Oct. 26, 1943. E. H. STEMPEL ET AL 2,332,762

UNIT HEATER

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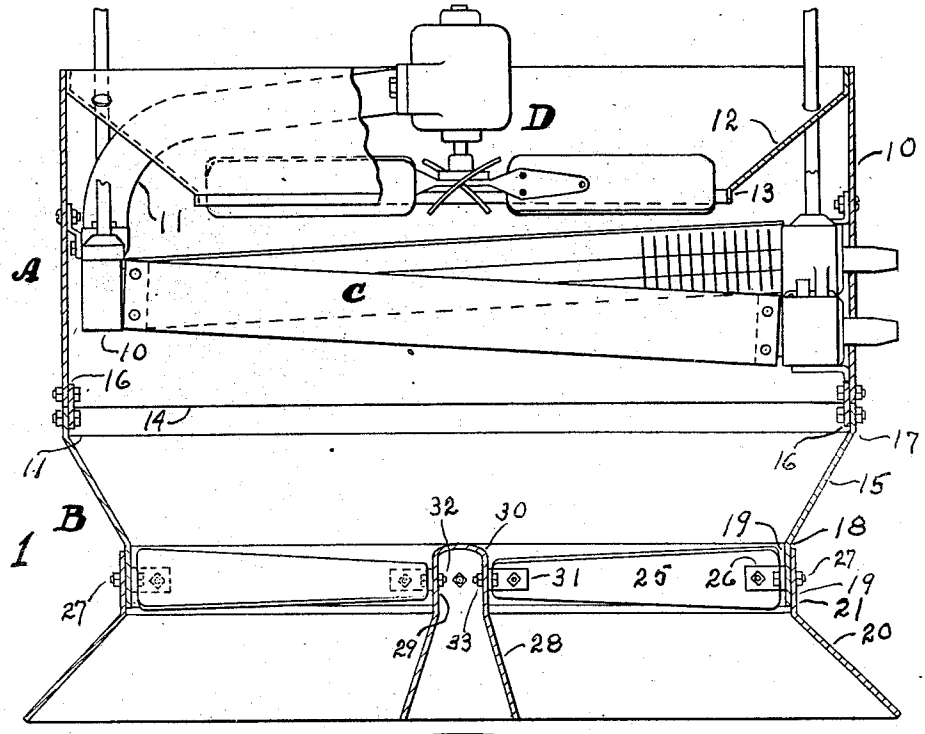
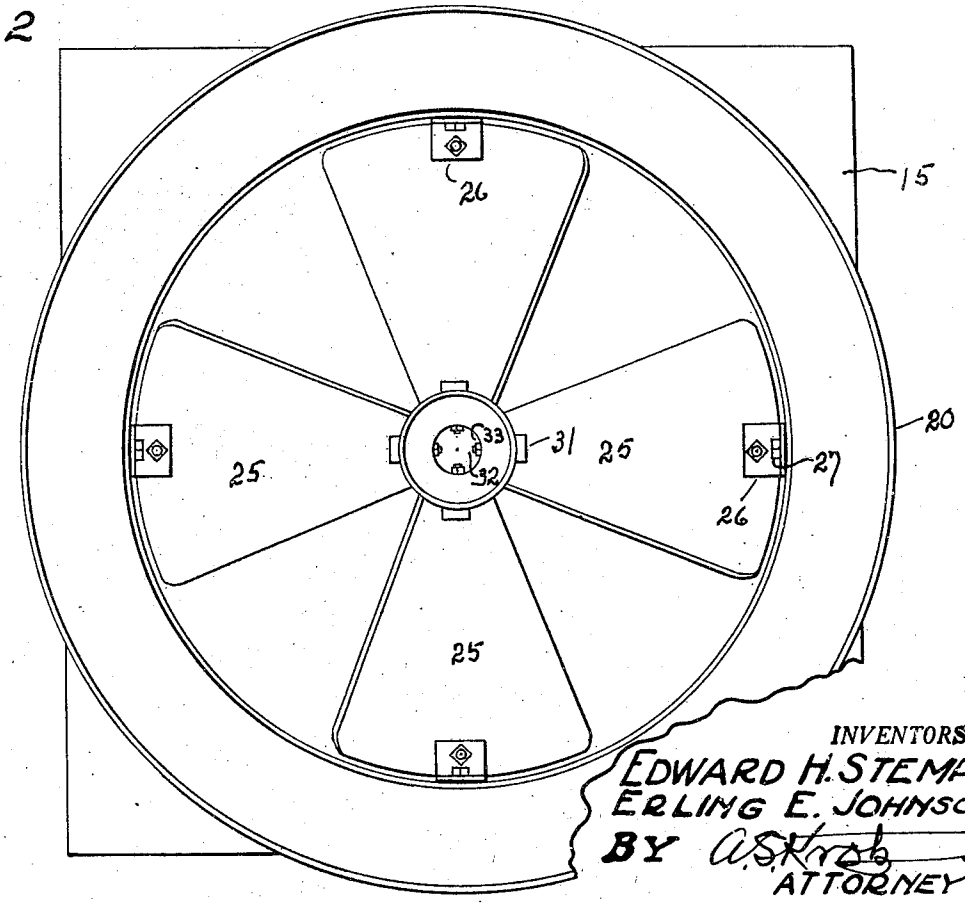


FIG. 1

FIG. 2



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FIG. 3

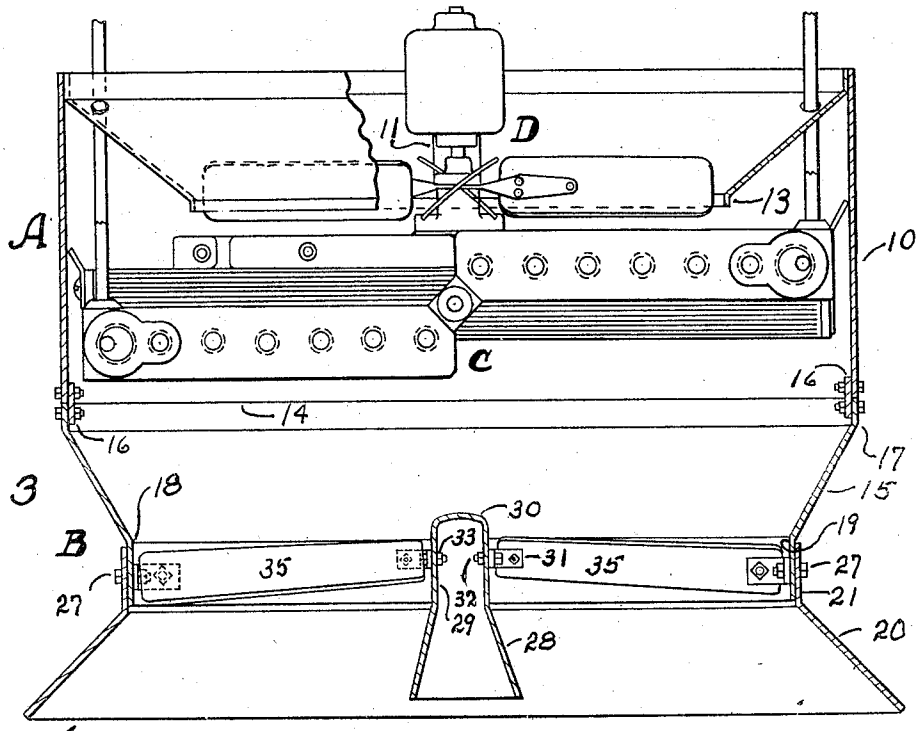
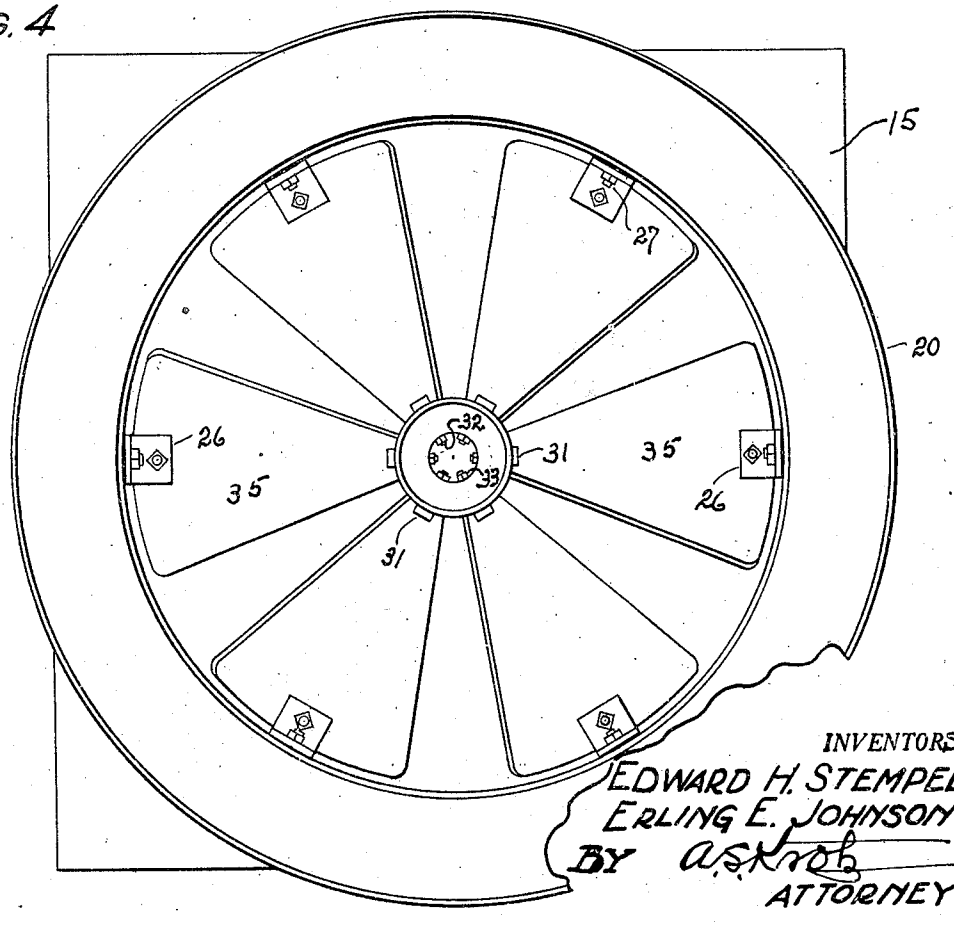


FIG. 4



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UNIT HEATER

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Application January 23, 1941, Serial No. 375,570

3 Claims. (Cl. 98—40)

The present invention relates to an improvement over conventional unit heaters of the class, wherein the heated or cooled air is discharged downwardly.

An object of our invention is to more uniformly discharge the air and over a larger area than has heretofore been possible by causing the air to flow downwardly spirally thus to make use of the principle of centrifugal force to cause the air to spread fan-like in every direction.

Another object of our invention is to cause the air, as it leaves the core, to impinge stationary blades which will act to spread the air fan-like and to assist this movement by means of outer and inner cone shaped rings.

A further object of our invention is to prevent vertical zones of different temperatures by first causing the downwardly flowing air to impinge stationary blades to thereby completely mix the air before it leaves the unit.

We accomplish the above stated objects by positioning stationary blades directly under the heating or cooling core and providing means whereby the angle of the blades may be adjusted to accommodate different conditions.

To these and other useful ends, our invention consists of parts, combinations of parts, or their equivalents, and mode of operation, as hereinafter described and claimed and shown in the accompanying drawings in which:

Fig. 1 is an elevational partially sectioned view of a well known unit heater equipped with our invention, the heater unit being shown with the near panel removed and the air distributing means being shown as sectioned on the center line of the same.

Fig. 2 is a bottom view of the device shown in Figure 1.

Fig. 3 is an elevational view similar to Figure 1 but taken at right angle to that shown in this figure, illustrating a modification of our air distributing device.

Fig. 4 is a bottom view of the device illustrated in Figure 3.

As thus illustrated, the heat exchange unit is designated in its entirety by reference character A. The air directing means in its entirety is designated by reference character B. Unit A comprises a vertically positioned preferably rectangular in cross section housing 10 having mounted therein a heat exchange core which in its entirety is designated by reference character C.

The fan and motor are designated in their entireties by reference character D, the motor being secured to header 10 of member C by means of a bracket 11 (see Figure 1). A suitable fan shroud 12 is provided extending from the inlet side of the housing downwardly and inwardly, terminating in a ring 13 which surrounds the fan blades so the air may be economically directed downwardly through core C.

Our improved air directing means B may be used on any style unit, either round or rectangular, in which any style fan and core may form a part. Therefore unit A, as illustrated, bears no part of the present invention.

Unit A is adapted to terminate as at 14. We provide an extension 15 which is secured to the bottom edge of member 10 by means of suitably spaced plates 16 and in a manner whereby unit B may be quickly removed and replaced. Member 15 at its top is shaped exactly like the bottom of member 10. Directly below its fastening to unit A, the walls of member 15 converge inwardly as at 17, terminating as at 18 and having from this point downwardly, a ring 19.

We provide a cone shaped outlet 20, the upper end 21 of which is adapted to fit over member 19. We provide a number of blades 25 each having at its outer end a bracket 26 and a bolt 27 which extends through members 19 and 21.

We provide a cone shaped center portion 28 having an upwardly extending portion 29 with a cap closure 30. The inner ends of members 25 are provided with brackets 31 having inwardly extending bolts 32 which extend through member 29, the bolts having nuts 33, thus blades 25 may be turned to any desired angle and locked by means of bolts 27 and 32.

It will be seen, by scrutinizing Figures 1 and 2 that after the air passes from core C, it will violently impinge blades 25 and will be diverted to an angular course so it passes from the bottom of cone 20 spirally, the angularity of the spiral depending upon the angle of blades 25 and somewhat upon cones 20 and 28.

Clearly if there are vertical zones of air, at different temperatures leaving core C, these zones will be broken up when the air contacts the blades and is whirled spirally downwardly through member 20.

Thus, when the air leaves member 20, it will be thoroughly mixed and have a uniform temperature. Clearly the action of centrifugal force on the air will cause it to spread out in every direction fan-like after leaving the blades.

The action of centrifugal force will be changed by changing the angle of the blades. The greater the angle of these blades, the sharper the spiral

and the greater the air will tend to spread out fan-like toward the floor of the room served.

Clearly there can be no direct downward movement of the air against the occupants; there can be no cold or hot zones because the air, when it leaves the unit, will have a uniform temperature, and be so completely diffused into the atmosphere of the room, before reaching the occupants, that the movement of the air will not be perceptible.

The design shown in Figures 3 and 4, is similar to that shown in Figures 1 and 2 except that six blades are made use of instead of four. The blades, as illustrated, are somewhat narrower and positioned at a tranverse angle to thereby assist in moving the air outwardly fan-like; otherwise the device operates the same as the device illustrated in Figures 1 and 2.

It will be seen that various blades and positions of the same may be used in our unit B. In Figures 3 and 4, parts which are similar to parts in Figures 1 and 2 bear similar identifying numbers. The blades are designated by numerals **35** and members **28**, **29** and **30** are however positioned somewhat higher than in Figures 1 and 2.

Clearly the air, before leaving the unit will be perfectly and violently mixed so that it will have a uniform temperature and that the air, assisted by centrifugal action, will spread over a large area.

Having thus shown and described our invention, we claim:

1. A device of the class described, comprising a vertically arranged rectangular in horizontal section housing, a motor driven impeller fan positioned in the upper end of said housing and adapted to discharge air downwardly through the housing, a heat exchange core arranged horizontally in the housing and below said fan, a fan shroud secured at its top to the top of said housing and converging downwardly terminating in a circular opening adapted to surround the blades of the fan, said heat exchange core comprising end headers with finned tubes forming operating connections therebetween, said housing being attached to the headers, vertically arranged spaced rods secured to said headers, openings in said fan shroud through which said rods extend, the rods being adapted to act as supports for the device, said motor having a supporting bracket which extends through said fan shroud and being secured at its outer end to one of said headers, a relatively short air duct secured to the bottom of the housing, the wall converging terminating in a reduced circular in cross section outlet, a relatively short outlet duct secured to the bottom of said air duct, the wall diverging, radially positioned blades adjacent the contact between said air duct and outlet duct and being mounted at a transverse angle to thereby cause the air to be discharged fan-like and spirally.

2. A device of the class described, comprising a vertically arranged rectangular in cross section housing, a heat exchange core comprising end headers and finned tubes forming an operating connection therebetween, the headers being secured to the side walls of the housing intermediate their ends, a motor driven impeller fan positioned in the upper end of said housing and adapted to discharge air downwardly through said core, a fan shroud, the upper edge being secured to the upper edge of said housing and converging downwardly terminating in a circular opening adapted to surround the blades of said fan, spaced vertically arranged rods secured to said headers, openings in said fan shroud through which said rods extend, the rods adapted to act as supports for the device, said motor having a bracket which extends through an opening in said fan shroud, its outer end being secured to one of said headers, a Venturi shaped outlet secured to the bottom of said housing having blades mounted radially within the smaller diameter of the outlet, and said blades having means whereby they may be adjusted to predetermined angles to thereby cause the air to be discharged spirally and fan-like.

3. A device as recited in claim 1 including: a centrally positioned member in the small portion of said outlet, the inner ends of said blades being secured thereto.

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