United States Patent

[11] 3,552,378

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[54] **GAS PANEL OF INFRARED RADIATION**
9 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **126/92,** 431/278, 431/328
[51] **Int. Cl.** **F23d 13/12,** F24c 3/04
[50] **Field of Search** 126/85, 92, 92B, 92RC, 92C; 431/191, 192, 278, 283, 285, 286, 328, 329

[56] **References Cited**

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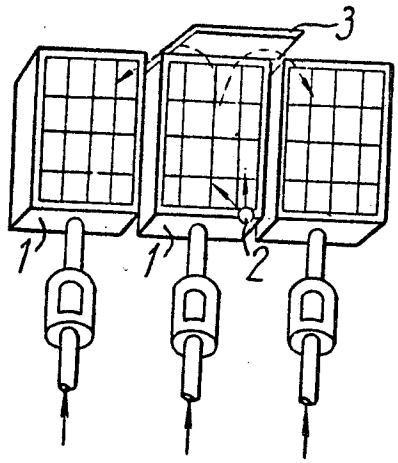
ABSTRACT: A gas panel for infrared radiation comprises a gas supply conduit to which are connected infrared burners in substantially horizontal rows. An ignition device is secured to a burner in one of the rows and screens are mounted in that row of burners over at least every second burner in the path of ascending flow of combustion products, so that in the process of firing the burners of the panel the flame is directed to adjacent burners for ignition thereof. The burners may be horizontal or vertical or in a mixed arrangement, and they may be slightly staggered in each row. The screens can be flat or curved and in the latter case, the concave surfaces of the screens face the burners.



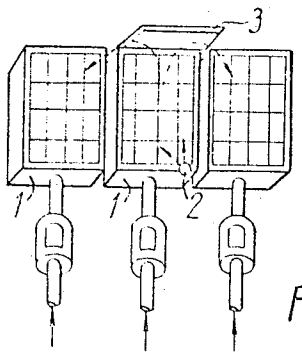


FIG. 1

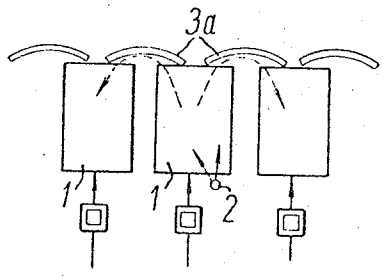


FIG. 2

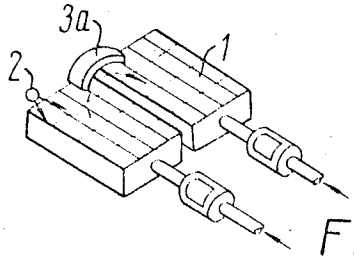


FIG. 3

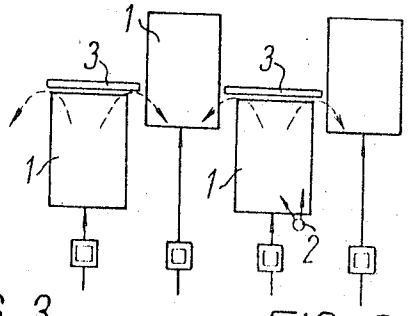


FIG. 5

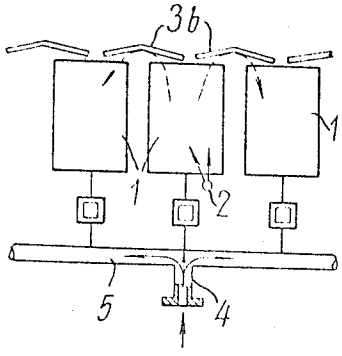


FIG. 4

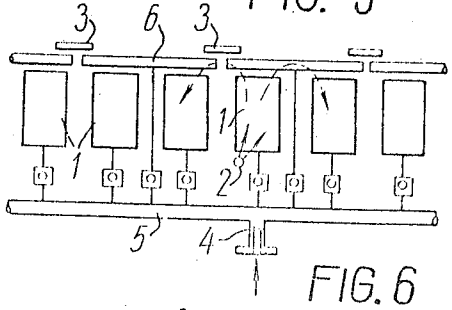


FIG. 6

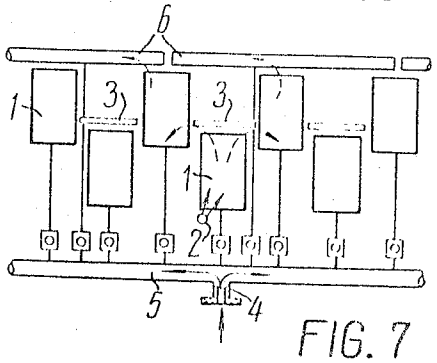


FIG. 7

GAS PANEL OF INFRARED RADIATION

The present invention relates to gas panels of infrared radiation.

The panels of the present invention are most advantageous in heating wagons and other vessels intended for transportation or the periodic placing therein of freezing cargoes, for instance, coal.

In well-known gas panels of infrared radiation each burner has an electric igniter, and means of control and inspection, which usually results in the design of the panels being complicated, and their operation unreliable.

Some panel designs have one or several auxiliary burners to start the main burners in case of their spontaneous extinction.

The operation of these panels create problems relating to the location of the auxiliary burners which limit the number of the main burners in the panel. And these auxiliary burners operate only when the main burners are off.

An object of the present invention is to eliminate these problems and provide a gas-fired infrared radiant panel, wherein a relatively large effective area of the panel is combined with all the burners serving as main burners, the number of the means of ignition, control and inspection being minimum, and the operation of the panel being dependable.

In accordance with the above-mentioned object of the invention, a gas panel of infrared radiation is proposed wherein burners are arranged in substantially horizontal rows, one ignition device being available for several burners.

According to the invention, in the row of burners which is fitted with an ignition device, mounted over the burners, at least over every second burner, are provided with screens located in the path of the upward flow of combustion products for directing the flame of the operating burners towards the adjacent burners to be fired.

It is preferable to make the screens in the form of plates located across the direction of movement of the upward flow of combustion products.

Taking into account relatively wide intervals between the adjacent burners, it is advisable to locate each screen so that it covers the gap between adjacent burners. Also it is advantageous to have the screen bent so that it has a concave surface facing the burners.

It is advisable that the pipe feeding gas to the distribution header be located near the burners provided with igniters.

If part of the burners in the panel have horizontally elongated nozzles, it is preferable to locate these burners so that they are adjacent to a row of burners with vertically elongated nozzles. In this case, it is desirable to locate the screens at the rows of burners with horizontally elongated nozzles.

An essential advantage of the present invention lies in the fact that a significant simplification of the panel design is realized along with an increased dependability in the operation thereof.

Following is a description of several embodiments of the present invention with reference to the accompanying drawing, wherein:

FIG. 1 is a schematic view of a part of a vertically mounted gas panel made according to the invention;

FIG. 2 is an embodiment of the vertically mounted panel wherein the burners are spaced at some distance from one another;

FIG. 3 is an embodiment of a horizontally mounted panel;

FIG. 4 illustrates the gas supply system of the panel;

FIG. 5 is an embodiment of the panel with a staggered location of the burners; and

FIGS. 5, 6, 7 are embodiments of a panel with a part of the burners having horizontally elongated nozzles.

The essence of the invention will become more fully apparent from a consideration of the following exemplary embodiment of a vertical panel of infrared radiation, part of which is diagrammatically represented in FIG. 1 showing three burners 1 of infrared radiation, the tips of which are elongated in the vertical direction.

The middle burner is fitted with igniter 2. Placed over this burner in the path of the outgoing flow of combustion products is a screen 3 in the form of a flat plate extending beyond the nozzle. When the igniter is fired, a microexplosion of the gas-air mixture at the nozzle of the middle burner takes place; the shock wave encounters the screen placed across the direction of movement of the ascending combustion products, and is thus reflected therefrom, the flame shifting to adjacent burners 1 and firing them.

Flat screens 3 are preferably placed over every other burner, with relatively small distances between the adjacent burners.

When spacing the adjacent burners 1 at relatively large distances from one another (FIG. 2), screens 3*a* are placed so that one end of the screen should be over one burner 5, and the other end-over another burner adjacent to the first one. In this case, the screens are of a bent shape, their concave surfaces facing the burners. The flame is reflected directionally (as a light beam from a spherical mirror). The igniter is fixed in the middle burner.

In horizontally mounted panels (FIG. 3) screens 3*a* are also located in the path of the ascending combustion products and cover the gaps between the adjacent burners 1. In this case, the screens are mainly located parallel to the burner nozzles.

In the embodiment of the panel pipe 4 (FIG. 4) supplying gas to piping 5, which distributes gas to burners 1, it is expedient to locate screens 3*b* approximately opposite the middle of the panel, and the ignition device 2 is mounted in the burner disposed centrally with respect to the rest of the burners.

Such a design of the panels provides conditions for reliable firing of the burners (the flame and gas flows will spread in parallel directions and substantially simultaneously).

Screens 3*b* (FIG. 4) are made of bent plates.

When the burners are located on the panel in a staggered order (FIG. 5), screens 3 are placed over the lower burner (in between the upper burners).

The edges of the screen plates are in this case positioned close to the upper burner nozzles to secure reliable flame reflection from one burner to another.

If in a vertically mounted panel, some burners 6 (FIGS. 6, 7) have horizontally elongated nozzles, and other burners 1 have vertically elongated nozzles, the screens 3 are placed over burners 6 (FIG. 6) when burners 1 are arranged in straight rows, or over burners 1 (FIG. 7) when the latter are arranged according to a staggered order. But in all cases, the positioning of the screens is defined by the requirement to secure reliable firing of the burners with a minimum number of screens and with at least one igniter.

Referring in greater detail to FIG. 6 therein is seen a row of vertical burners 1 surmounted by horizontal burners 6, each horizontal burner extending above two vertical burners. All the burners are supplied with gas from a common piping 5. The screens 3 extend over the gaps between adjacent burners 6 and serve to fire adjacent horizontal and vertical burners as shown in FIG. 6 when igniter 2 is ignited.

The arrangement in FIG. 7 differs from that in FIG. 6 only by the vertically staggered arrangement of the burners 1 and the placement of the screens 3 over respective burners 1.

We claim:

1. Apparatus comprising a plurality of burners, means for supporting said burners adjacent one another, one of said burners including ignition means for igniting a gas supplied to said one burner, and reflecting means for reflecting combustion products issuing from said one burner to said burners adjacent said one burner for igniting gas supplied to adjacent burners, said reflecting means including a plurality of reflecting elements spaced from one another and from said burners for successively reflecting issuing combustion products to adjacent burners.

2. Apparatus as claimed in claim 1, wherein said reflecting elements are constituted by plates having opposite end portions respectively overlying two adjacent burners.

3. Apparatus as claimed in claim 2, wherein said plates each have a concave surface opposing the combustion products issuing from said burners.

4. Apparatus as claimed in claim 1, wherein said reflecting elements are supported opposite at least every second of said burners.

5. Apparatus as claimed in claim 4 wherein said reflecting elements are constituted as plates extending transversely of the direction of ascending flow of combustion products.

6. Apparatus as claimed in claim 4 wherein relatively wide gaps are formed between adjacent burners, each said reflecting elements extending across the gap between adjacent burners.

7. Apparatus as claimed in claim 4 wherein said reflecting elements are bent and have a concave surface facing the burners.

8. Apparatus as claimed in claim 4 wherein said burners are vertically mounted in a first lower horizontal row and are mounted horizontally in a second horizontal row above the first, said reflecting elements extending above the burners in the second row.

9. Apparatus as claimed in claim 4 wherein said burners are vertically mounted in a first lower horizontal row and are mounted horizontally in a second horizontal row above the first, said burners in the first row being staggered vertically, said reflecting elements extending above respective burners in the first row.