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54 **Radiant plaque heater.**

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Description

This invention relates to a radiant plaque heater of the kind having a burner arranged to heat a plaque element from which radiant heat is emitted into a space to be heated, such as a factory working area.

US-A-4524753 discloses a radiant plaque heater in which a plaque element is arranged within the casing so as to be heated by a burner, and air flow means induces a flow of air into the casing creating an over-pressure therein which inhibits air flow from the exterior into the casing adjacent the plaque.

The efficiency of some conventional plaque heaters is relatively low, typically less than 30%, because much of the heat produced by the burner is carried away in the burner exhaust gases. An object of the invention is to provide an improved radiant plaque heater of relatively increased efficiency.

According to the present invention, a radiant plaque heater comprises a casing, a burner, a plaque element arranged within the casing so as to be heated by the burner and produce a radiant heat output, and air flow means operable to induce a flow of air into the casing in order to create an over-pressure therein which inhibits air flow from the exterior into the casing adjacent the plaque, and a heat exchanger arranged to receive burner exhaust gas and said air flow in heat exchange relationship in respective separate flow paths therein, an outlet of the heat exchanger being arranged to introduce heated air emitted therefrom into a location from which the heated air serves to transmit heat to the plaque element to assist in raising the temperature of the latter.

Conveniently, the air flow induced into the heater passes through a flow distributor which controls the induced air flow, preferably in a variable manner, and thereby the over-pressure in the casing.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 is a diagrammatic side elevation of one form of the radiant plaque heater of the invention; Figure 2 is a view of the heater of Figure 1 from the opposite side, and

Figure 3 is an end view of the heater of Figures 1 and 2.

The radiant plaque heater illustrated in the drawings includes an outer hollow casing 1 which supports, adjacent to an open end 2 thereof, a radiant plaque element 3 and a burner 4 arranged to direct burning fuel, such as gas, over and/or into the interior of the plaque to heat the latter. The heated plaque radiates heat outwardly through the open end 2 of the casing. The open end of the casing is flared outwardly by the provision of an oblique peripheral surface 2A which acts as a reflector to direct radiant heat from the plaque downwards and thereby minimise sideways heat loss. The flared casing portion also forms a

space beneath the plaque within which a slight positive air pressure may exist. Air flow means, illustrated as a fan 5, is mounted on the casing and, although conveniently shown at the top of the casing, could be disposed at any convenient location. The fan, when operating, draws in air and injects this under a small pressure into the interior of the casing 1, the air flow being controlled by means of a flow distributor, illustrated as a perforated plate 6 which may be adjusted to vary the flow rate of the air entering the casing.

As will be seen more clearly from Figure 3, the casing in this embodiment of the plaque heater contains a heat exchanger, illustrated diagrammatically and in a general manner at 7. The heat exchanger contains a first convoluted flow path, branches of which are illustrated at A and a second convoluted flow path having branches B, the paths A and B being separated in fluid tight manner by partitions 8. An outlet from the path B communicates with an exhaust port 9 of the casing (fig 2) and the flow of exhaust gas through the heat exchanger to the exhaust port is represented by the arrows B in Figure 2. The path A of the heat exchanger communicates with a region 10 adjacent the burner for introduction of gas flow on to the plaque 3, as illustrated by the arrows A in Figure 1.

In operation, the plaque 3 is heated by the burner 4 and radiates heat through the open end 2 of the casing 2 as mentioned previously. The exhaust gases from the burner, represented by the arrows E rise within the casing into the exhaust flow path B within the heat exchanger. Operation of the fan 5 produces an inflow of air to the casing 1 through the flow control plate 6, which is adjusted to provide the desired air flow. The inflow of air enters the path A of the heat exchanger and, in flowing along this path, extracts heat from the exhaust gases in path B and is thereby heated. The heated air is then introduced at a relatively high temperature into the aforesaid region 10 and assists in raising the temperature of the radiant plaque 3.

The action of the fan 5 creates within the housing 1 a slight over-pressure, the magnitude of which can be optimised by adjustment of the plate 6 and/or the fan speed. Because of the flared casing end portion, the aforesaid over-pressure exists beneath the plaque and inhibits any tendency for air to be drawn inwardly through the open end 2 of the casing and thereby substantially prevents the radiant plaque 3 from being contacted by an upward inflow of cool air which would have the effect of cooling the plaque and lessening the efficiency of the heater.

Tests have shown that the heater of the invention in the form described incorporating a heat exchanger can achieve an efficiency approaching 50% of the energy input, measured as radiant heat output, in comparison with an efficiency of less than 30% obtained in many conventional radiant plaque heaters.

The heat exchanger may be demountable, or in the form of an add-on module which may be attached, when required, to an existing radiant plaque heater.

It will be understood that the various components such as the radiant plaque, fan and heat exchanger may be of any appropriate type and arranged in ways possibly differing from the particular arrangement illustrated.

Claims

1. A radiant plaque heater comprising a casing (1) a burner (4), a plaque element (3) arranged within the casing so as to be heated by the burner and produce a radiant heat output, and air flow means (5) operable to induce a flow of air into the casing in order to create an over-pressure therein which inhibits air flow from the exterior into the casing adjacent the plaque, characterised by a heat exchanger (7) arranged to receive burner exhaust gas and said air flow in heat exchange relationship in respective separate flow paths (A, B) therein, an outlet of the heat exchanger being arranged to introduce heated air emitted therefrom into a location (10) from which the heated air serves to transmit heat to the plaque element (3) to assist in raising the temperature of the latter.
2. A heater according to Claim 1, characterised in that the air flow induced into the casing (1) passes through a flow distributor (6) which controls the induced air flow and thereby the over-pressure in the casing.
3. A heater according to Claim 2, characterised in that the flow distributor (6) is operable to vary the induced air flow.
4. A heater according to Claim 2 or Claim 3, characterised in that a mouth (2) of the casing through which the radiant heat output is directed is provided with a divergent peripheral surface (2A) which acts as an inward deflector for the radiant heat.
5. A heater according to Claim 1, characterised in that one of the heat exchanger paths (B) receives exhaust gases from the burner (4) and has an outlet which communicates with an exhaust port (9) of the casing, the other path (A) having an inlet for air from said air flow means (5) and an outlet from which emerging heated air is directed onto or into the plaque element (3) to assist in raising the temperature of the latter.
6. A heater according to any one of the preceding claims, characterised in that the casing (1) is pro-

vided with an exhaust port (9) for egress of burner exhaust gases.

Patentansprüche

1. Heizplattenstrahler, der ein Gehäuse (1), einen Brenner (4) und ein Plattenteil (3) umfaßt, das innerhalb des Gehäuses so angeordnet ist, daß es von dem Brenner geheizt wird und eine Heizstrahlenabgabe produziert, und Luftstrommittel (5), die dazu geeignet sind, einen Luftstrom in das Gehäuse zu induzieren, um einen Überdruck darin zu schaffen, der einen Luftstrom von außen in das an der Platte anliegende Gehäuse hemmt, dadurch gekennzeichnet, daß ein Wärmeaustauscher (7) so angeordnet ist, daß er Brennerabgas und den Luftstrom im Wärmeaustauschverhältnis in jeweils getrennten Durchflußwegen (A, B) hierin aufnimmt, und daß ein Abführkanal des Wärmeaustauschers so angeordnet ist, daß er hiervon abgegebene erwärmte Luft in eine Örtlichkeit (10) einleitet, von der die erwärmte Luft aus dazu dient, Wärme auf das Plattenteil (3) zu übertragen, um dazu beizutragen, die Temperatur des letzteren zu erhöhen.
2. Heizgerät gemäß Anspruch 1, dadurch gekennzeichnet, daß der in das Gehäuse (1) induzierte Luftstrom durch einen Stromverteiler (6) fließt, der den induzierten Luftstrom und hierdurch den Überdruck in dem Gehäuse steuert.
3. Heizgerät gemäß Anspruch 2, dadurch gekennzeichnet, daß der Stromverteiler (6) dazu geeignet ist, den induzierten Luftstrom zu ändern.
4. Heizgerät gemäß Anspruch 2 oder 3, dadurch gekennzeichnet, daß eine Öffnung des Gehäuses, durch die die Heizstrahlenabgabe geleitet wird, mit einer divergierenden Umfangsfläche (2A) vorgesehen ist, die als nach innen gerichteter Ablenker für die Heizstrahlung agiert.
5. Heizgerät gemäß Anspruch 1, dadurch gekennzeichnet, daß einer der Wärmeaustauscher-Durchflußwege (B) Abgase von dem Brenner (4) aufnimmt und er einen Abführkanal hat, der mit einem Auspuffkanal (9) des Gehäuses verbunden ist, wobei der andere Durchflußweg (A) eine Einführleitung für die Luft von den Luftstrommitteln (5) und einen Abführkanal hat, von dem aus austretende aufgewärmte Luft auf oder in das Plattenteil (3) geleitet wird, um dazu beizutragen, die Temperatur des letzteren zu erhöhen.
6. Heizgerät gemäß irgendeinem der vorherigen Ansprüche, dadurch gekennzeichnet, daß das

Gehäuse (1) mit einem Auspuffkanal (9) für den Abzug von Brennerabgasen vorgesehen ist.

6. Chauffage selon l'une quelconque des revendications précédentes, caractérisé en ce que le boîtier (1) est muni d'un orifice d'évacuation (9) pour évacuer les gaz d'échappement du brûleur.

Revendications

1. Chauffage à plaque radiante comprenant un boîtier (1), un brûleur (4), un élément en forme de plaque (3) disposé à l'intérieur du boîtier de façon à être chauffé par le brûleur et à émettre une énergie thermique rayonnante, ainsi qu'un moyen d'écoulement d'air (5) qui peut être mis en service pour induire un écoulement d'air dans le boîtier afin de créer une surpression à l'intérieur qui empêche l'écoulement d'air provenant de l'extérieur dans le boîtier en position adjacente à la plaque, caractérisé par un échangeur de chaleur (7) disposé en son sein pour recevoir les gaz d'échappement du brûleur et ledit écoulement d'air dans une relation d'échange de chaleur dans des voies d'écoulement séparées respectives (A, B), une sortie de l'échangeur de chaleur étant arrangée pour introduire de l'air chauffé émis par ce dernier dans un endroit (10) à partir duquel l'air chauffé sert à transmettre de la chaleur à l'élément en forme de plaque (3) pour favoriser l'élévation de la température de ce dernier.
2. Chauffage selon la revendication 1, caractérisé en ce que l'écoulement d'air induit dans le boîtier (1) passe par un distributeur d'écoulement (6) qui commande l'écoulement d'air induit et ainsi, la surpression régnant dans le boîtier.
3. Chauffage selon la revendication 2, caractérisé en ce que le distributeur d'écoulement (6) peut être mis en service pour faire varier l'écoulement d'air induit.
4. Chauffage selon la revendication 2 ou 3, caractérisé en ce qu'un orifice (2) du boîtier, à travers lequel est dirigée l'énergie thermique rayonnante, est muni d'une surface périphérique divergente (2A) qui fait office de déflecteur vers l'intérieur pour la chaleur rayonnante.
5. Chauffage selon la revendication 1, caractérisé en ce qu'une des voies (B) de l'échangeur de chaleur reçoit des gaz d'échappement provenant du brûleur (4) et comporte une sortie qui communique avec un orifice d'évacuation (9) du boîtier, l'autre voie (A) comportant une entrée pour l'air provenant dudit moyen d'écoulement d'air (5) et une sortie à partir de laquelle l'air chauffé qui s'échappe est dirigé sur ou dans l'élément en forme de plaque (3) pour favoriser l'élévation de température de ce dernier.

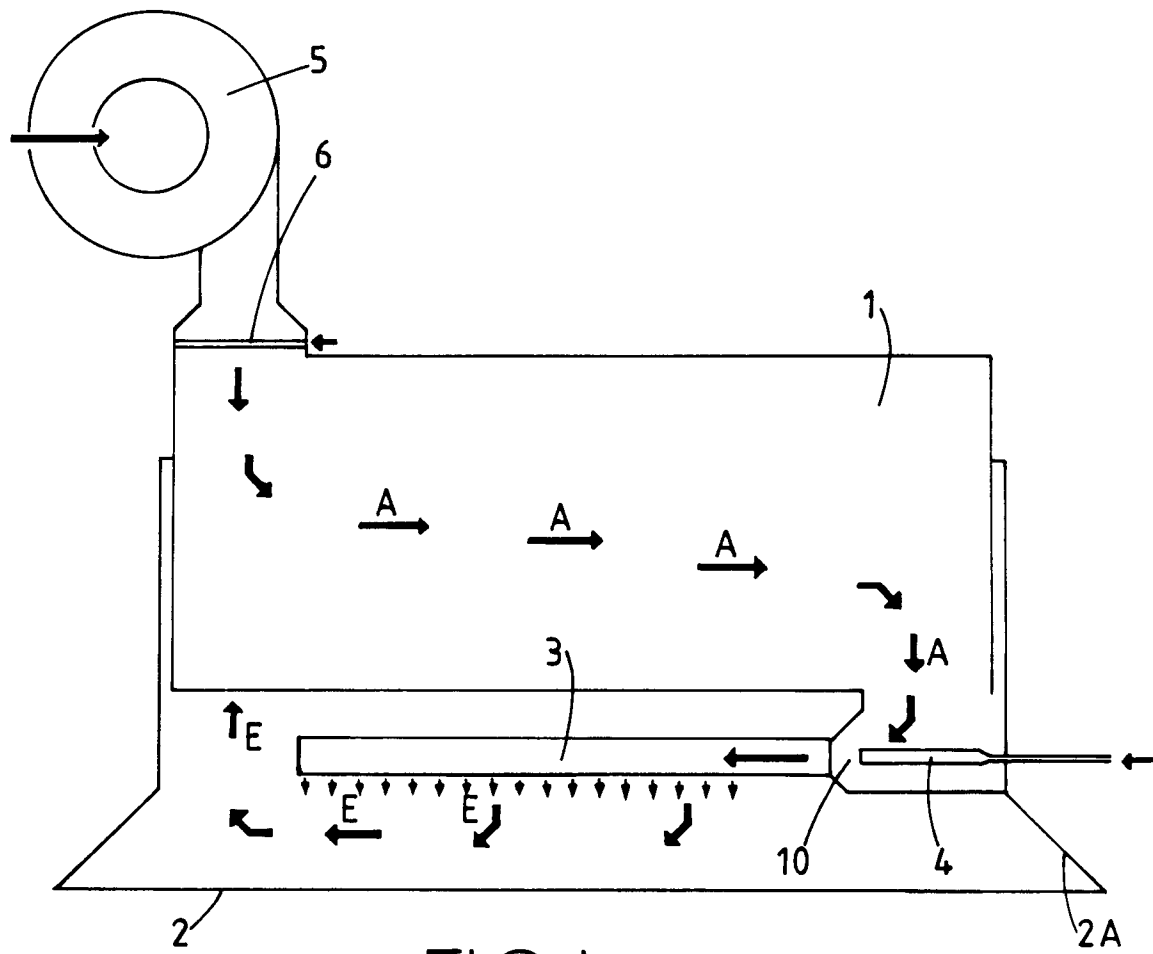


FIG. 1.

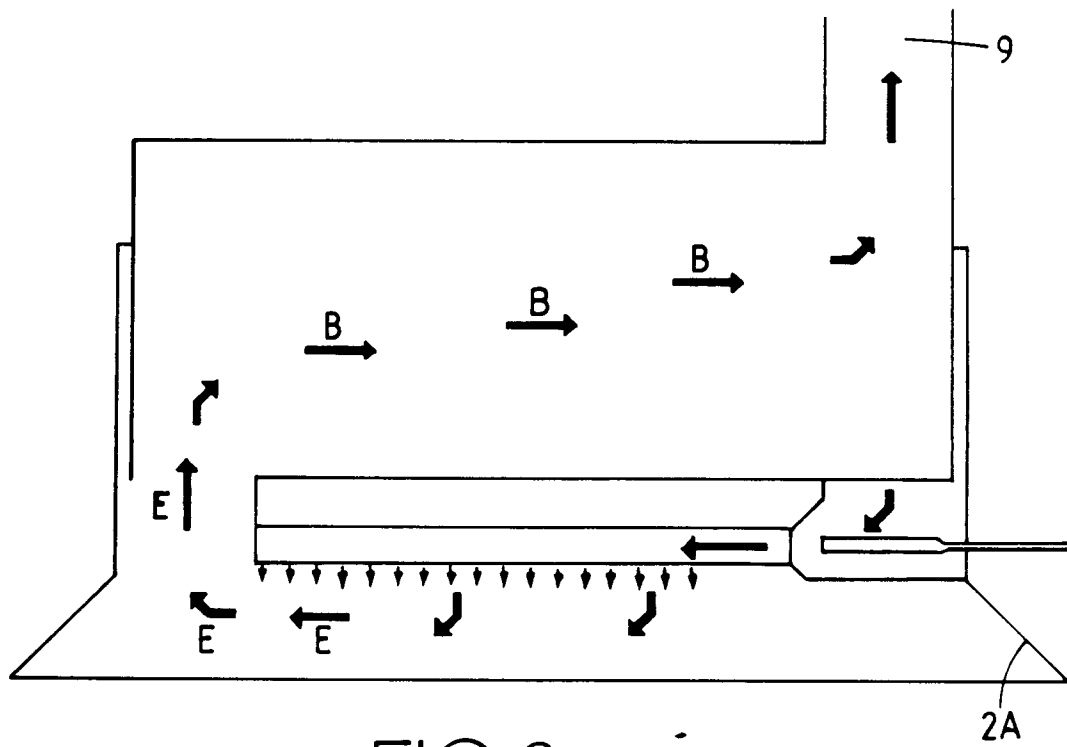


FIG. 2.

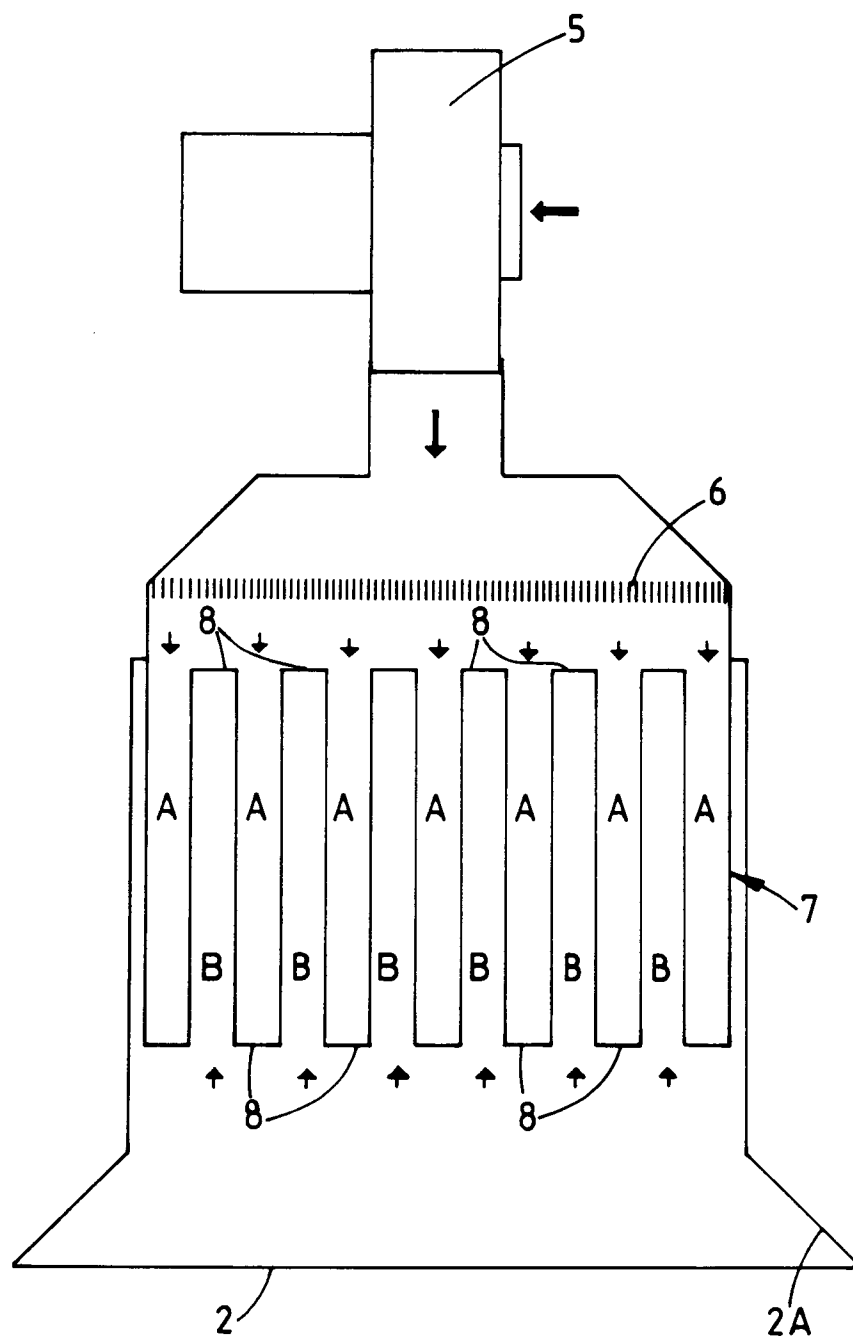


FIG. 3.