May 25, 1943. L. F. WILSON 2,320,207

UNIT HEATER

Filed Jan. 1, 1942 2 Sheets-Sheet 1

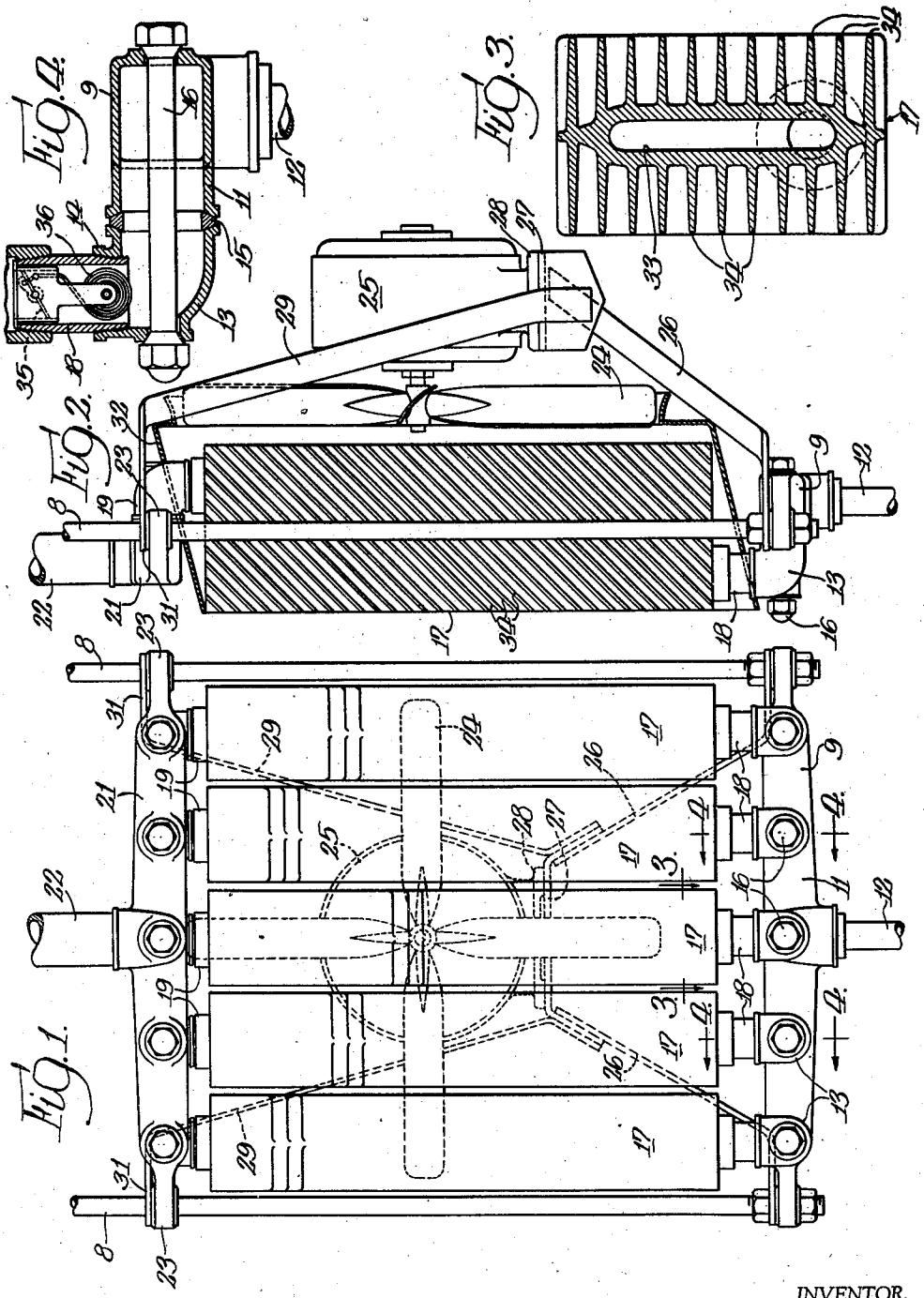


Fig. 1.

Fig. 2.

Fig. 3.

INVENTOR.
Lyndon F. Wilson
BY Ira J. Wilson Atty.

May 25, 1943. L. F. WILSON 2,320,207

UNIT HEATER

Filed Jan. 1, 1942 2 Sheets-Sheet 2

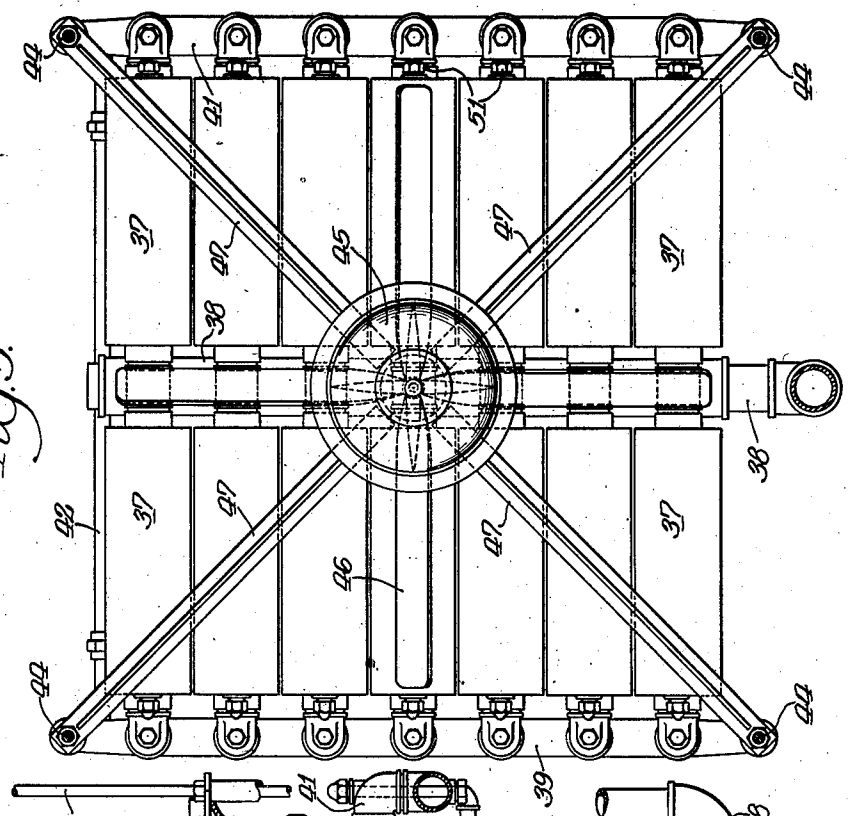


Fig. 5.

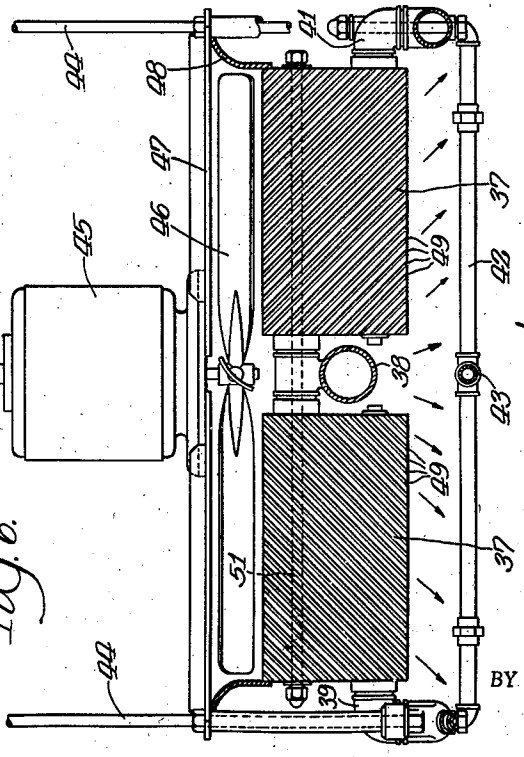


Fig. 6.

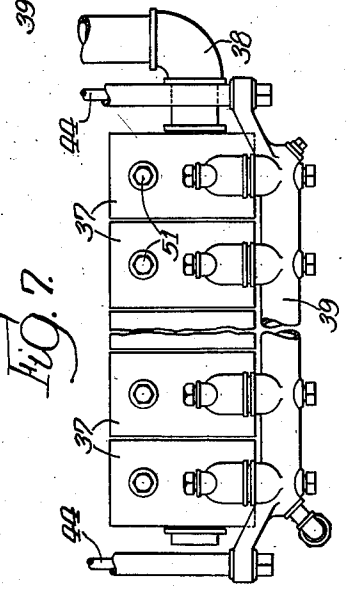


Fig. 7.

INVENTOR.
Lyndon F. Wilson
BY Ira J. Wilson Atty.

Patented May 25, 1943 2,320,207

UNITED STATES PATENT OFFICE

2,320,207

UNIT HEATER

Lyndon F. Wilson, Chicago, Ill., assignor to Wilson Engineering Corporation, Chicago, Ill., a corporation of Delaware

Application January 1, 1942, Serial No. 425,297

2 Claims. (Cl. 257—137)

This invention relates to unit heaters of the type primarily employed for space heating purposes.

Heaters of this general type customarily comprise a heating unit to which the heating medium is supplied, an air moving device such as a fan or blower arranged to induce an air flow through the heating unit, and adjustable louvers whereby the current of heated air may be directed in a desired direction. The heat control is electric in character, designed to either stop the blower or to reduce its speed upon the attainment of a predetermined room temperature. The heating medium is customarily supplied to the unit, unless the heater is completely shut off.

Since the characteristics of fans vary greatly with the speeds, multi-speed electric controls produce inefficient results and are for that reason unsatisfactory. Single speed controls, under which the fan operates at a single speed or is shut off entirely, produced intermittent and unequal heating effects in the space being heated, the maximum heat being delivered at intervals alternating with non-heat or low temperature periods.

One of the primary purposes of my present invention is to provide a unit which will deliver a constant volume of air but at varying temperatures dependent upon the variation of the room temperature from a predetermined desired temperature.

The employment of air current-directing louvers results in loss of air impetus and heat distribution due to the friction of the air against and the deflection of the air by such louvers, and without any compensation for such loss.

My present invention aims to eliminate the employment of such louvers and to impart to the air the desired directional discharge by means of radiating fins incorporated in the structure of the heating unit, the efficiency of which will be materially increased by the intimate contact of the air delivered by the fan against these fins. By reason of this intimate contact, the transfer of heat units between the fins and the air is greatly facilitated, thereby increasing the efficiency of the device.

Another purpose of the invention is to provide a heater of the character indicated in which the motor and fan will be supported independently of the heating unit and of the casing, thereby reducing the danger of leakage in the heating medium connections to the unit, which leakage is liable to be produced by vibration when the fan and motor are supported by the unit and also enabling the employment of a much lighter casing than is required when such casing is designed to serve as a support for the motor and fan.

Other objects and many inherent advantages of my invention should be readily appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawings.

Referring to the drawings,

Fig. 1 is a front elevation of a unit heater embodying the principles of my invention;

Fig. 2 is a side elevation of the structure shown in Fig. 1;

Fig. 3 is a fragmentary sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a plan view of another form of the invention embodied in a heater of the vertical type;

Fig. 6 is a side view of the heater shown in Fig. 5; and

Fig. 7 is an end view of the heater shown in Figs. 5 and 6.

Referring now to Figs. 1 to 4, the heater of the horizontal type therein disclosed is supported by a hanger comprising a plurality of vertical rods 8 suspended from the building structure. A header 9 carried by and between the lower ends of these rods preferably comprises the section 11 communicating centrally with the discharge pipe 12 and elbows 13 provided with upturned tapped bosses 14. The sections 11 and 13 and an interposed ball joint ring 15 are clamped together into a unitary structure by bolts 16.

The heating unit consisting of a series of unit sections 17 is supported upon the exhaust header, each section being connected therewith through a short length of connecting pipe 18. The upper ends of the unit sections communicate through connections 19 with the supply header 21 to which air temperature influencing medium is supplied through the pipe 22. For heating purposes this influencing medium would be steam from a suitable supply, but should it be desirable to employ the unit for cooling purposes, a cool fluid would be circulated through the unit. The ends of the intake header 21 are cast to form cored lugs 23 which somewhat loosely receive the supporting rods 8 so that the header is free to move upwardly or downwardly to accommodate expansion and contraction of the unit under temperature changes.

And air flow producing device, such as a blower

or a fan 24, is disposed in proximity to one face of the heating unit and preferably is mounted directly upon the shaft of an electric motor 25. This motor, instead of being supported by the heating unit or by a fan casing, is carried in the present instance by a frame consisting of lower legs 26 supported upon the rods 8, a table 27 upon which the motor base 28 is securely mounted and the upper legs 29, the out-turned ends 31 of which are provided with eyes to loosely receive the rods 8. In this manner the motor and fan are supported directly from the hanger so that none of their weight is transmitted to the heating unit or to a fan casing. This relieves the heating unit and its connections from strains and stresses and the danger of leakage resulting from vibration which heretofore in those heaters wherein the motor and fan have been carried by the heating unit has been prone to produce leakage in the connecting joints leading to and from the unit.

In those heaters heretofore employed, in which the fan and motor have been supported by the fan casing, such casing was required to be of heavy, substantial construction. By supporting the motor independently of the casing, I am enabled to use a much lighter and cheaper casing, indicated by reference character 32, the sole duty of which is to confine the air delivered by the fan to passage through the heating unit. This casing may be made of relatively lightweight sheet metal and suitably attached to the motor supporting framework.

The heater unit sections are preferably of cast metal construction, and may be made of cast iron, cast aluminum or any other suitable material or combinations of materials. Each section is provided with a hollow core 33 to receive the temperature influencing medium and is provided with a series of outwardly projecting radiating fins 34. These fins are spaced a limited distance apart and are arranged substantially in parallelism. Instead, however, of being disposed transversely to the longitudinal axis of the section, they are disposed at an angle to both the longitudinal and transverse axes. The degree of angularity of the fins may, of course, be varied to suit particular conditions, but most conditions will be satisfied by positioning the fins at approximately a 45° angle to the longitudinal and transverse axes of the section, as best shown in Fig. 2 of the drawings.

This angular disposition of the fins in the path of air flow created by the fan effects two desirable accomplishments. First, the fins serve as deflectors to deflect the heated air downwardly at an angle into the space to be heated, so as to heat the space at and near the floor and establish an air circulation throughout the space. This function is similar to that previously performed by the commonly used deflectors, but entirely eliminates the manufacturing and installation costs of such deflectors, thereby simplifying the structure and reducing its cost. Second, the angular position of the fins causes the air delivered by the fan to impinge against and intimately contact the fins so as to greatly increase the transfer of heat units between the fins and the flowing air. The efficiency of the apparatus is thereby very substantially improved.

The inefficiency of a multi-speed fan and the objectionable intermittent heat delivery resulting from the use of a thermostatically controlled start and stop fan are both eliminated in my present invention by employing a one speed continuously operating fan and regulating the heat delivered by controlling the amount of temperature influencing medium passing through the heater.

Referring to Fig. 4, it will be observed that in one or more of the connections 18 between the discharge header 9 and the unit sections 17 is mounted a valve 35, preferably of the butterfly type, the position of which is automatically controlled by a suitable thermostatic device, in the present instance illustrated as a bi-metallic coiled strip 36 mounted in the connection so as to be influenced by the medium flowing through the connection and connected with the valve. The thermostatic device is constructed to move the valve toward closed position under the influence of steam flowing through the connection, but to move the valve toward open position when the medium flowing through the connection is below steam temperature.

In a heater of the size and type disclosed, usually two, but sometimes three, of the discharge connections from the unit sections will be equipped with such thermostatic valves, while the remaining two or three sections will be unequipped. In operation the steam will be turned on to supply the heater through the pipe 22 and the fan will be started. So long as the temperature of the air blown by the fan against the radiating fins and through the heating unit is low enough to condense the steam in the sections, the control valves will remain open and a maximum heating effect will be produced. As the temperature of the air in the space being heated rises and the temperature differential between the heater and the air passing therethrough diminishes, fewer heat units will be transferred and more uncondensed steam will consequently flow to the discharge header. The thermostatic valves will, therefore, be moved by the thermostats to or toward closed position, thus shutting off or reducing the circulation through the controlled unit sections and thereby reducing the heating effect of the heater without shutting off or reducing the speed of the fan. The thermostatic devices may be set all to close at a predetermined temperature or, preferably, they may be so set that they will open and close in succession instead of in unison, thereby obviating abrupt temperature variations and contributing toward the maintenance of a uniform temperature in the space being heated.

The vertical type of heater disclosed in Figs. 5, 6 and 7 is similar in principle to the horizontal type above described, but differs therefrom in details of structure and in the manner of air distribution, as will now be explained.

With this form of heater the unit sections 37 are preferably shorter than those employed in the horizontal type, are disposed horizontally and are arranged in two rows between which the supply header 38 is disposed and connected to the individual sections. The outlet ends of the seconds are connected with discharge headers 39 and 41 which in turn are connected by a discharge pipe 42 connected to deliver through a common outlet pipe 43. The connections between the individual unit sections and the discharge headers may be equipped with thermostatic control valves similar to those disclosed in Fig. 4, but a showing of such valves in the horizontal type is deemed unnecessary.

The heating unit in this instance also is supported upon a plurality of suspension rods 44,

and the motor 45 and fan 46 are carried by these rods through the intermediary of a supporting framework comprising the diagonally disposed struts 47. A casing 48 may be used to surround the fan and the heating unit, similar to the casing 32 of the horizontal type.

The air distribution in the horizontal type differs somewhat from that produced by the vertical type in that the fins 49 in the horizontal type are inclined in opposite directions in the two rows of sections, as will be apparent from Fig. 6. This arrangement causes the air flow passing through the heating unit to be deflected outwardly in opposite directions from the center of the heater, thus giving a wide air distribution. The air, however, delivered downwardly by the fan between the rows of sections and heated by the ends of the sections and by the supply header 38 and section connections, is discharged directly downwardly so as to heat the space directly underneath the heater. In this manner the heated air, some of which travels downwardly and some of which is deflected outwardly in opposite directions, is thoroughly distributed and a highly desirable uniformity of temperature in the space to be heated is attained. Tie rods 51 connecting the sections of the units are preferably employed to provide rigidity to the heater and relieve the pipe connections of undue strains.

My invention and many of its advantages will be understood and appreciated from the foregoing, but it may be mentioned that, in addition to the desirable feature above set forth, my invention possesses the added advantage that the constant speed of the fan with the thermostatic control of the heating element effect maintains a ventilation in the space so as to improve the working conditions in shops, engine houses and the like where obnoxious gases or steam fogs have a tendency to accumulate.

The structural details of both types of heaters above described may obviously be varied within considerable limits without departing from the scope of my invention as defined in the following claims.

I claim:

1. A unit heater comprising in combination a heating unit consisting of a plurality of unit sections arranged in spaced apart groups, means located between the groups for supplying temperature influencing medium to the sections, and a fan arranged to deliver air between said groups and between the sections of each group, all of said sections being provided with heat radiating fins disposed at an angle to the direction of flow of air delivered by said fan, the fins in one group being disposed at an angle with respect to the fins of an adjacent group to thereby divert the air flow from the heating unit in opposite directions.

2. In a unit heater, the combination of a heating unit comprising a plurality of unit sections each provided with downwardly inclined heat radiating fins, said sections being arranged in spaced apart groups, the fins in one group being inclined in the opposite direction to the fins in an adjacent group, means for supplying temperature influencing medium to the sections, and a fan arranged to deliver air through the unit between said groups of sections and between the sections of each group, whereby such air is delivered downwardly between the groups and in oppositely inclined directions from the spaced groups.

LYNDON F. WILSON.