Dec. 24, 1946. B. SPIETH 2,413,118

AIR DEFLECTOR VANE FOR UNIT HEATERS

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Fig. 1

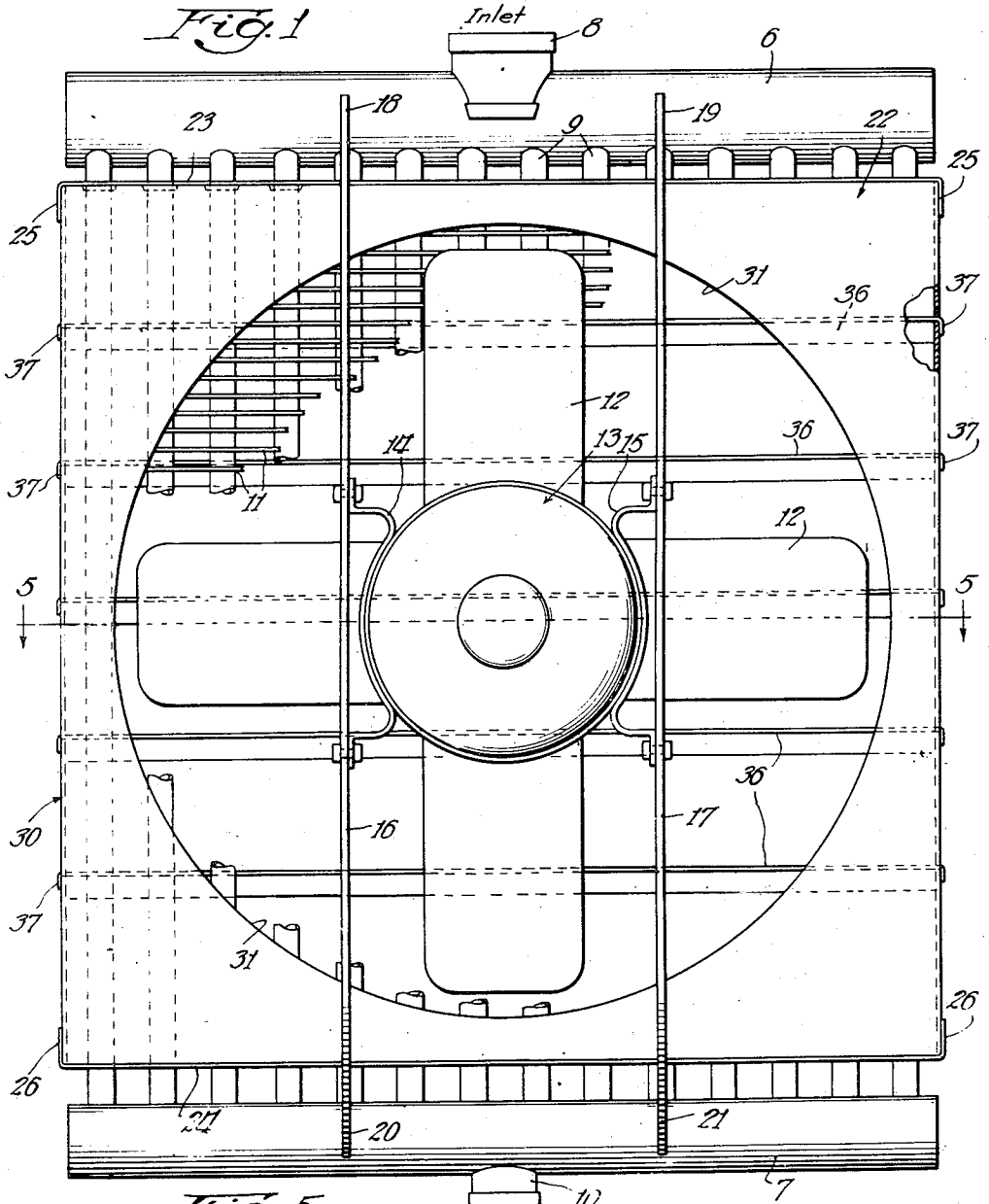


Fig. 5

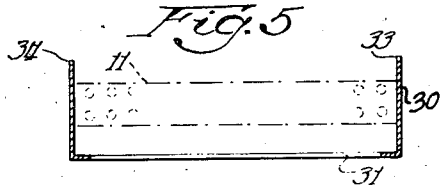


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Fig. 2

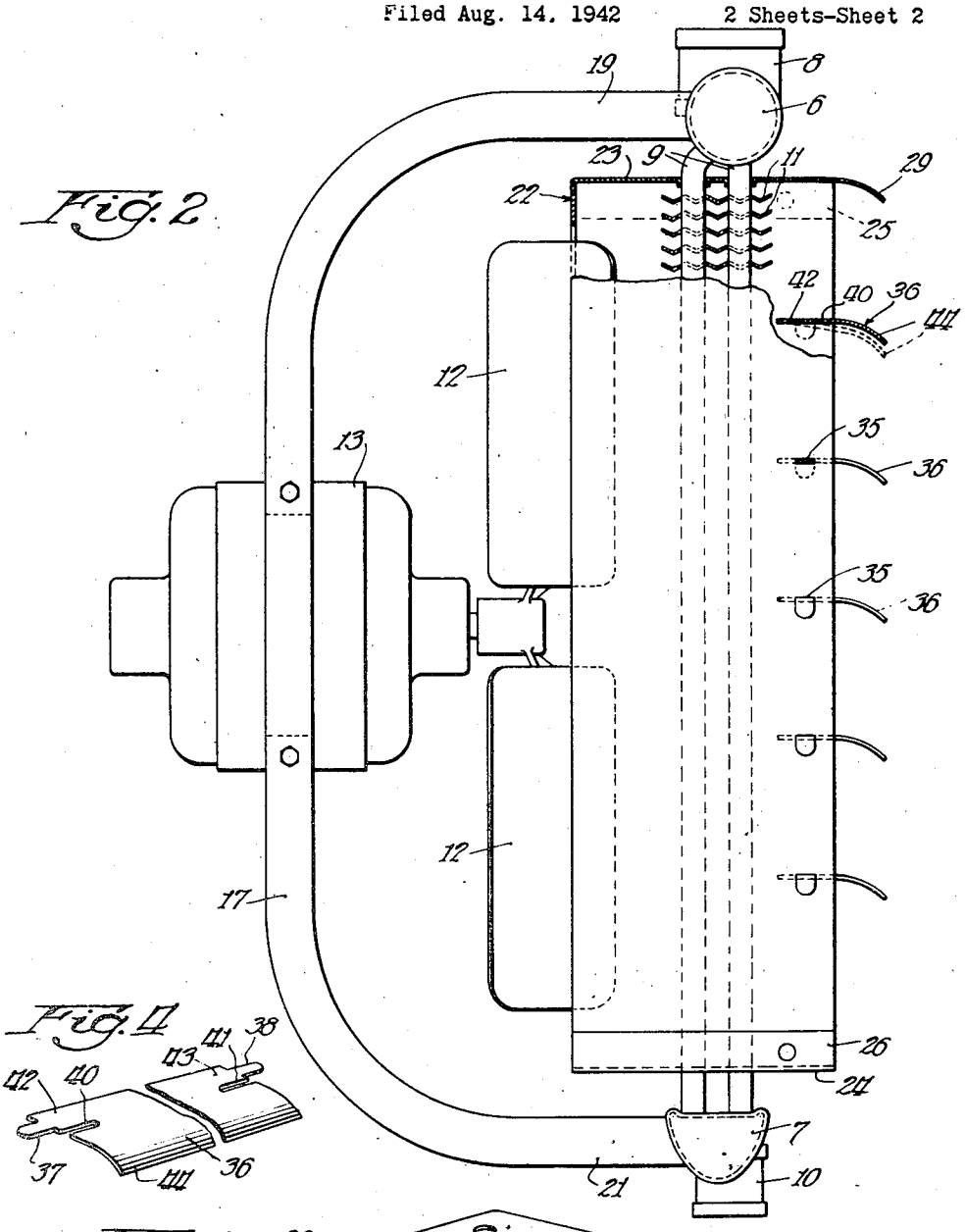
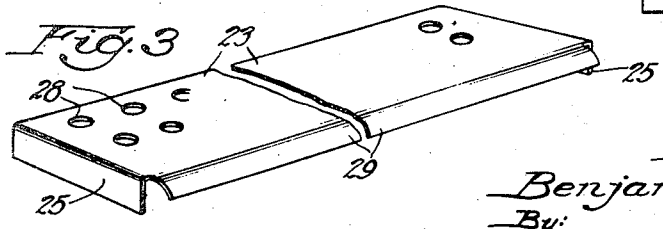



Fig. 4




Fig. 3

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# UNITED STATES PATENT OFFICE

2,413,118

## AIR DEFLECTOR VANE FOR UNIT HEATERS

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2 Claims. (Cl. 98—40)

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The present invention relates to a unit heater of the class which is commonly used for the comfort heating of relatively large enclosed spaces such as shops, work-rooms, show-rooms, offices and other similar enclosures. The invention is more specifically directed to the new and novel arrangement and construction of the essential cooperating mechanisms which have been so combined and assembled as to form a very simplified and compact unit having a minimum number of parts.

A further object of the present invention is the novel construction of the vanes or deflectors which are used in combination with the fan housing to direct the air into the room in such a manner as to provide the best hot air circulation for the particular space which is heated by the unit heater. The deflectors are adjustable and may be regulated after the unit heater is installed and obviously may be maintained in the most efficient deflecting position after the latter has once been determined by a trial run of the unit heater in the enclosure to be heated thereby.

All other objects and advantages of the present device shall hereinafter appear in the following detailed description having reference to the accompanying drawings.

In the drawings:

Fig. 1 is a rear elevational view of the unit heater of the present construction as viewed from the fan or intake side thereof.

Fig. 2 is a side elevational view of the heater illustrated in Fig. 1.

Fig. 3 is a perspective view of one of the fins of the heat transfer surfaces which is utilized to constitute a part of the fan housing;

Fig. 4 is a perspective view of one of the vanes or heat deflectors, and

Fig. 5 is a central sectional view of the portion of the housing comprising the fan hood, per se, as taken substantially along the line 5—5 in Fig. 1.

Referring to Figs. 1 and 2, the unit heater of the present invention is provided with an upper inlet header 6 and a lower return header 7. The upper header is provided with an inlet fitting 8 which may be suitably connected with any form of heat source which may provide hot water, steam, or any other form of heating medium or fluid. A plurality of tubes 9 are connected to the upper header 6 and the lower header 7 in the usual manner as by welding or brazing, and constitute the heating portion of the heater core and are adapted for conducting the heating medium from the tank or header 6 to the lower tank or header 7. From the latter, a suitable outlet

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10 may be connected as desired for conducting the cooled heating medium away from the unit heater back to the heat source. The plurality of tubes which are preferably of relatively small diameter are disposed parallel in a manner illustrated in Figs. 1 and 2, and they may be arranged parallel in rows as shown or in staggered relation if desired. Since the ends of the tubes 9 are welded or brazed to the spaced headers they form a rigid heat medium conducting system which substantially constitutes the skeleton framework or backbone of the present unit heater.

The tubes 9 hereinbefore referred to are connected by a plurality of fins 11 which are provided and function as extended heat transfer surfaces in addition to the heating surfaces presented by the tubes, thereby creating an efficient heater core which will readily transfer most of the heat to the air which is forced between the fins and around the tubes by means of the circulating fan 12. The fan 12 is driven by a motor 13 which is positioned and supported through the means of a pair of saddle brackets 14 and 15 which are bolted or spot welded or otherwise secured to the vertically disposed U-shaped brackets 16 and 17 which form spaced hangers for supporting the entire wind driven unit. It is also possible to modify the shape of the main fan unit supporting brackets 16 and 17 centrally thereof to follow the contour of and connect with the motor in the manner of brackets 14 and 15 and in that event the latter may be eliminated.

The straps or hangers 16 and 17 bridge the heat exchange core and are of relatively thin cross-section disposed edgewise in the path of the air stream to reduce the air resistance thereof and the top legs 18 and 19 of the brackets 16 and 17 are brazed, welded, or otherwise rigidly connected with the upper header 6, while the lower legs 20 and 21 of said hangers 16 and 17, respectively, are similarly connected or secured to the lower header or tank 7.

From the foregoing description, it will be apparent that the two headers and their connecting tubes are reinforced mechanically by means of the horizontally disposed fins 11 joining all of said tubes. The motor driven fan is likewise rigidly disposed and suspended by the brackets 16 and 17 in a definite and desirable predetermined relation with respect to the main skeleton of the unit heater with the latter forming the heat transfer unit which supplies the heat to the air driven therethrough by means of the fan 12. By this arrangement, the tubes 9 and the brackets 16 and 17 all connect the two headers so that tubes 9 which form the skeleton or backbone of

the unit are also reinforced through the parallel connections of the headers by the fan unit supporting brackets 16 and 17.

In order that the air heated by the unit heater shall be directed through the heating unit in the proper and desired direction and that none of the heat or air shall be dissipated from the direct or main air stream through the heater, a suitable fan hood or casing indicated by 22 in its entirety is constructed for the purpose of controlling the direction and concentrating the air stream before and after it leaves the heating unit proper. There are various ways in which the fan hood may be constructed and in the present device the extreme top and bottom fins 23 and 24 of the heater are enlarged so as to extend forwardly and rearwardly with respect to the remainder of the fins 11 as best illustrated in Fig. 2. In addition, the top and bottom fins 23 and 24 are provided with pairs of flanges 25 and 26, respectively. The construction of the upper fin is very clearly indicated in Fig. 3, which shows the fin 23 as provided with the flanges 25 hereinbefore referred to, said fin also having suitable openings 28 for the reception of the tubes 9.

The fin 23 is also made with an extended end 29 forming an air deflector which may be bent up or down as best determined after the installation of the unit to obtain the proper air deflection at this point. Although the lower fin is not provided with a deflector, this may or may not be desirable and in all other respects the lower fin 24 is identical with the upper fin 23 but reversely positioned. The remainder of the fan hood or housing, part of which is formed of the fins 23 and 24 as the top and bottom thereof, comprises a U-shaped member 30 illustrated in Fig. 5, which is adapted to be connected with the flanges 25 and 26 of the upper and lower fins 23 and 24, respectively. The housing 30 is also provided with an opening 31 which is slightly larger than the sweep of the fan blades 12 and acts to concentrate the intake air as the latter is forced into and through the heating unit by means of the fan. From the foregoing description, it will be seen that the fan hood or housing is directly secured to and supported from certain of the fins of the heating unit which also form an integral portion of the complete housing. With certain of the fins such as 23 and 24 of the core forming the top and bottom of the fan casing 22 and by securing the remainder of the fan hood to said fins, some of the heat from the core is dissipated to the casing directly by conduction as well as by radiation so that the casing will also act to heat the fan air while functioning to direct and concentrate the air stream from the fan.

Although the present drawings illustrate the housing as manufactured from sheet metal or other relatively thin metallic members, it will be relatively simple to substitute the main portion of the housing 30 with non-metallic materials such as plastics or Masonite in order to further avoid the necessity of using metals in the manufacture of the present unit heater. The fan hood or housing 30 can also be made of separate parts, namely, an apertured back wall with two side walls and this may be preferable when using thicker materials other than metal.

As an additional means to vane 29 for deflecting and directing the heated air from the front face of the unit heater, the extended sides 33 and 34 of the fan hood 30 are provided with apertures as at 35 in Fig. 2, which are aligned and conveniently arranged to receive deflectors 36 which are best illustrated in perspective in Fig. 4. Each of the deflectors 36 is provided with a pair of ears 37 and 38, which may be inserted through the holes 35 of the oppositely related sides 33 and 34 by springing the latter sides. Subsequently ears 37 and 38 may be bent against the sides of the housing 22 to hold the deflectors against movement and to connect the same with extended sides 33 and 34 of the fan hood 30. This eliminates the use of any other forms of fastening devices such as the nuts and bolts or screws, and at the same time the deflectors are rigidly held in place and cannot be shaken loose by vibration of the fan unit nor do they have any looseness which may tend to produce objectionable noises as the air is blown therethrough. The spaced deflectors also aid to hold the sides 33 and 34 against the ends of the heating core comprising the tubes 9 and the fins 11, adding further rigidity to the open end of the casing 22.

In order to obtain the adjustment of these deflectors for each particular installation, aligned notches 40 and 41 are provided near or adjacent each of the ears 37 and 38 in a manner best illustrated in Fig. 4, whereby relatively narrow strips or bands of metal 42 and 43 are produced which can be flexed as the ends 44 of the deflectors are moved upwardly or downwardly into various positions as best illustrated in the dotted lined position in Fig. 2. Obviously, these deflectors may easily be replaced should the flexing portions thereof become ruptured, but it will seldom be necessary to adjust the deflectors more than once or twice since only one or two settings thereof are usually necessary to determine the best position for the deflectors, and thereafter no further adjustment will be necessary.

Thus it will be seen that the invention provides a new and novel arrangement, and simplified construction of unit heater which utilizes a minimum of metallic elements and wherein certain portions of the heating transfer unit per se also provide the main skeleton and backbone of the entire unit heater.

Having thus described the invention, it is obvious that various immaterial modifications may be made in the same without departing from the general scope and field of this invention; hence, it is not to be understood that the present device is to be limited to the exact form, construction, arrangement and combination of parts herein shown and described or to the uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. An air deflector for connection with opposite walls of an air casing comprising a vane, oppositely related ears for insertion in openings in said casing walls for fixedly securing said vane into one position in said casing, and aligned slots at the opposite ends of said vane and adjacent said fastening ears providing narrow vane sections contiguous with said ears whereby the whole vane may be flexed relative to said casing to obtain the desired air deflection.

2. An air deflector for a hot air heat exchange unit casing comprising an elongated vane formed separately from the casing, oppositely directed ears at the ends of said vane extending through slots in opposite walls of the casing for securing the vanes to said opposite walls and weakened portions adjacent said ears extending lengthwise of the vane to permit flexing of said whole vane, relatively to said casing to adjust the vane for deflecting hot air expelled from said hot air unit.

BENJAMIN SPIETH.