May 29, 1945. C. E. MEYERHOEFER 2,377,094

HEAT TRANSFER DEVICE

Filed July 10, 1937 2 Sheets-Sheet 1

Fig. 1

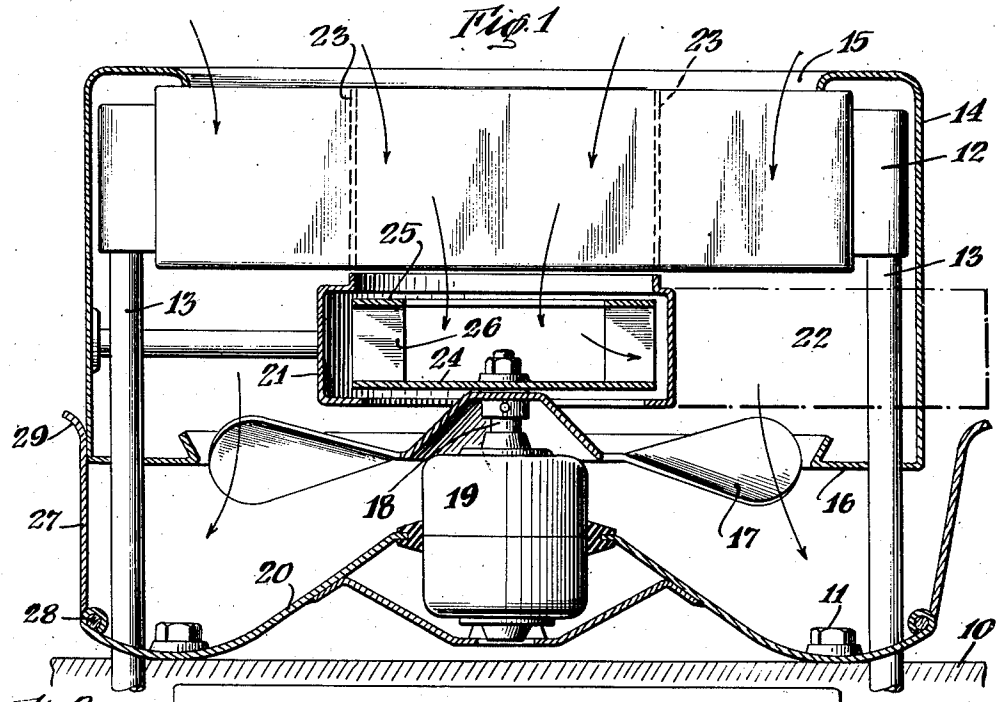
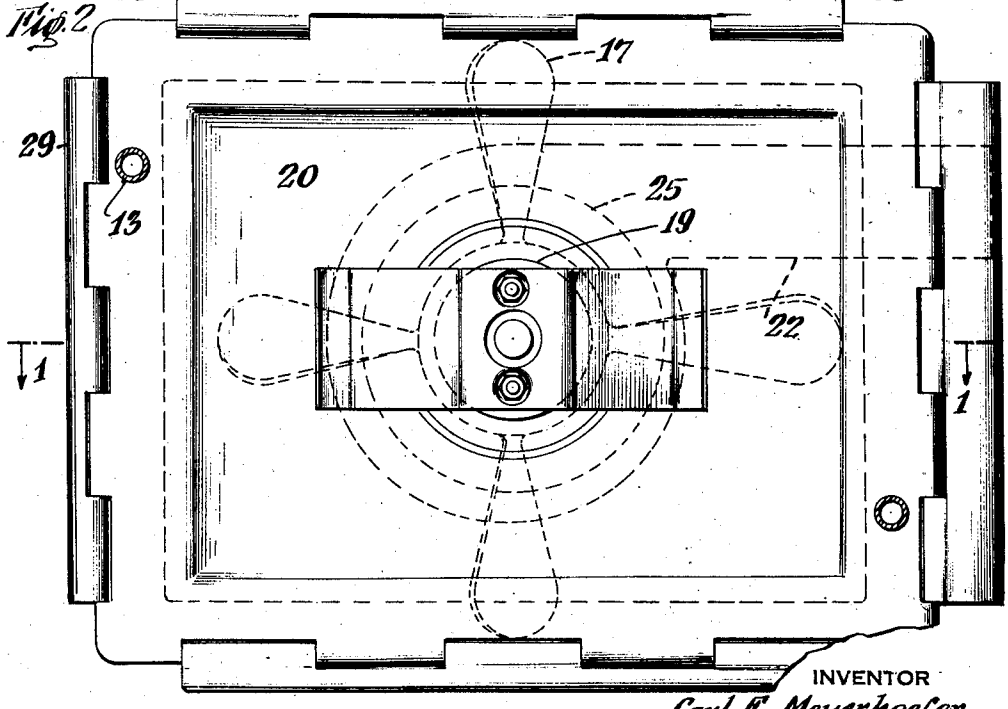


Fig. 2



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Filed July 10, 1937 2 Sheets-Sheet 2

Fig. 3

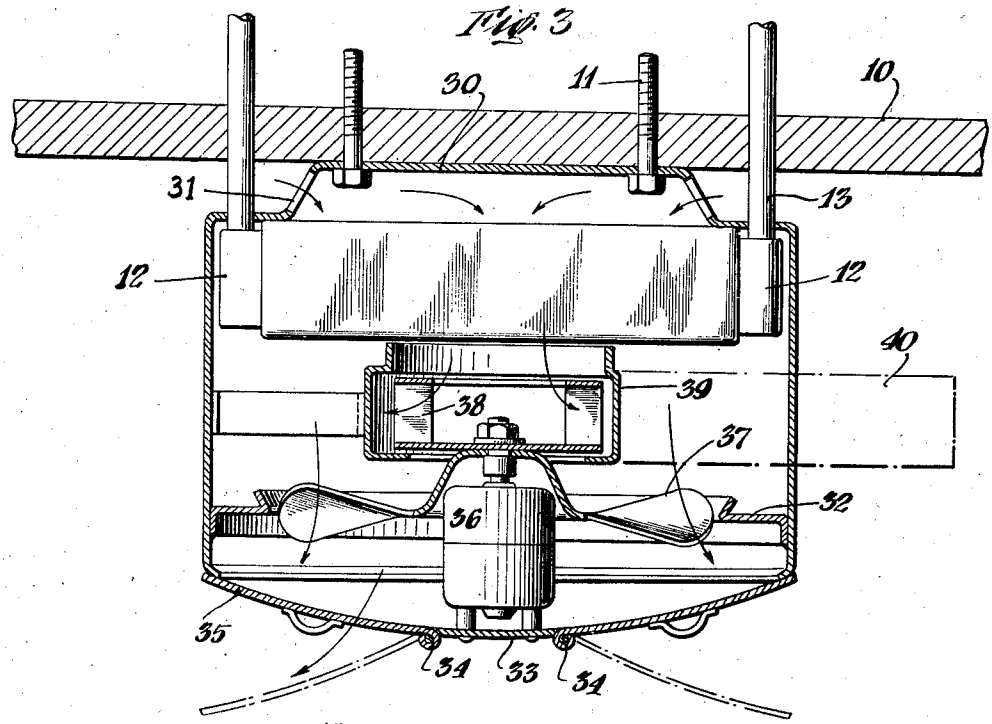
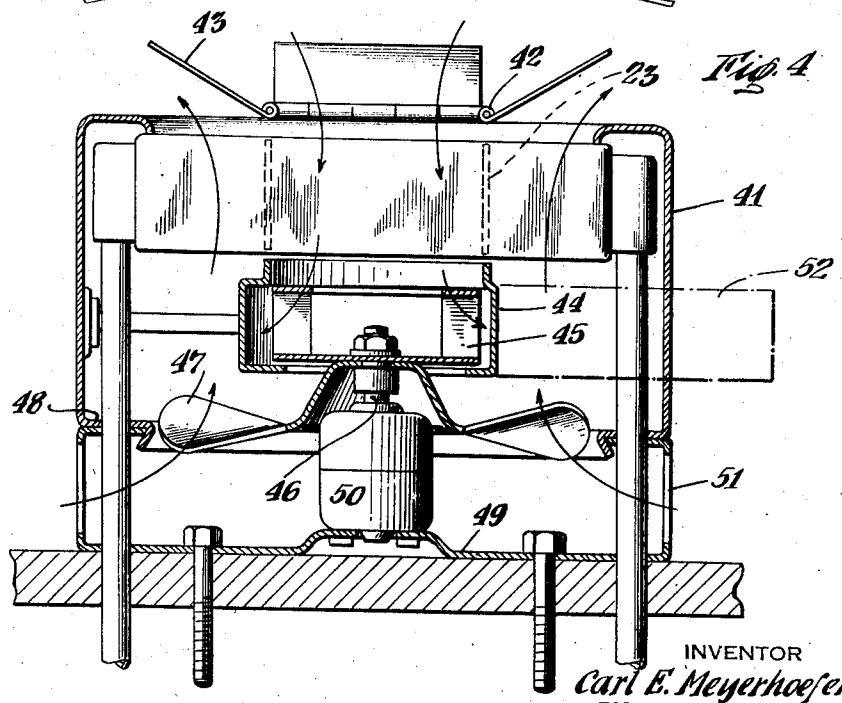


Fig. 4



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Patented May 29, 1945 2,377,094

UNITED STATES PATENT OFFICE

2,377,094

HEAT TRANSFER DEVICE

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Application July 10, 1937, Serial No. 152,877

3 Claims. (Cl. 257—137)

This invention relates to a heat transfer device and in its more specific aspects aims to provide a functionally and structurally improved apparatus of this character, primarily intended for use in vehicles but not necessarily limited to such a particular association.

According to its preferred aspects, where an apparatus constructed in accordance with the teachings of the present invention is so employed, it will be utilized for heating the air in the vehicle. Such apparatus may, however, obviously be utilized for the purpose of cooling air in the event it is coupled to some mechanism whereby the dry bulb temperature of its heat transfer element may be maintained at comparatively low range.

With the foregoing in mind it is an object of the invention to furnish a unit which will have high heat transfer value and which may readily be installed and coupled for example to the cooling system of an internal combustion motor.

A further object of the invention is that of constructing a device of this character and by means of which air will be circulated and distributed in an extremely efficient manner for raising the temperature of an enclosure and/or defrosting certain of the surfaces of such enclosure. These functions, by means of the present apparatus, may readily be accomplished by an operator having virtually no skill; the unit being entirely automatic in operation and requiring practically no attention.

A still further object is that of furnishing a unit of this type embodying relatively few parts, each individually simple and rugged in construction and capable of manufacture largely by automatic machinery and methods so that the apparatus may be placed upon the market at a relatively nominal figure and will function over long periods of time with freedom from all difficulties.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating practical embodiments of the invention and in which

Fig. 1 is a sectional plan view taken along the lines 1—1 and in the direction of the arrows as indicated in Fig. 2, but showing the core and motor casing in elevation;

Fig. 2 is a rear view of the unit as shown in Fig. 1; and

Figs. 3 and 4 are views corresponding to Fig. 1, but showing alternative forms of apparatus.

Referring to Figs. 1 to 4, the numeral 10 indicates the dash of a motor vehicle or other suitable mounting surface to which the unit is secured as by bolts 11. The unit includes a core embracing, for example, headers 12, between which is interposed a cellular or tube structure (not shown) through which air may move. The headers have extending from them tubes 13 which, as shown, especially in Fig. 2, are located preferably in different horizontal planes so that the unit may either be disposed as illustrated in Fig. 2, or turned axially through an angle of ninety degrees without sacrifice of the thermosiphon effect on the part of the fluid passing therethrough.

Normally, a unit such as the present will be employed for the purpose of heating and distributing air and therefore the tubes 13 will, under such circumstances, be coupled to the cooling system of an internal combustion motor or to some other suitable source of heated fluid. In view of the fact that the technique of such coupling is well known to those skilled in the art, it is believed to be unnecessary to describe or illustrate the same in detail.

Now, referring especially to Figs. 1 and 2, it will be seen that the numeral 14 indicates a casing, the front face of which is formed with an opening 15 framing the core. This casing is continued rearwardly and may terminate in a shroud plate 16 in line with which a fan 17 is mounted. This fan is supported upon a motor shaft 18 driven by motor 19 and plate 20 may support the motor 19 and have openings through which bolts 11 extend. While not essential, it is preferred, in this form of the invention, that plate 20 be curved outwardly and forwardly so as to similarly divert the air column directed by the blades of fan 17.

A blower wheel casing 21 may be suitably mounted as part of the apparatus and have an outlet duct 22. The forward edge of this casing defines the intake for the blower wheel and is disposed in close proximity to, or adjacent the inner face of the core. Where a cellular type of core is employed it will not be necessary to use baffles or partitions so that certain air passages or spaces through the core may be substantially segregated or isolated from others. This will, of course, follow, due to the well known characteristics of a cellular structure. Where, however, a tube type of heat transfer unit is employed, partitions or walls will have to be employed to achieve the desired characteristics. Therefore, in order to clearly indicate the function which is desired, there has been shown at 23 by dotted lines in Fig. 1, a partition which, in effect, furnishes an elongation or continuation of the intake of casing 21.

Thus, air drawn into this casing is segregated from the air, sucked through the core by fan 17, and while both air streams are treated by the same heat transfer structure, it follows that there will be no danger of conflict occurring between these streams. The flow through a casing 21 is—as afore brought out—induced by a blower wheel which, as shown, may conveniently take the form of a plate 24 affixed to motor

shaft 18 and mounting in conjunction with a ring 25 a series of blades 26. Thus air is discharged through duct 22 and in association with this passage any suitable form of control may be provided for varying the volume of the discharge and directing the same as desired. Ordinarily, such air will be directed to a surface to be defrosted—such as a windshield. Obviously, however, the air may be otherwise directed should this be desired.

Now, with a view to directing and controlling the air discharged by fan 17, it will be observed that a series of panels 27 may be hingedly secured as at 28, adjacent their rear edges to plate 20. The forward edges of each of the panels may be curved outwardly as indicated at 29 to furnish finger holds so that the panels may be conveniently swung. The pivot or hinge structures 28 should be of that type which will maintain the parts against all rattling, in addition to maintaining such parts in any position to which they have been adjusted by the operator.

Referring next to Fig. 3, it will be observed that substantially the same structure has been employed as described in connection with Figs. 1 and 2, except that the core is, in this instance, disposed adjacent the mounting wall or dash 10 instead of beyond the air impelling structures. With this thought in mind, the mounting plate 30 may be formed with air intake openings 31 and be continued materially into the space within which the air is to be conditioned. Adjacent its outer edge, plate 30 mounts a shroud plate 32 as well as a motor supporting strip or cover 33. In turn, supported by the latter through the medium of hinge connections 34, are panels 35 which may, of course, be swung to the positions indicated in dotted lines or even beyond such positions.

Again, in this instance the motor 36 which is supported by cover 33 serves to drive a fan 37 and blower wheel 38. The former is disposed in the plane of the shroud plate and the latter is enclosed within a casing 39 provided with a discharge duct 40. The intake end of casing 39 is again disposed in line with and in proximity to the core structure and it is obvious that air flowing through the openings 31 will pass in the form of a column through casing 39 and duct 40 under the influence of blower wheel 38, while a concentrically disposed cylinder of air will flow through the core beyond the casing 39 and in contact with the outer portion of blades 37. The latter air may, of course, be directed as desired by panels 35.

As shown in Fig. 4, substantially the same principle of segregation is utilized. As in the case of Figs. 1 and 2 the core is disposed towards the space to be heated or cooled. In this instance, however, a reverse flow occurs. In other words, a casing 41 frames the forward face of the core and mounts, by means of hinges 42, a series of panels 43. The inner edges of these panels define a space corresponding to the intake opening of blower wheel casing 44. Within this casing is disposed a blower wheel 45 mounted upon motor shaft 46 which also supports a fan 47 in line with the opening of a shroud plate 48. A mounting plate 49 serves to support the motor 50 and is provided with a series of openings 51 through which air may be drawn into impelling contact with blades 47.

This air is, of course, distributed around casing 44 and through the passages of the core. It emerges through the opening of plate 41 and is deflected as desired by the panel structure 43. On the other hand, air drawn inward thru casing 44 and discharged through duct 52 moves in opposition to, but not in interference with, the first named air flow. Accordingly, in this form of unit, segregation and reverse air flow is provided for.

It is also apparent that numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A heater including in combination a core to receive heating fluid, a blower-wheel housing having its entrance end disposed substantially immediately to the rear of said core and through the central portion of which air flows to said housing, a blower wheel within said housing, a fan disposed to the rear of said blower wheel and having its blades extending beyond said housing, a motor arranged beyond said fan and connected thereto, as well as to said blower wheel, a casing extending around said core, blower wheel, fan and motor, said casing being formed with openings for the passage of air at points beyond said core and motor, and a shroud plate extending inwardly from said casing to a point adjacent the tips of the fan blades and providing, between its body and said core, an enlarged space through which air flows at relatively low velocity.

2. A heater including in combination a core to receive heating fluid, a blower-wheel housing having its entrance end disposed substantially immediately to the rear of said core and through the central portion of which air flows to said housing, a blower wheel within said housing, a fan disposed to the rear of said blower wheel and having its blades extending beyond said housing, a motor arranged beyond said fan and connected thereto, as well as to said blower wheel, a casing extending around said core, blower wheel, fan and motor, said casing being formed with openings for the passage of air at points beyond said core and motor; said fan having its blades disposed to blow air through said core, and a shroud plate extending inwardly from said casing to a point adjacent the tips of the fan blades and providing, between its body and said core, an enlarged plenum space through which air flows at relatively low velocity.

3. A heater including in combination a casing formed with an intake opening to be disposed adjacent a mounting surface, a core within said casing and arranged to the rear of said opening, liquid-conducting tubes connected to said core and extending beyond the same adjacent the intake opening and through the casing and the mounting surface, a motor also disposed within said casing and to the rear of said core, a blower wheel connected to said motor, a housing enclosing said wheel and formed with an intake extending immediately adjacent the central area of said core, a fan comprising a plurality of radially extending blades connected to said blower wheel and motor and extending beyond said housing, and a shroud plate extending inwardly from said casing to a point adjacent the tips of the fan blades and providing, between its body and said core, an enlarged space through which air flows at relatively low velocity.

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