

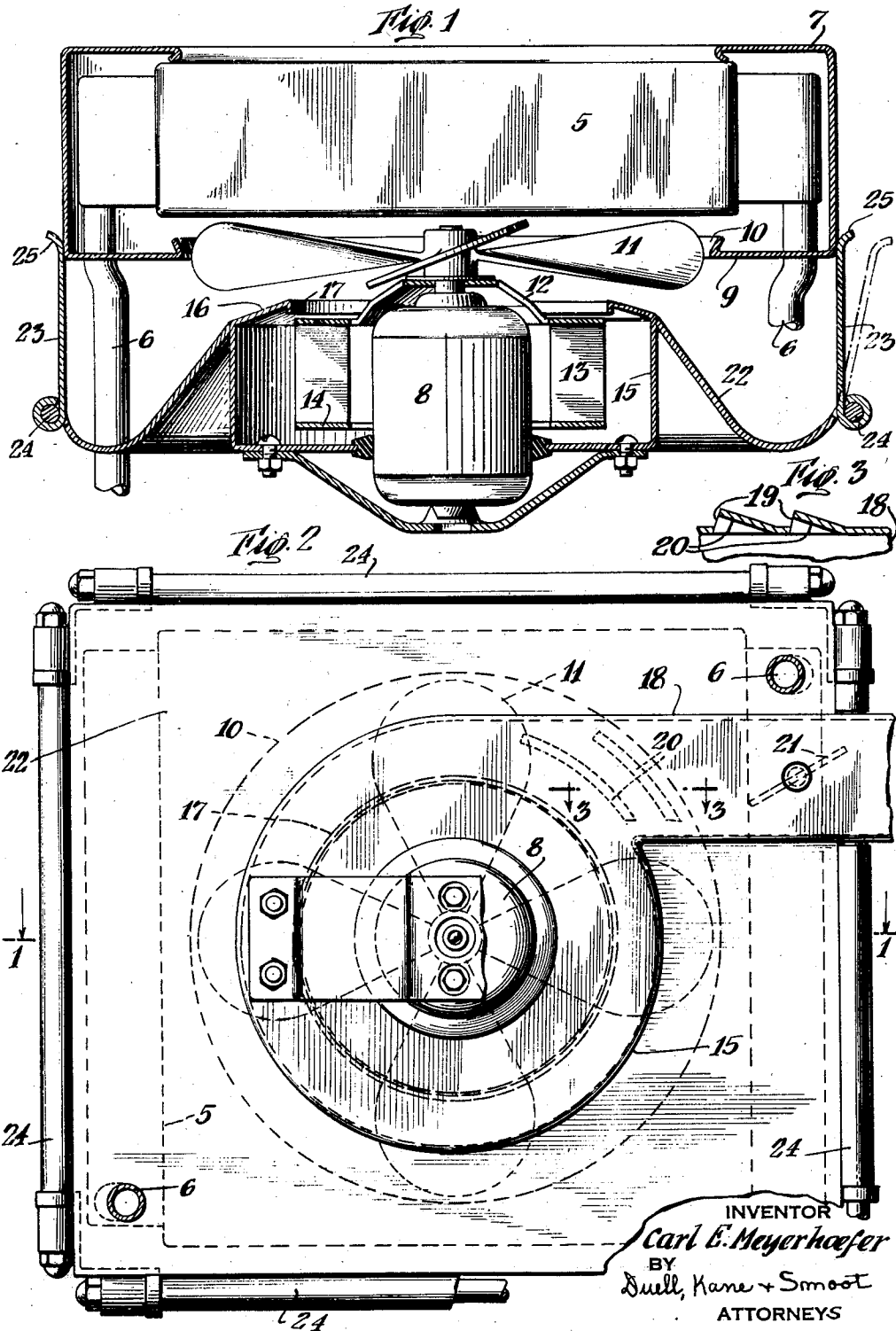
Jan. 6, 1942.

C. E. MEYERHOEFER

2,268,762

HEATER

Filed June 29, 1937



UNITED STATES PATENT OFFICE

2,268,762

HEATER

Carl E. Meyerhoefer, Brooklyn, N. Y., assignor to
E. A. Laboratories, Inc., Brooklyn, N. Y., a corporation of New York

Application June 29, 1937, Serial No. 150,962

7 Claims. (Cl. 257-137)

This invention relates to a structurally and functionally improved heat exchange device capable of use in numerous different associations, but primarily to be employed in connection with motor vehicles and for the purpose of circulating and changing the condition of the air within the same.

It is an object of the invention to furnish a structure of this character and by means of which a maximum flow of air will occur without it being necessary to increase the size or speed of the motor or the impellers associated therewith.

A further object is that of constructing a unit of this type and in which the flow of air in circulation may be controlled in a novel and desirable manner so that such air may be efficiently distributed or directed in any desired direction.

Still another object is that of constructing a heat exchange unit which will embody relatively few parts, each individually simple and rugged in construction, these parts occupying a minimum amount of space and cooperating with utmost efficiency over long periods of time with freedom from all difficulties.

With these and other objects in mind, reference is had to the attached sheet of drawing illustrating one practical embodiment 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 with the motor casing, fan, and core shown in elevation;

Fig. 2 is a rear elevation of such unit, and

Fig. 3 is an enlarged sectional plan view taken along the lines 3-3 and in the direction of the arrows as indicated in Fig. 2.

A unit of the present type is primarily intended for use as a heater and it is also intended to be employed within a motor vehicle. In such association it is usually mounted under the dash of the vehicle and suitably connected with the cooling system of the motor. In view of the fact that this is common practice, no illustration thereof has been resorted to. At the same time it is to be understood that the present invention may be employed in associations other than the particular example afore noted.

Referring to the drawing, the numeral 5 indicates the upper header from which any suitable heat exchange structure extends and which structure is, in turn, connected with a lower header. This core unit is coupled to a source of fluid, having a temperature differential, in any desired manner as, for example, by employing

tubes 6. Moreover, the core is preferably enclosed within a casing 7 having a central forward opening for the passage of air. In the illustrated embodiment the mounting structure for the unit has not been shown. This may follow any desired and well known practice, and likewise there has not been shown any control for the motor 8 which is usually governed by a rheostat-switch type of unit coupling the same to a source of electrical supply. Such control may also follow any desirable and well known construction.

Suitably associated with or forming a part of casing 7 is a shroud plate 9 formed with an opening preferably defined by a forwardly extending flange 10 in line with the core. Arranged within the area of this opening is a fan 11 secured to the shaft of motor 8. Also secured to the shaft is the forward element or spider 12 of a blower wheel including an annular series of blades 13 preferably curved in section and which blades have their rear edges conveniently coupled by a ring 14 concentrically disposed with respect to motor 8. It will be noted as a consequence of this construction that the blower wheel is, in effect "telescoped" over the motor casing so that an extremely compact arrangement of the parts is presented and additionally air impelled by the blower wheel moves in contact with the casing of the motor.

Enclosing the blower wheel is a casing or channel member 15, the forward wall 16 of which, in accordance with the teachings of the present invention, is preferably inclined outwardly and terminates in an inwardly extending flange 17. This flange defines a central opening concentrically disposed with reference to the periphery of the blower wheel. While, of course, the dimensions may be varied in numerous respects, I have found that one satisfactory arrangement of the parts consists in having the diameter of the opening defined by flange 17 one thirty-second of an inch greater than the diameter of the blower wheel and having the blower wheel spaced from this opening (the inner edge of the flange or its equivalent) a distance of one-sixteenth of an inch.

At this time it will be observed that spider 12 extends at all points either in line with the point of juncture of channel member 15 and forward wall 16 or else beyond such point of juncture into the space defined by such wall. This is particularly shown in Fig. 1, if one will consider the right hand and left hand portions of the blower wheel as there shown, and their relationship to

the channel member and its associated parts. It accordingly follows that high velocity air distributed by the blower wheel is thrown out radially and (at least adjacent the wall 16) inwardly, toward the central portion of channel member 15. As a consequence a vacuum will be created adjacent the edge of flange 17 and as viewed in the left hand side of Fig. 1. However, due to the relationship of the forward or outer portion of the blower wheel and the flange 17—or an equivalent edge—air flows inwardly between such edge and the spider 12 of the blower wheel, and any tendency for a vacuum to be created is counteracted.

Casing 15 has an outlet duct 18 extending, for example, as illustrated in Fig. 2. This duct, or the casing, is formed with a series of openings 19 guided by louvers 20. These openings are preferably disposed in line with the bodies of blades 11 and in that wall of the duct or casing which is nearest the fan 11. The louvers guarding such openings extend in such manner that a slot is defined which has tapered end portions and a substantially constant width. The louvers of course close the side edges of the openings and in this manner openings having the characteristics of venturi are furnished.

These openings may be furnished as substitutes for the particular relationship of blower wheel and channel wall edges, etc., afore described, or may be auxiliary thereto. Under certain conditions the openings may be dispensed with, but in any event they will serve to prevent undesirable vacuum conditions arising. In this connection it is to be observed that air under high velocity and pressure is flowing in member or casing 15 and through duct 18. The air propelled by fan 11 is, of course, moving at lower velocity. Normally, if an opening were provided, anywhere in the blower housing or discharge duct, it would only decrease the efficiency of the apparatus because air would be discharged through such opening. However, by arranging the edges of the opening or openings in the manner afore described, the reverse effect is accomplished and air is drawn through these openings into member 15 and/or duct 18. Thus, incident to the shape of the openings, the high velocity with which the air is moving is employed to create a vacuum immediately adjacent the base of the venturi; this vacuum being instantly broken by air flowing through the openings. Of course, as a consequence, the volume of air inside the casing and duct is increased, but the velocity pressure is decreased. A valve 21 of any desired type may be employed to control or divert the discharge.

As afore noted, wall 16 is preferably inclined. Accordingly, the exterior surface of this wall being in line with the most efficient portions of blades 11 (the outer one-third of the blades) this surface will cause a flow of air rearwardly and this air will be deflected into a transversely curved ring 22 which, as shown, may be continued to an extent such that it would normally cause a reverse air flow towards the core and beyond the side edges of the same.

Usually a unit of this character will be rectangular and such a unit has accordingly been illustrated. Of course, if another configuration were employed, the hereinafter described control could be amplified or modified as desired. Such control preferably includes a series of panels or strips 23 each having their inner edges pivotally supported as at 24 by the ring. This supporting

structure should be such that the strip or panel will remain in any position to which it has been manually adjusted or shifted. Obviously this structure should be sufficiently tight to prevent objectionable rattles occurring and the forward edges of each panel may be curved outwardly as indicated at 25 to afford a finger grip for the ready manipulation of such panels.

With the latter swung to a position such as that indicated in dotted lines in Fig. 1, or even slightly beyond such position, the deflector panels will in effect function as continuations of ring 22 to divert air forwardly and outwardly. If swung to a greater extent the path of the deflected air will be more nearly radial. If one or more of the deflector strips is brought to a position such as that shown in full lines, a greater volume of air will be discharged through the spaces adjacent which the strips or panels are in more or less open position. Thus, it is obvious that the operator may control with nicety exactly the volume and direction of flow which may be desired and such control may, of course, be even further varied by decreasing or increasing the speed of motor 8. With all panels closed and the motor operating, air which is sucked through the core by both the fan and the blower wheel will have to escape through the channel member or casing 15. In this manner the volume of air delivered through duct 18 is increased to a material extent and any defrosting of the windshield and/or heating of an area with which duct 18 connects is accelerated.

From the foregoing it will be understood that among others the several objects of the invention as specifically afore noted are achieved. Obviously, 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. An apparatus of the character described, including, in combination, a heat transfer core, a motor shaft disposed to the rear of the same, a blower wheel secured to said shaft, a casing including walls enclosing said wheel, a duct also including walls extending from said casing walls certain of said casing and duct walls extending substantially adjacent said core, and one of said latter walls being provided with an opening and said blower wheel drawing air through said core and discharging such air into said casing and duct, said opening permitting auxiliary air to flow into said duct.

2. An apparatus of the character described including, in combination, a heat transfer core, a motor shaft disposed to the rear of the same, a blower wheel secured to said shaft, a casing enclosing said wheel, a duct extending from said casing and forming a part thereof, said casing being provided with openings, a fan secured to said shaft, said fan and blower wheel both functioning to draw air through said core and to distribute the same within said casing and duct, said casing openings being arranged in line with said fan, air entering through said openings and supplementing the flow of air through said duct.

3. An apparatus of the character described including, in combination, a heat transfer core, a motor shaft disposed to the rear of the same, a blower wheel secured to said shaft, a casing enclosing said wheel, a duct extending from said casing and forming a part thereof, said casing being provided with an opening in the duct wall

nearest the core and in proximity to the periphery of the fan, said fan and blower wheel drawing air through said core, and louvers disposed adjacent said opening and defining in conjunction with the edge of the casing opening a Venturi passage. 5

4. A heat exchange structure including a core, a motor shaft disposed adjacent the same, a blower wheel coupled to said shaft, a casing enclosing said wheel and including a forward wall formed with an opening, a duct extending from said casing, the diameter of said blower wheel being less than that of the casing opening, and said duct being formed with an opening in its wall which extends in closest proximity to said core and through which air is drawn into said duct. 10 15

5. A heat exchange structure including a core, a motor shaft disposed adjacent the same, a blower wheel coupled to said shaft, a casing enclosing said wheel and including a forward wall formed with an opening, a duct extending from said casing, the edges of said blower wheel and casing opening being spaced, said duct being formed with openings in its wall which extends in closest proximity to said core and through which air is drawn into said duct, and a fan also coupled to said motor shaft and disposed beyond such wall to impel air towards said blower wheel and the duct openings. 20 25 30

6. An apparatus of the character described, including a heat transfer core, a motor shaft disposed to the rear of the same, a fan secured to said shaft to draw air through said core and distribute the same rearwardly, means for deflecting the air so distributed in a direction substantially radial to said core, a blower wheel also connected to said shaft, a casing enclosing said blower wheel, a duct extending from said casing, and independently controllable elements framing said fan and movably connected to said apparatus to govern the radial flow of air as induced by said fan and to vary the amount of air distributed by said blower wheel, said elements being shiftable to cause the radially flowing air to be diverted toward and beyond the edges of said core.

7. An apparatus of the character described, including a heat transfer core, a motor shaft, a blower wheel mounted by said motor shaft to draw air through said core and distribute the same, a casing for said wheel and being formed with an opening in that wall of its body which extends substantially adjacent said core, the edges of such opening defining a Venturi passage through which air is drawn into said casing incident to the flow of air therethrough and as induced by said blower wheel.

CARL E. MEYERHOEFER.