

March 31, 1942.

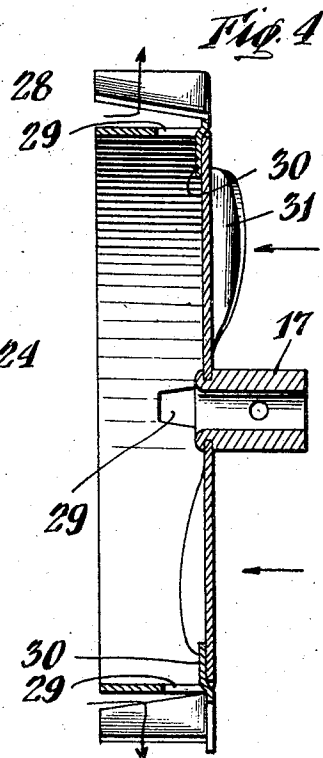
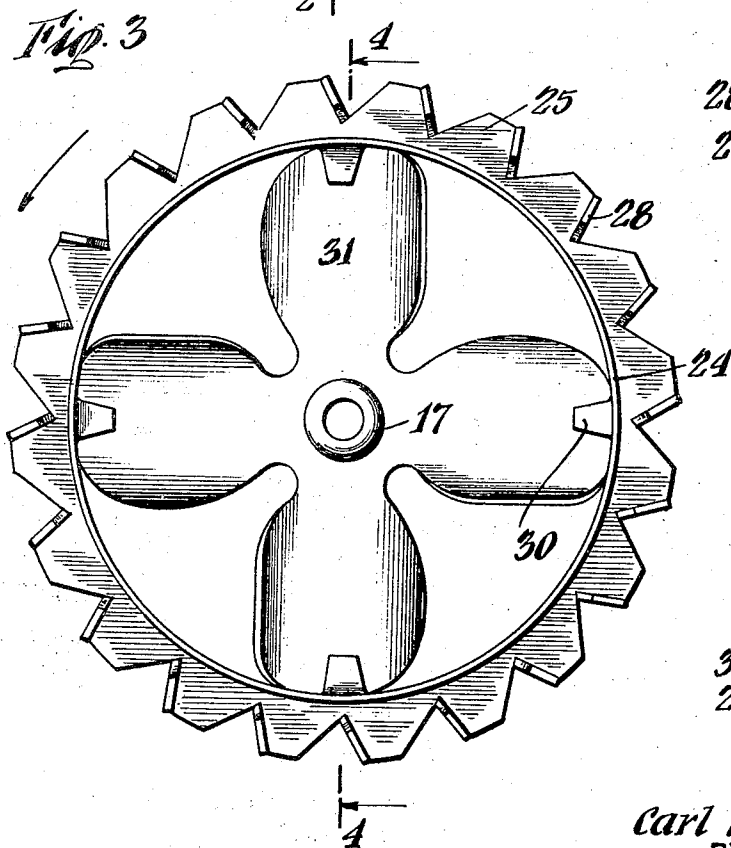
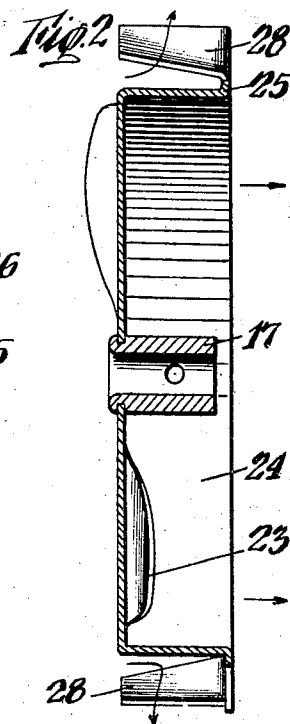
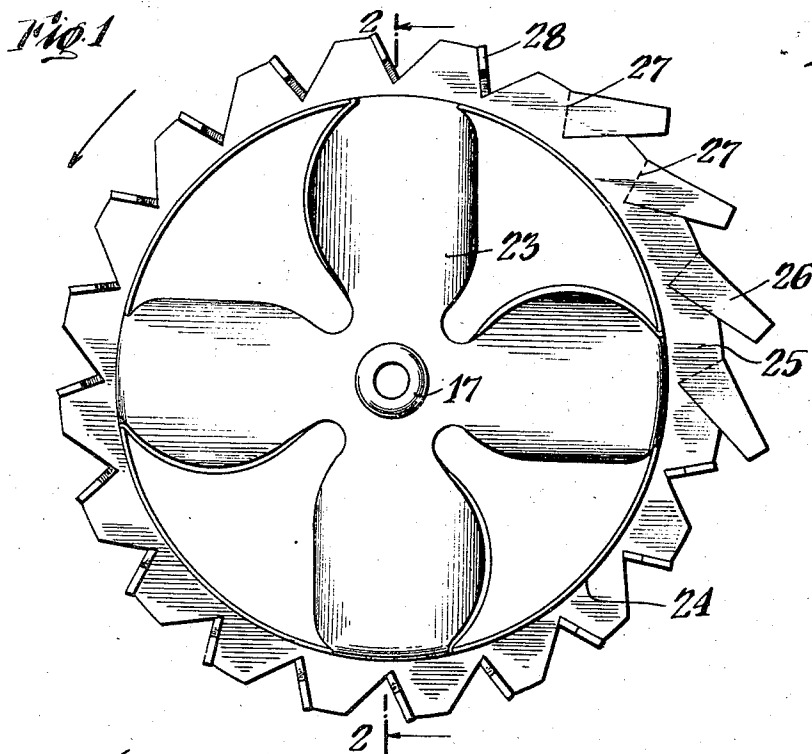
C. E. MEYERHOEFER

2,277,868

FAN CONSTRUCTION

Filed Aug. 12, 1937

3 Sheets-Sheet 1



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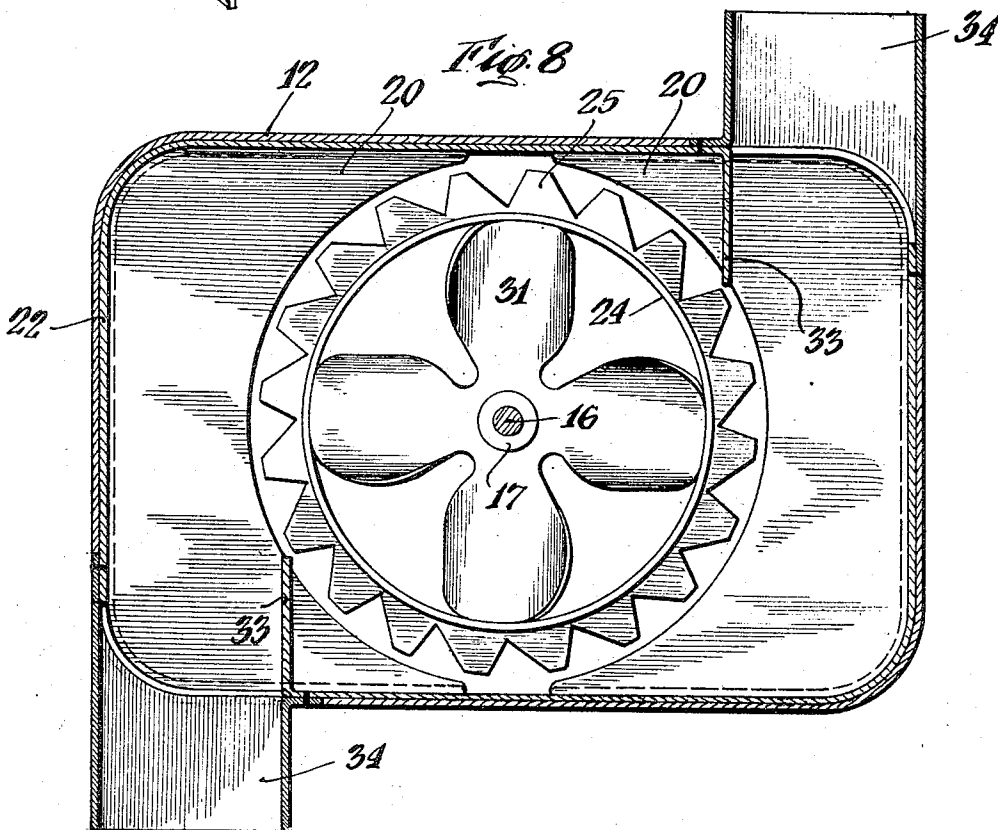
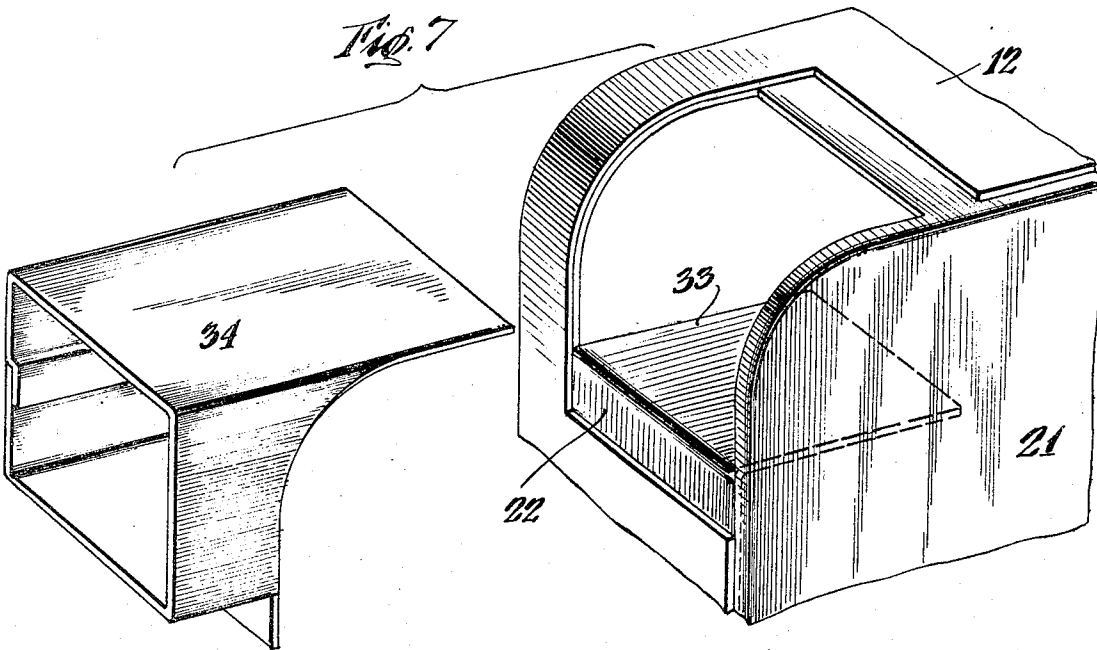
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2,277,868

FAN CONSTRUCTION

Filed Aug. 12, 1937

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,277,868

FAN CONSTRUCTION

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Application August 12, 1937, Serial No. 158,669

2 Claims. (Cl. 230—44)

This invention relates to a structurally and functionally improved heat transfer and fan unit, and in its more specific aspects, aims to provide an article of this character which will be ideally suited for use in connection with the interiors of vehicles.

It is an object of the invention to furnish a heat transfer mechanism—and especially a unit to be employed as a heater—which mechanism will embody relatively few parts, each individually simple and rugged in construction and capable of production and assembly largely by automatic machinery and unskilled labor.

A further object of the invention is that of constructing a unit of this type, and by means of which a large volume of air may be effectively distributed.

An additional object is that of providing an air impelling structure, and also a method for producing such structure and by means of which the cost of manufacture of the air impeller may be reduced to a minimum, aside from the fact that such unit will operate with high efficiency.

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 face view of an air impeller or fan;

Fig. 2 is a transverse sectional view, taken along the line 2—2 and in the direction of the arrows as indicated in Fig. 1;

Fig. 3 is a view similar to Fig. 1 but showing a slightly different form of impeller construction;

Fig. 4 is a transverse sectional view taken along the lines 4—4 and in the direction of the arrows as indicated in Fig. 3;

Fig. 5 is a sectional plan view taken through a complete heat transfer unit, but showing the core, fan and motor casing in elevation;

Fig. 6 is a rear view of the unit as illustrated in Fig. 5 and taken along the lines 6—6 and in the direction of the arrows as indicated in that figure; it being, moreover, noted that certain of the parts have been broken away to disclose underlying constructions;

Fig. 7 is a fragmentary perspective view of a portion of the heater assembly; and

Fig. 8 is a view similar to Fig. 6 but illustrating a slightly different form of construction.

Referring primarily to Figs. 5 and 6, it will be observed that the numeral 10 indicates a heating core, including, for example, spaced heads between which a heat transfer structure extends. This structure may take numerous

different forms but preferably, and for the purpose of the present specification, is to be considered as a cellular type radiator, extending from the heads or tubes 11, which may be connected with the circulating system of the engine of a motor vehicle, or otherwise. In any event, hot or cold fluid is circulated through these tubes and through the heat transfer core. The edges of the core are enclosed by a casing 12, and this casing extends rearwardly of the core. The entire unit may be mounted by means of brackets 13. Directly or indirectly coupled to these brackets is a motor mounting plate or web 14 supporting a motor casing 15. The shaft 16 of this motor has attached to it an air impeller, as for example, by hub 17 and set screw 18.

A shroud plate assembly is formed by telescoping and seaming within the main casing 12 a further casing section comprising a rear wall plate 21 formed with a central annular opening and a flange 22. This flange 22 is preferably continued to form mounting arms 19 to receive or support resilient studs 19' which bear against and retain the core assembly in position within and adjacent the forward portion of the casing 12. If desired, the mounting arms 19 may be separate plates or any other convenient structure.

Secured forward of and spaced from the rear wall plate 21 are a pair of flanged plates 20, each presenting arcuate inner edges and cooperating to form a central annular opening of a greater area than the opening in the rear plate 21. The plates 20 may be conveniently attached to the inner face of flange 22.

Now, with regard to the air impeller operated by shaft 16, attention is directed to Figs. 1 and 2 in which the numeral 23 indicates a multi-bladed fan, having a central opening within the central area of which hub 17 is affixed. This fan, as shown in Fig. 2, may be integral with a flange 24 extending forwardly from its blade-tips. This flange or collar, has adjacent its forward edge an outwardly extending flange 25. As illustrated in Fig. 1, this flange—at the conclusion of one of the initial steps of manufacture—may present a plurality of tangentially extending projections 26. Preferably these projections are tapered outwardly and a slitting operation is resorted to along a line which is a continuation of their inner edges. Thereafter, they are bent along a line perpendicular (or substantially so) to their outer edges and adjacent the base of such edges. Such line of bending has been indicated at 27. It follows that if these

projections are bent to extend perpendicular to flange 25 and forwardly as indicated in Figs. 1 and 2, an annular series of vanes or blades 28 is presented. Each of these extends at an angle to a line projecting radially from the hull and it follows that by this structure a blower wheel assembly is furnished. Obviously, if this assembly is rotated, air will be impelled between fan blades 23. Additionally, due to the inclination of blades or vanes 28, air will be drawn inwardly over flange 24 and be radially distributed by these vanes.

In the figures just considered a structure is presented in which air is preferably sucked through the core by both the fan and blower wheel. Returning to a consideration of Fig. 5, it will be understood that air drawn rearwardly by the fan will be deflected by means of any desired structure (not shown) and particularly by a structure having the functional characteristics illustrated in my prior Patent No. 2,087,160, issued July 13, 1937. The air distributed by the blower wheel will, of course, be projected into the space between plates 20 and 21 for the purpose hereinafter brought out.

In the form of impeller shown in Figs. 3 and 4, it is preferred that precisely the same structure be employed with reference to the blower wheel as that which has heretofore been described. However, this form of impeller is primarily designed where the air is to be drawn inwardly by the blower wheel and projected outwardly by the fan. It will be understood that in certain respects by merely reversing the angle of blades 23, as shown in Figs. 1 and 2, a similar result could be achieved, and in neither event would interference occur between the opposed air flows because of the cellular or equivalent structure embodied in the core, and as a consequence of which, segregation of the opposed currents results. However, where such opposed flow is to occur, it is preferable that the fan be located as indicated in Fig. 5, or in other words, spaced to a material extent from the core. One of the advantages of the construction shown in Figs. 1 and 2 is that the fan and blower wheel are integral, although this need not necessarily be the case. Where a construction such as that illustrated in Figs. 3 and 4 is to be employed, it does not appear feasible to make the parts of one piece. Therefore, flange 24 may be slitted at a number of points and, as indicated at 29, provide tongue portions 30 which, by spot welding or otherwise, may be secured to the blades 31 of the fan. Thus, again, the impeller may in effect be considered as a single unit and the operation thereof will be obvious. In the latter form of construction the fan will lie in proper relationship with respect to the edges or openings of plates 21, and thus a maximum volume of air will be projected through the core.

Now, with a view to distributing the air discharged by the blower wheel, it will be observed, as in Fig. 6, that ducts 32 may extend from each corner of the casing and afford passages which may be conveniently coupled to the tubes, or otherwise, which latter are connected, for exam-

ple, to openings or nozzles situated adjacent the windshield, or other desired portion of the vehicle. A distinct advantage is, of course, derived by the use of individual ducts and the inner ends of these ducts, or passages, may conveniently be provided in the following manner:

As shown in Figs. 6 and 7, the flange 22 of the shroud plate assembly is slitted to furnish a tongue portion 33 and the latter is bent inwardly to extend at a tangent to the elements of the blower wheel. In line with the opening thus furnished, the casing is cut away, and in fact the opening furnished through the latter should, preferably, be of larger area than the opening through flange 22. A duct 34 of rectangular or other configuration, overlies flange 22 and provides a passageway in line with the opening through the latter. This duct extends flush with, and forms a continuation of, casing 12. Consequently, properly extending discharge passages are furnished for the air which is radially distributed by the blower wheel.

In many respects it is preferred to have these passages extending outwardly from the side edges of the casing, but if a greater "pick-up" space is desired for the blower wheel, and in advance of these passages, then they may be located as shown in Fig. 8. In this figure a construction identical to that aforescribed is employed with the exception only that the passageways extend perpendicularly to the longitudinal edges of casing 12. However, it will be apparent that under these circumstances practically the entire effective space between one passageway and the next adjacent passageway may be employed by the blower wheel to collect air for discharge through such passageways. Obviously while it is desirable to employ a pair of discharge passages, a greater or lesser number of the same might be utilized.

Thus, among others, the several objects of the invention, as specifically aforesaid, are achieved. It will be understood that numerous changes in construction and method 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. As an article of manufacture, a fan, a flange extending angularly from and connected to the tips of the fan blades, an outwardly extending flange projecting from the edge of said first named flange, and a plurality of vanes extending angularly from said last named flange, said vanes overlying said first named flange and being tapered towards their outer ends.

2. As an article of manufacture, an air impeller comprising a fan, a flange secured to the blade tips of said fan and extending outwardly therefrom, a further flange extending from the outer edge of said first named flange, and a plurality of vanes extending from said last named flange and inwardly towards the plane in which said fan blades are situated.

CARL E. MEYERHOEFER.