Jan. 31, 1933. G. BLUEMEL 1,895,966

AIR HEATER

Filed July 23, 1931

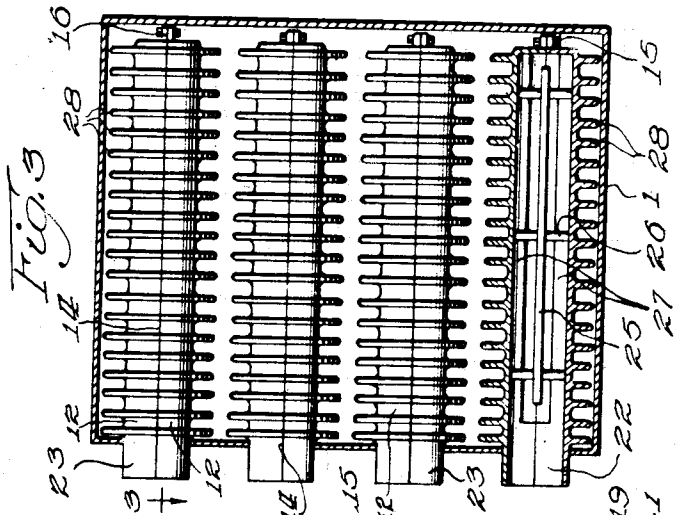


Fig. 3.

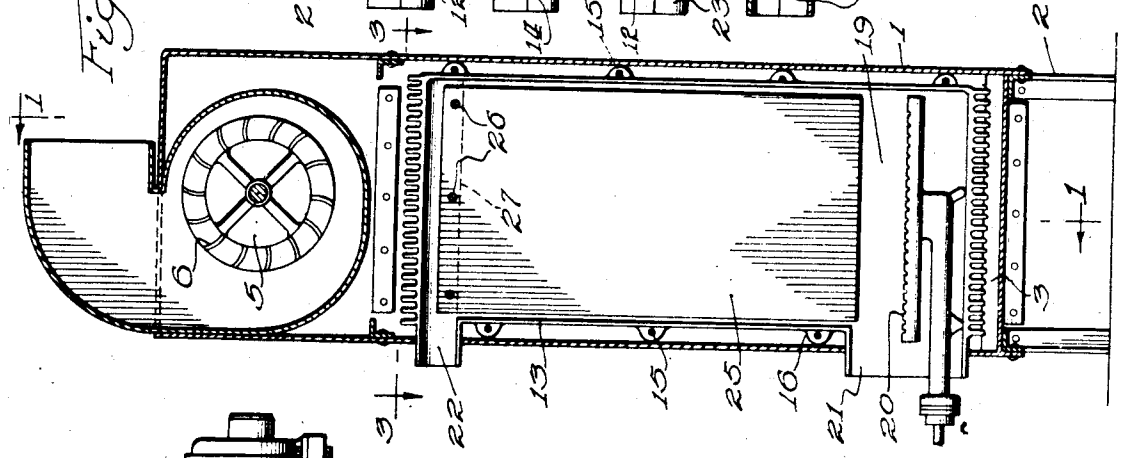


Fig. 2.

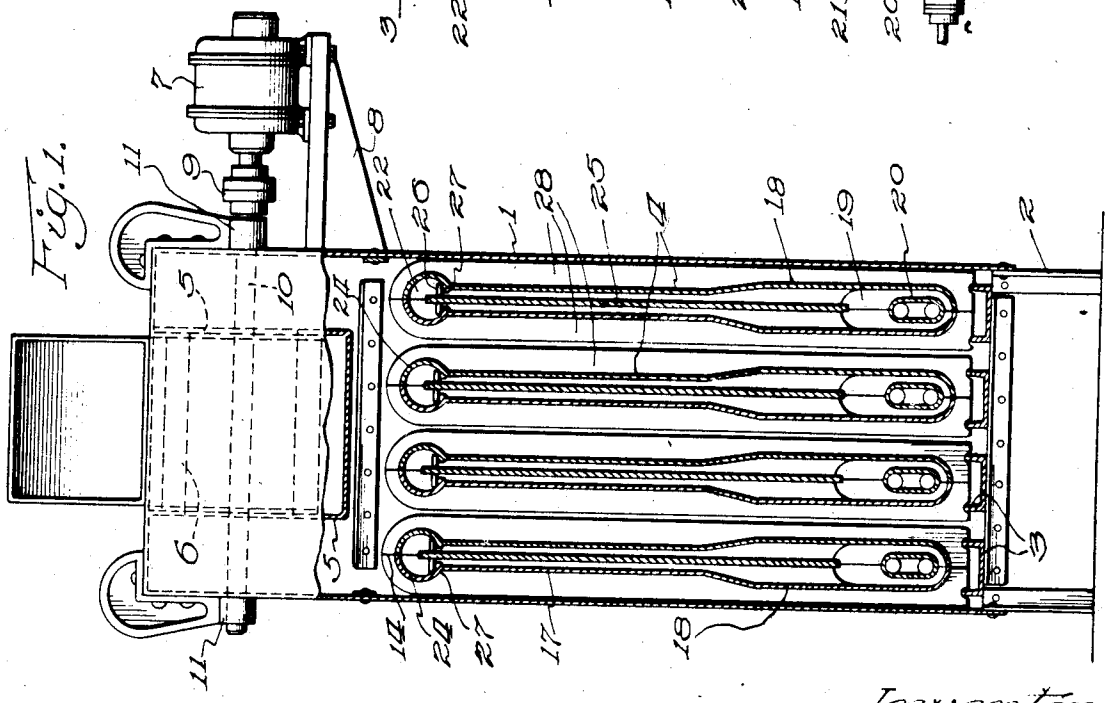


Fig. 1.

Inventor
Gustave Bluemel.
Rummler, Rummler
& Woodworth Attys.

Patented Jan. 31, 1933

1,895,966

UNITED STATES PATENT OFFICE

GUSTAVE BLUEMEL, OF CHICAGO, ILLINOIS, ASSIGNOR TO DRYING SYSTEMS, INC., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

AIR HEATER

Application filed July 23, 1931. Serial No. 552,602.

This invention relates to air heaters of the type described in the application of Gustave Bluemel, Serial No. 473,349, filed August 6, 1930, which heater consists of a plurality of hollow, flat elements of large area arranged in a parallel series and spaced apart so that the air to be heated may pass between the elements in contact with the surfaces thereof. Each element is equipped at its lower end with a burner and at its upper end with an outlet for the products of combustion. Combustion takes place in the lower end of each element and the gases of combustion then travel upwardly therethrough in sheet-like form, wiping against the inner surfaces of the walls of the heating units and in this manner transferring heat through the walls of the units to the currents of air exterior thereof.

It has been found that such a heat transferring device may be improved as to efficiency and uniformity of distribution of the heat by inclusion, in each heating unit thereof, of an element for the absorption of heat in large quantities and the radiation thereof to the side walls of the unit. By this means it is possible to reduce the number of heat transfer units required for performing a given quantity of work by the construction described in the above mentioned application for patent.

It is therefore the object of this invention to increase the efficiency of the type of air heaters to which this invention relates and to provide therein for more even transmission and distribution of a large amount of the heat by radiation.

The object of the invention is accomplished by means of a construction illustrated in the drawing wherein:

Figure 1 is a front view of the air heater, with the casing partly broken away and shown in section, and the heat elements and their supports also shown in section, as indicated by the line 1—1 of Fig. 2.

Fig. 2 is a longitudinal sectional view of the heater.

Fig. 3 is a plan view of some of the heating elements, one of said elements being shown in section, and the casing is in section, as indicated by the line 3—3 of Fig. 2.

This heat interchanger, like that described in the copending application for patent, includes a plurality of flat, hollow elements in parallel relation and spaced apart within a casing or conduit for the air to be heated, which flows upwardly between these elements. Each heating element is formed to provide for the combustion of a fluid fuel at its lower end and with a suitable intake for air for combustion, and at its upper end with an outlet flue communicating with a stack.

Heat is transmitted to the walls of each unit by convection currents of the gases of combustion and is conducted through the walls to radiating fins over which the air to be heated is drawn or blown by an air blower. The present construction differs from the former by providing each unit with an additional heat absorbing and radiating element in the form of a heavy metallic plate, suspended centrally within each unit between the parallel heat receiving and transmitting side walls of the unit.

The hot gases of combustion therefore give up their heat to the center plate as well as the outer walls of the unit and the center plate transmits the heat so received by radiation to the final heat transmitting surfaces. In this manner these surfaces receive heat both by the usual convection currents and by radiation from the central plate.

Referring to the drawing the construction illustrated includes a casing 1 supported by feet 2 and having at its lower end transverse horizontally disposed channel bars 3, upon which are supported heating elements 4. These are arranged in parallel relation and spaced apart sufficiently to provide space for the upward travel of air to be heated along the outer walls of the units to the inlets 5 of a blower 6 mounted within the upper end of casing 1. The blower is driven by a motor 7 supported upon a bracket 8, and coupled at 9 to the blower shaft 10. Bearings 11 for the latter are carried by casing 1.

The heating units to which the present invention particularly relates are for conven-

ience in casting each formed with a pair of exteriorly ribbed side plates 12, the marginal surfaces of which are flanged inwardly, to provide for the top, bottom and end walls of each unit.

These marginal flanges 13 meet at the dividing lines 14 and the two sections of each heat element are clamped together by bolts 15 passing through the projecting ears 16, on each half of a unit. The side walls 17 of each unit are formed to be farther apart at the lower end 18 thereof to provide a combustion space 19 in which may be located a gas burner 20.

The gas burner extends through an opening 21 for air left in the bottom of each unit. Each unit is also provided with an opening 22 at its upper end which serves as an outlet to a stack for the products of combustion. Each outlet 22 is preferably surrounded by flanges 23 extending from the heater units and to which may be attached flues leading to a stack. The walls of each unit at the upper end thereof are preferably rounded outwardly as indicated at 24, to provide suitable carrying capacity of the gases of combustion to the outlets 24.

Heat absorbing and radiating plates 25 extend parallel to the side walls 17 of each unit and centrally therebetween. These elements are in the form of heavy metallic plates of suitable material for withstanding the effects of heat and the action of the gases of combustion, and are conveniently suspended in this location by transverse pins 26 passing therethrough and resting upon the shoulders 27, on the inner surfaces of the side walls of the heating units.

In the operation of this heater, the air to be heated is drawn upwardly between the units and between the fins 28 thereof, by the blower 6. The heat from the burning gas from the burner 20 in each unit is transmitted to the walls 17 of each heater unit by direct contact of flame and gases of combustion, and the radiating plate 25 is also heated in this manner and transmits its heat by radiation to the walls 17, by which it is conducted to the outer surfaces thereof and to the ribs 28 over which the air to be heated passes. The plates 25 serve to largely increase the efficiency of this heater, enabling a reduction in the number of heating elements for any required delivery of heat, with reference to this device when not equipped with the heat radiating plates 25.

It is also found that these plates serve to more uniformly distribute the heat throughout the apparatus.

The dimensions of each heater unit and the plate 25 therein are such as to provide passageways for the gases of combustion of considerable width and length, with reference to the extent of separation between the sides of said plates and the side walls 17 of the heater units.

It is to be understood that details of the construction shown may be varied without departing from the spirit of this invention as defined by the following claim.

I claim:

In a heat interchanger, a heat transferring unit consisting of a walled structure having parallel side walls of large area with reference to marginal end connecting walls, a heat absorbing and radiating plate hung in said structure to extend between and parallel with said side walls but slightly spaced therefrom, said walled structure being formed to provide an inlet at one end and an outlet at the other end, and means for supplying heat to the inlet end of said structure.

Signed at Chicago this 18th day of July, 1931.

GUSTAVE BLUEMEL.