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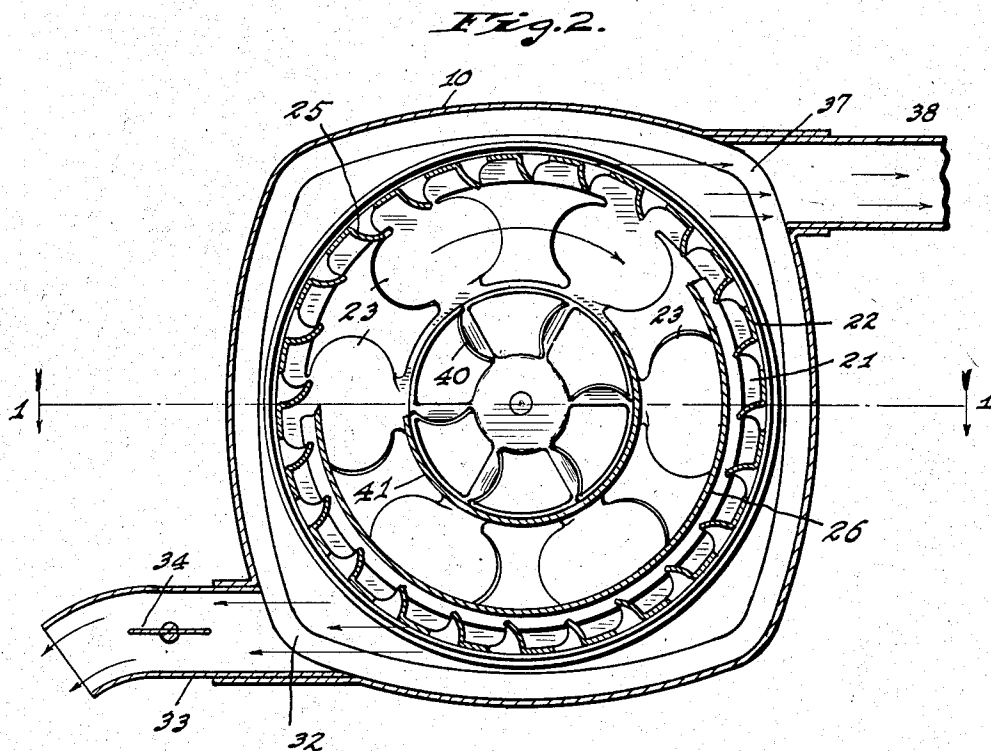
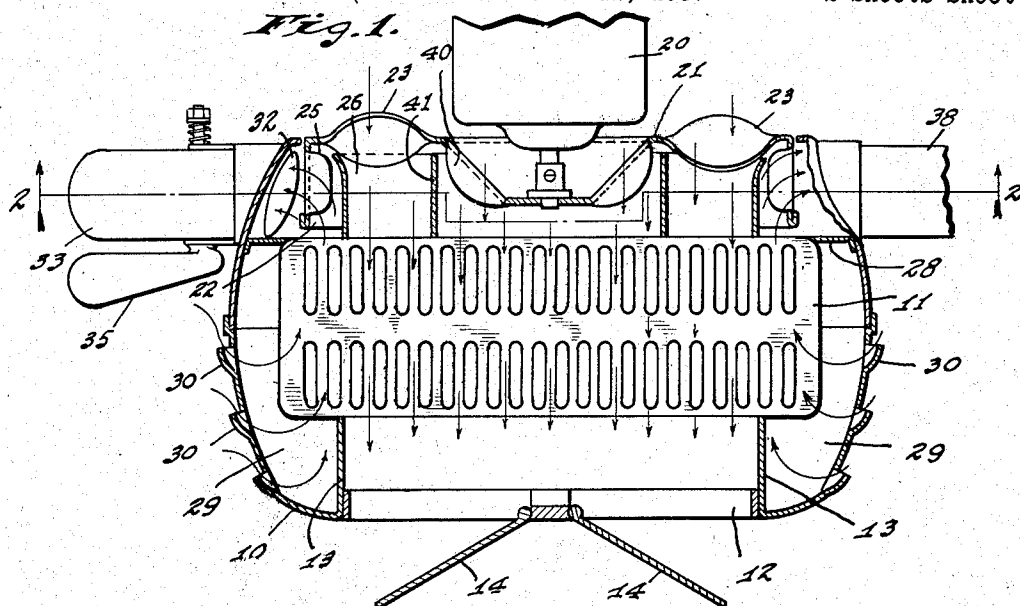
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2,274,033

AUTOMOBILE HEATER

Filed March 12, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

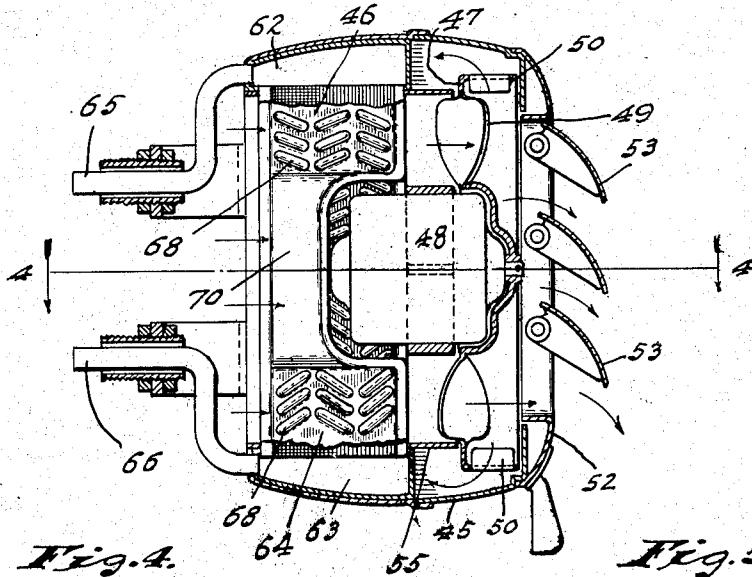


Fig. 4.

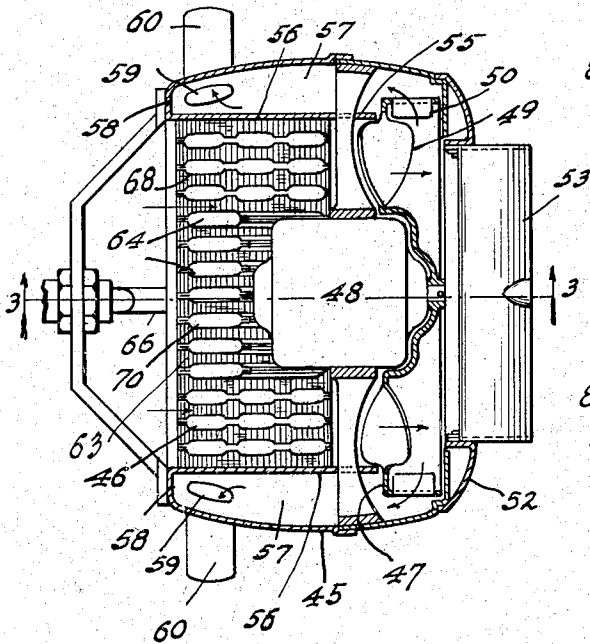
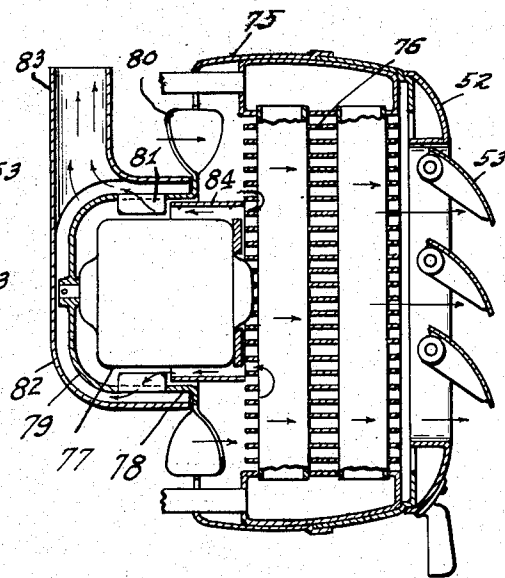


Fig. 5.



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AUTOMOBILE HEATER

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13 Claims. (Cl. 257—137)

My invention relates to automobile-body heaters of the circulating fluid type and partially to heaters which, in addition to discharging a relatively large volume of air into the passenger compartment of the automobile body, also discharge one or more relatively small air streams toward localized areas, such as against the windshield to remove any moisture condensed thereon or toward the feet of the driver. It is the primary object of my invention to produce a heater of this kind in which the main volume of air is delivered at relatively low pressure while the air discharged to localized areas is delivered under a higher pressure. More specifically, it is my object to produce a simple and effective means and arrangement of parts whereby the large-volume, low-pressure flow and the low-volume, high-pressure flow may be created.

In carrying out my invention I employ a heater having a casing, a core, a rotary air impeller, and a driving means, such as an electric motor for the air impeller. The casing is provided on its front face with a relatively large air-discharge opening, through which is delivered the air used in warming the interior of the automobile body, and also with one or more auxiliary openings, for the delivery of heated air to specific locations such as toward the feet of the driver or to a windshield defroster. In the latter case, a conduit may be associated with one of the auxiliary discharge openings, which conduit extends and is connected to a nozzle disposed adjacent the windshield. The air impeller is desirably formed as a single sheet-metal stamping containing two concentric series of blades one of which resembles a series of fan blades and is adapted to deliver air axially through the core to the main discharge opening of the casing while the other resembles a series of turbine or blower blades so associated with the walls of the casing and auxiliary baffles as to deliver air under an appreciable pressure to the auxiliary openings in the casing.

The accompanying drawings illustrate my invention: Fig. 1 is a horizontal section on the line 1—1 of Fig. 2 through one form of heater in which my invention has been incorporated; Fig. 2 is a vertical section on the line 2—2 of Fig. 1; Fig. 3 is a vertical section on the line 3—3 of Fig. 4 showing a modification of my invention; Fig. 4 is a horizontal section on the line 4—4 of Fig. 3; and Fig. 5 is a vertical section through a heater embodying still another modification of the invention.

The heater illustrated in Fig. 1 embodies a

casing 10 and a core 11. The core embodies a plurality of water passages, through which the cooling fluid in the engine is circulated, and a plurality of air passages, through which is passed the air to be heated. In its broader aspects my invention is not concerned with any particular form of core.

The front wall of the casing 10 is provided with a large air-discharge opening 12 surrounding which there is an annular baffle 13 extending between the front casing-wall and the front face of the core 11. If desired, the discharge opening 12 may have associated with it one or more adjustable shutters or dampers 14 by means of which the main air-discharge can be regulated both in quantity and in direction.

Mounted in rear of the core I provide a suitable source of power, conveniently an electric motor 20, for driving the air impeller 21. As is clear from Figs. 1 and 2 the air impeller is preferably formed as a single sheet-metal stamping which conveniently has a depressed central portion, within which the front end of the motor is received, and a forwardly projecting rim or flange 22. In the intermediate portion of the impeller, between the central depression and the flange 22, there are formed a plurality of fan blades 23 which, as the impeller 21 is rotated, force a stream of air through the core and forwardly through the baffle 13 and main air-discharge opening 12.

The annular rim or flange 22 of the impeller 21 is provided with a series of blower blades 25 conveniently inclined forwardly and inwardly in the direction of impeller rotation and having the function of moving radially outwardly the air which they engage as the impeller rotates. To separate the stream of air moved forwardly by the fan blades 23 from the air engaged by the blower blades 25, there is provided in rear of the core an annular baffle 26 the outer edge of which extends between the fan blades 23 and the blower blades 25.

Near the rear face of the core the casing 10 is provided with a transverse baffle 28 which extends between the core and the casing walls and which, in co-operation with the baffle 13 and the side walls of the casing, define air chambers 29 into which the sides of the core extend. Openings for the admission of air in this chamber are provided in the walls of the casing, conveniently as rearwardly and outwardly sloping louvers 30.

In the side walls of the casing and in rear of the partition 28 there are provided one or more

auxiliary air-discharge openings, two of which are shown in Fig. 2. One of these, indicated at 32, is located near a lower corner of the casing 10 and has associated with it a laterally directed nozzle 33 desirably provided with an adjustable damper 34 the position of which is controlled by a suitable handle 35. Another auxiliary air-discharge opening, indicated at 37, has associated with it a nipple 38 adapted to be received in one end of a conduit leading to a windshield-defroster nozzle (not shown).

In the arrangement illustrated in Figs. 1 and 2 rotation of the impeller 21 in the direction of the arrow causes air to be drawn into the casing by the fan blades 23 and to be forced forwardly through the baffle 26, the core 11, and the baffle 13, and outwardly through the main air-discharge 20. At the same time, the blower blades 25 induce a flow of air into the chamber 29 through the louvers 30, such air being passed through the sides of the core and discharged through the auxiliary air openings 32 and 37.

In a heater of the type described, unless the motor is located a considerable distance in rear of the core, air flow through the extreme center portion of the core is obstructed by the motor and the efficiency of the heater will be correspondingly decreased. To overcome this disadvantage, the central depression in the impeller 21 may be provided with an annular series of blades 40 inclined radially so as to induce air to flow into the depression around the sides of the motor and to force such air outwardly and forwardly. A stationary baffle 41 surrounding the blades 40 collects the air thrown outwardly by those impeller-blades and directs it forwardly through the core.

The modification of my invention illustrated in Figs. 3 and 4 embodies a casing 45, a core 46, an air impeller 47, and a motor 48 for driving the impeller. The impeller 47 resembles the impeller 21 shown in Figs. 1 and 2 in that it has an annular series of helically inclined fan blades 49 and a forwardly extending rim provided with an annular series of blower blades 50. The heater of Figs. 3 and 4, however, differs from that shown in Figs. 1 and 2 in that the motor and air impeller are located in front of the core and also in that the core is of a different and novel construction.

The front of the casing 45 is open to permit the discharge of the main quantity of air delivered by the heater. As shown, the front of the casing is provided with a rotatably adjustable frame 52 having a central opening in which are mounted a plurality of shutters 53 for the regulation of the quantity and direction of the air discharged forwardly from the heater. This particular arrangement, however, forms no part of my invention.

Inside the heater casing, and projecting forwardly from the core 46, I provide a fan-shroud 55 which, at its front end conforms approximately to the circumference of the fan blades 49 and, at its rear end, to the shape of the core. At the sides of the core, the shroud 55 continues rearwardly to form partitions 56 which co-operate with the side walls of the casing to form chambers 57. At the rear of the casing, the side walls thereof are bent inwardly, as indicated at 58, to close the rear ends of the chambers 57. Auxiliary air-discharge openings 59, desirably communicating with nozzles or nipples 60, are provided in the walls of the casing 45 in communication with the chambers 57, respectively.

In the heater illustrated in Figs. 3 and 4 and just described, rotation of the impeller causes the fan blades 49 to draw air in through the opening in the rear wall of the casing and thence through the core. If the shutters 53 are open, the larger portion of the air drawn through the core by the fan blades 49 will be discharged forwardly past the shutters. However, the action of the blower blades 50 will cause a part of the air heated by passage through the core to be forced outwardly into the chambers 57 and through the chambers rearwardly of the heater to the auxiliary air-discharge openings 59. If the shutters 53 are closed or partly closed, the proportionate quantity of air supplied to the auxiliary discharge openings will be increased.

As indicated above, the core 46 shown in Figs. 3 and 4 is of novel construction. It comprises an upper tank 62, a lower tank 63, and a plurality of liquid-conveying tubes 64 extending between the tanks. The tanks are provided respectively with water-supply and water-discharge pipes 65 and 66.

Each of the tubes 64 interconnecting the tanks 62 and 63 is formed of sheet-metal, desirably of a single piece of sheet-metal doubled back on itself to form the two side walls of the tube, and the edges of the sheet-metal are secured together as by soldering or by seaming and soldering to prevent leakage. Each side wall of the tube thus formed is provided with a multiplicity of outwardly projecting embossments 68. Each of such embossments is desirably elongated, and the several embossments are arranged in rows extending longitudinally of the tubes with the embossments in adjacent rows oppositely oblique. These embossments serve to increase the area of tube-wall exposed to the air flowing between the tubes, and their oppositely inclined positions serve to create a certain amount of turbulence in the air, thus aiding heat-transfer.

To decrease the overall depth of the heater, the front face is desirably recessed to receive the rear portion of the motor 48, as is clear from Figs. 3 and 4. To provide this recess, the tubes near the center of the core are narrowed intermediately, as indicated in Fig. 3; and to avoid undue restriction of the liquid-flow through the tubes thus narrowed, the narrowed portions of the tubes are made of greater thickness, as indicated at 70. This thickening of the tubes in the central portion of the core decreases the aggregate cross-sectional area of the air passages; but this results in no serious decrease in efficiency, as it is confined approximately to the projected area of the motor 48, and in that area the motor itself serves to retard air flow.

In the modification of my invention illustrated in Fig. 5, the heater proper may be of any desired form of construction. The casing 75 encloses the core 76 and is open at the front and back for the flow of air. As shown, the casing is provided with the same rotatable front 52 and shutters 53 with which the heater illustrated in Figs. 3 and 4 is equipped. The motor 77 is mounted in rear of the core 76 and arranged to drive an air impeller 78.

The air impeller, in the arrangement illustrated in Fig. 5, is mounted on the rear end of the armature shaft of the motor 77 and is deeply recessed at its center, as indicated at 79, to bring the fan blades 80 at its periphery adjacent the rear face of the core. The side walls of the recess 79 are spaced from the motor 77 and are provided

ed with an annular series of inwardly directed blower blades 81. A blower casing 82 surrounds the recessed portion 79 of the impeller, extending forwardly to a point near the inner ends of the fan blades 80. The blower casing 82 is provided with an air discharge nipple or nozzle 83, and an annular baffle or shroud 84 is mounted in rear of the core 46 and extends into the recessed portion 79 of the air impeller in spaced relation to the motor 77.

In the heater shown in Fig. 5, rotation of the impeller will cause the fan blades 80 to force air forwardly through the core and outwardly past the shutters 53. At the same time, the impeller blades 81 will draw air from the core rearwardly through the baffle 84, discharging such air into the blower casing 82 and outwardly through the nozzle 83.

I claim as my invention:

1. In an automobile-body heater of the circulating fluid type, a core, a casing for said core, said casing having main and auxiliary air discharge openings, a rotatable air impeller comprising a circular sheet-metal stamping having a generally axially extending annular flange near its periphery, said impeller being provided within said flange with a set of helically disposed fan blades for forcing air outwardly through said main air discharge opening, said flange having an annular series of blower blades for forcing air outwardly through said auxiliary openings, and means for rotating said impeller.

2. In an automobile-body heater of the circulating fluid type, a core, a casing for said core, said casing having main and auxiliary air discharge openings, a rotatable air impeller having a generally axially extending annular flange near its periphery, said impeller being provided within said flange with a set of helically disposed fan blades for forcing air outwardly through said main air discharge opening, said flange having an annular series of blower blades for forcing air outwardly through said auxiliary openings, and means for rotating said impeller.

3. The invention set forth in claim 2 with the addition that said casing is provided interiorly with baffles defining an air passage extending to said main discharge opening and a second air passage extending to at least one of said auxiliary discharge openings, said fan blades being located in said first named passage and said blower blades being located in said second passage, said core having portions located in both passages.

4. In an automobile-body heater of the circulating fluid type, a core, a casing for said core, said casing being provided in its front face with a main discharge opening, an annular baffle surrounding said opening and extending rearwardly to said core, a second annular baffle projecting rearwardly from the rear face of said core, portions of said core extending laterally outwardly beyond both said baffles, a rotatable air impeller located in rear of said core, said impeller having within the periphery of said second baffle an annular series of fan blades and in the space between said second baffle and the side walls of said casing a second annular series of blades adapted to move air radially outwardly, and means for rotating said impeller, the side walls of said casing being provided near the front thereof with one or more auxiliary air-inlet openings and near the rear thereof with one or more auxiliary air-discharge openings.

5. In an automobile-body heater of the circulating fluid type, a core, an electric motor mount-

ed in alignment with said core, a casing, a rotatable air impeller coaxial with said motor and driven thereby, said impeller having an annular series of air-impelling blades and, within said blades, a central depression into which said motor extends, the annular wall of said depression being provided with a second series of air impelling blades, and a shroud surrounding said second series of blades.

6. The invention set forth in claim 5, with the addition that said impeller is disposed between said motor and core, said shroud extending between said impeller and core to form a conduit for air acted upon by said second series of blades.

7. In an automobile-body heater of the circulating fluid type, a core, a casing for said core, said casing having a main air-discharge opening in its front face, an air impeller disposed within said casing in front of said core, said impeller having a forwardly projecting peripheral flange and, within said flange, an annular series of helically inclined fan blades, said flange being provided with an annular series of blower blades for moving air radially outwardly, and means for rotating said impeller, said casing having one or more auxiliary discharge openings and provisions for guiding to said auxiliary discharge openings air discharged from said blower blades.

8. In a heater, a core comprising spaced tanks and a plurality of tubes extending between them, said tubes being spaced apart to define air passages, the tubes near the center of said core being narrower near their middles than at their ends to provide a recess in one face of said core, an electric motor disposed in said recess, and an air impeller driven by said motor and located adjacent one face of said core for causing air to flow therethrough.

9. The invention set forth in claim 8 with the addition that the side walls of said narrowed tubes are spaced farther apart over said narrowed middle portions than at the ends of the tubes.

10. In a combined heater and defroster, a heating radiator having air passages, a pair of air impellers, one of said impellers substantially surrounding the periphery of the other, means for operating said impellers to force air through selected air passages in opposite directions simultaneously, and means for preventing interference between the oppositely moving air streams created by said impellers.

11. In a combined heater and defroster, a heating radiator having air passages, a fan impelling air through certain of said passages, a blower for impelling air through other of said passages and constituted by a ring which is attached to the fan blades near their peripheries, said ring having therein openings and each opening having a blade extending radially inwardly from one margin thereof.

12. In a heater of the class described, a casing provided with a main air outlet, a core in said casing, a propeller type of fan for circulating air through the core and said main air outlet, said casing also having oppositely disposed auxiliary air outlets, each communicating with a gradually enlarging arcuate air passage, an annular member secured to the core and forming the bottoms of said arcuate passages, and an impeller type of fan operatively connected with said propeller and adapted to circulate a portion of the air passing through the core through said arcuate passages and the auxiliary outlets.

13. A unit heater having an outer casing hav-

ing a main delivery opening, a radiator in the casing, a fan of the propeller type for forcing air through said radiator and then through said main opening, and an impeller type of fan including a fan chamber adapted to receive air from the radiator and having oppositely disposed

delivery outlets through which the impeller forces air by centrifugal action, and said chamber being in part defined by an annular shroud which co-operates with the face of the radiator to in part define central and peripheral air flow paths.

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