last mentioned chamber at the end of the casing opposite the warm air outlet opening.

3. In a heater, the combination of a casing of elongated form arranged to be supported on the outside of a wall of an enclosure to be heated, a heating element of elongated form disposed lengthwise in said casing and dividing the same into two chambers for incoming cold air and outgoing warm air, the air in passing from one chamber to the other being caused to traverse the heating element and abstract heat therefrom, a blower casing supported on one end of said casing by means of the discharge neck portion thereof for supplying cold air to the casing at one end of the cold air inlet chamber, there being means for delivering the warm air from the casing from the other end of the warm air outlet chamber, a centrifugal type blower fan in the blower casing, and means for supplying cold air to the side of the blower casing substantially centrally of said fan.

4. In a heating system of the character described, the combination with an enclosing wall of the compartment to be heated, of an elongated heater casing mounted on said wall outside the compartment, an elongated heating element disposed lengthwise in said casing and dividing the same into two chambers, one for incoming cold air and the other for outgoing warm air, there being a warm air register for said compartment and said casing having a warm air outlet opening at one end of the warm air outlet chamber for discharging warm air through said register, a centrifugal type blower fan, a casing therefor mounted on the other end of the heater casing and having a substantially tangential discharge opening communicating with the end of the cold air inlet chamber opposite the warm air outlet opening, there being a cold air register for said compartment spaced from the warm air register, an elbow communicating with the side of the blower casing substantially centrally of the fan therein and having communication with the cold air register, and means for driving the fan.

5. In a heating system of the character described, the combination with an enclosing wall of the compartment to be heated, of an elongated heater casing mounted on said wall outside the compartment, an elongated heating element disposed lengthwise in said casing and dividing the same into two chambers, one for incoming cold air and the other for outgoing warm air, there being a warm air register for said compartment and said casing having a warm air outlet opening at one end of the warm air outlet chamber for discharging warm air through said register, a centrifugal type blower fan, a casing therefor mounted on the other end of the heater casing and having a substantially tangential discharge opening communicating with the end of the cold air inlet chamber opposite the warm air outlet opening, there being a cold air register for said compartment spaced from the warm air register, an elbow communicating with the side of the blower casing substantially centrally of the fan therein and having communication with the cold air register, an electric motor for driving the fan having the same mounted on the armature shaft thereof, and a housing for said motor mounted on the blower casing on the opposite side thereof from the cold air inlet opening.

6. In a heating system of the character described, the combination with the floor of the compartment to be heated, of an elongated heater casing mounted on said floor outside the compartment, an elongated heating element disposed lengthwise in said casing and dividing the same into two chambers, one for incoming cold air and the other for outgoing warm air, there being a warm air register for said compartment and said

casing having a warm air outlet opening at one end of the warm air outlet chamber for discharging warm air through said register, a centrifugal type blower fan, a casing therefor mounted on the other end of the heater casing and having a substantially tangential discharge opening communicating with the end of the cold air inlet chamber opposite the warm air outlet opening, there being a cold air register for said compartment spaced from the warm air register, an elbow communicating with the side of the blower casing substantially centrally of the fan therein and having communication with the cold air register, and means for driving the fan.

7. In a heating system of the character described, the combination with the floor of the compartment to be heated, of an elongated heater casing mounted on said floor outside the compartment, an elongated heating element disposed lengthwise in said casing and dividing the same into two chambers, one for incoming cold air and the other for outgoing warm air, there being a warm air register for said compartment and said casing having a warm air outlet opening at one end of the warm air outlet chamber for discharging warm air through said register, a centrifugal type blower fan, a casing therefor mounted on the other end of the heater casing and having a substantially tangential discharge opening communicating with the end of the cold air inlet chamber opposite the warm air outlet opening, there being a cold air register for said compartment spaced from the warm air register, an elbow communicating with the side of the blower casing substantially centrally of the fan therein and having communication with the cold air register, an electric motor for driving the fan having the same mounted on the armature shaft thereof, and a housing for said motor mounted on the blower casing on the opposite side thereof from the cold air inlet opening.

8. In a heating system of the character described, the combination with an enclosing wall of the compartment to be heated, of an elongated heater casing mounted on the wall outside said compartment, an elongated radiator disposed length-wise in said casing and dividing the same into two chambers, one for incoming cold air and the other for outgoing warm air, said radiator comprising headers at opposite ends and a core therebetween, there being a warm air register for said compartment and said casing having a warm air outlet opening at one end of the warm air outlet chamber for discharging warm air through said register, a centrifugal type blower fan, a casing therefor mounted on the other end of the heater casing and having a substantially tangential discharge opening communicating with the end of the cold air inlet chamber opposite the warm air outlet opening, fins on the radiator core in transverse relation to the direction of travel of the air in the casing in going from the cold air inlet to the warm air outlet, said fins serving to transfer heat to the air passing therebetween and serving also to direct the air in its passage through the core in a predetermined manner so as to have the air contacting all portions of the core and the adjacent headers substantially uniformly, there being a cold air register for said compartment spaced from the warm air register, an elbow communicating with the side of the blower casing substantially centrally of the fan therein and having communication with the cold air register, and means for driving the fan.

9. In a heating system of the character described, the combination with the floor of the compartment to be heated, of an elongated heater casing mounted on the floor outside said compartment, an elongated radiator disposed lengthwise in said casing and dividing the same into two chambers, one for incoming cold air and the other for outgoing warm air, said radiator comprising headers at opposite ends and a core therebetween, there being a warm air register for said compartment and said casing having a warm air outlet opening at one end of the warm air outlet chamber for discharging warm air through said register, a centrifugal type blower fan, a casing therefor mounted on the other end of the heater casing and having a substantially tangential discharge opening communicating with the end of the cold air inlet chamber opposite the warm air outlet opening, fins on the radiator core in transverse relation to the direction of travel of the air in the casing in going from the cold air inlet to the warm air outlet, said fins serving to transfer heat to the air passing therebetween and serving also to direct the air in its passage through the core in a predetermined manner so as to have the air contacting all portions of the core and the adjacent headers substantially uniformly, there being a cold air register for said compartment spaced from the warm air register, an elbow communicating with the side of the blower casing substantially centrally of the fan therein and having communication with the cold air register, and means for driving the fan.

In witness of the foregoing I affix my signature.

ALBERT H. BATES.