May 14, 1929. F. H. WILLCOX 1,713,313

GAS BURNER INSTALLATION

Filed July 10, 1925

Fig. 1

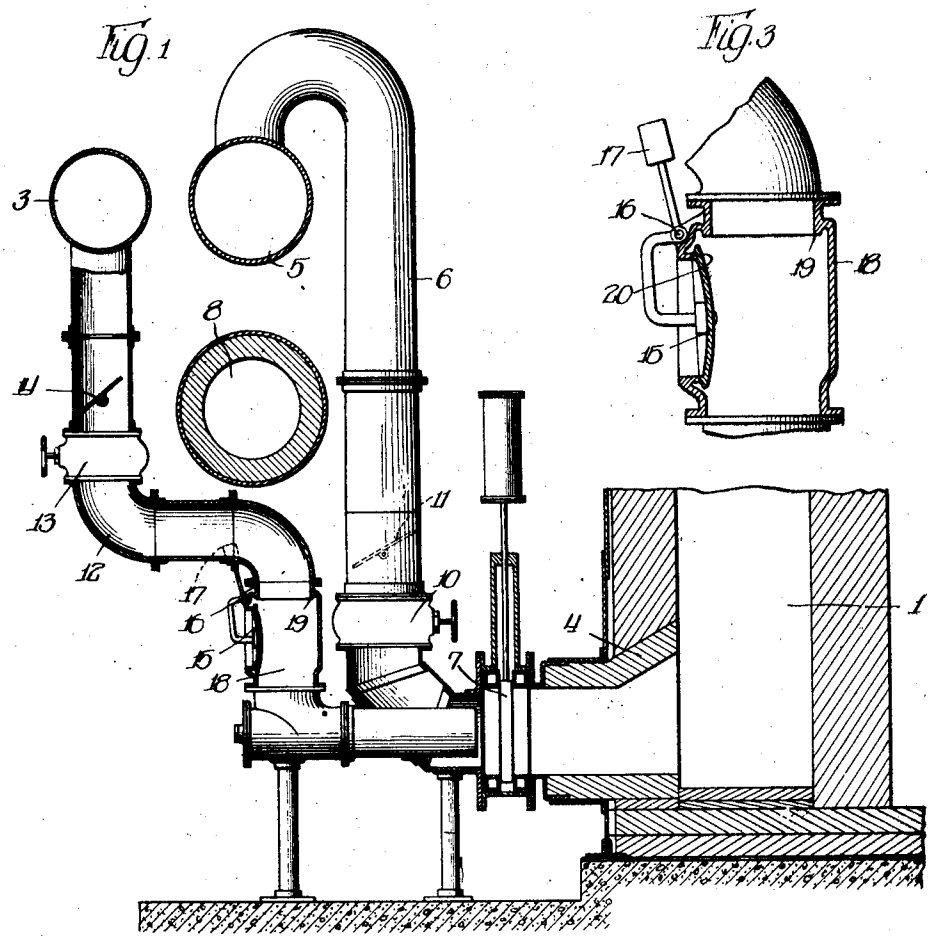
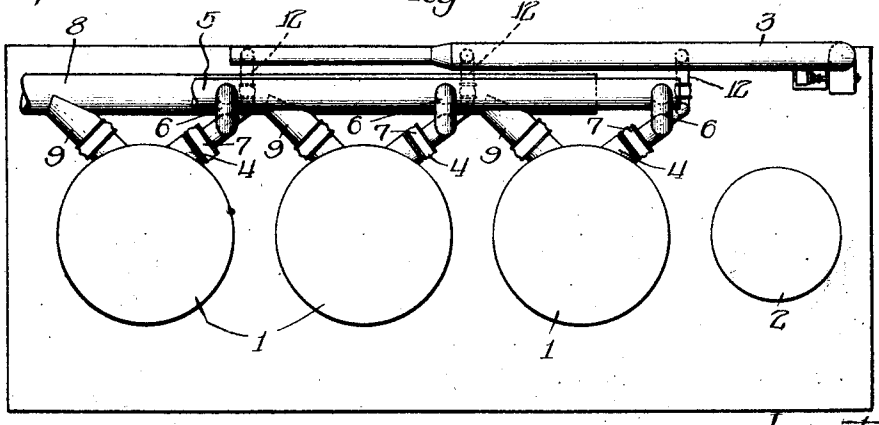


Fig. 3

Fig. 2



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UNITED STATES PATENT OFFICE.

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GAS-BURNER INSTALLATION.

Application filed July 10, 1925. Serial No. 42,624.

The present invention relates to gas burner installations at hot blast stoves, used at blast furnaces.

More particularly, the present invention relates to the arrangement of the valves in connection with a hot blast stove installation, and has for one of its objects the provision of an arrangement for preventing the formation of explosive mixtures with gas.

A further object is to provide a blast furnace installation which in the event of leakage of the valves ordinarily provided will prevent the admixture of the blast furnace gas with the air supply, whereby the danger of explosion is minimized.

A further object is to provide a relief valve arrangement which may be used with blast furnace constructions as now known and used, which relief valve will minimize the danger of explosions.

Further objects will appear as the description proceeds.

Referring to the drawings—

Figure 1 is a diagrammatic view, partly in elevation and partly in section, of a gas burner installation at hot blast stoves of blast furnaces embodying the principles of the present invention;

Figure 2 is a diagrammatic view illustrating a battery of hot blast stoves with their cooperating gas and air mains; and

Figure 3 is a detail view on an enlarged scale showing a relief valve used in the practice of the present invention.

Referring first to the disclosure of Figure 2, the numerals 1—1 indicate hot blast stoves and the numeral 2 indicates a stack. The numeral 3 indicates an air main, which supplies air under pressure to the burners 4—4 of the hot blast stoves 1—1. The numeral 5 indicates a gas main which supplies combustible gas through the pipes 6—6 to said burners 4—4. Admission of air and gas to the hot blast stoves 4—4 is controlled by means of the valves 7—7. The hot blast main is indicated by the numeral 8, which main is connected to the stoves 1—1 through the pipes 9—9.

Referring more particularly to the structure shown in Figure 1, it will be noted that the gas flow or supply to the burner is controlled by the valve 10 and by the butterfly damper 11. The air main 3 directs air to the burner 4 through the pipe 12, which is controlled by the valve 13 and the butterfly damper 14. Disposed in the air pipe 12 is the relief valve 15. Said relief valve 15 is pivotally mounted for movement about the axis 16, the counterweight 17 being provided for tending to swing said relief valve 15 to a position to close communication between the air main 3 and the burner 4, and to open communication between the valve 7 and the atmosphere.

In order to provide a mounting for the relief valve 15, a casting 18 may be provided, having the valve seat 19 adapted for cooperation with the relief valve 15. The casting 18 is also provided with the valve seat 20, providing an opening to the atmosphere, which valve seat 20 is adapted also to cooperate with the relief valve 15. As the parts are viewed in Figures 1 and 3, the counterweight 17 tends to swing the relief valve 15 in a counterclockwise direction, whereby to seat said relief valve upon the valve seat 19 to close communication from the air main 3 and to allow communication with the atmosphere from the valve 7. Movement of said valve 15 is responsive to pressure within the air pipe 12 and air main 3. If pressure should fail within the air main 3, the counterweight 17 will cause movement of the relief valve 15 to its position on the valve seat 19. When a normal pressure is maintained within the air pipe 12, however, the relief valve 15 will be held against the valve seat 20, whereby the passage of air is permitted from the air main 3 and air pipe 12 to the burner 4.

In explaining the operation of the above described embodiment of the present invention, two conditions may be assumed, as follows: (1) In case the stoves 1—1 are on gas and combustion air, the valve 13 will be open, the relief valve 15 will be closed to the atmosphere, (that is, in its position on the seat 20, as shown in Figures 1 and 3), the valve 10 will be open, and the valve 7 will be open. In case the air pressure fails, the relief valve 15 will open to the atmosphere, being urged in a counterclockwise direction by the counterweight 17 to a position on the valve seat 19. Under these conditions communication to the air main 3 will be closed, by reason of the fact that the relief valve 15 is seated upon the valve seat 19. In this event, gas from the gas main 5 will not be permitted to communicate with the air in the air main 3, and an explosive mixture

within said air main 3 will be prevented. (2) In case the stoves are on blast, the valve 13 will be closed, the relief valve 15 will be open to the atmosphere, valve 10 will be closed, and valve 7 will be closed. If valves 7 and 10 should leak, no explosive mixture will be formed inasmuch as air from the stoves finds its way past the relief valve 15 to the atmosphere instead of passing into the gas pipe 6 to form an explosive mixture within said gas pipe 6 and gas main 5.

By reason of the construction described, the danger from failure of pressure in the air supply main and the danger from leaky valves is minimized, whereby the danger from explosions is very greatly reduced.

The showing in the present case is diagrammatic in its nature, and many modifications will occur to those skilled in the art. It is intended to cover all such modifications that fall within the scope of the appended claims and is intended to cover applications to gas-fired steam boilers and to gas-fired heating or melting furnaces.

I claim:

1. In a blast furnace installation, a hot blast stove, a gas supply conduit, an air supply conduit, said conduits leading to a common region, one of said conduits including a casing having a pair of valve seats, and valve means within said casing adapted to cooperate with said two valve seats, said valve when positioned on one of said seats being adapted to close communication between said one conduit and said common region and to open communication between said common region and the atmosphere and in the other of said positions to close communication of the stove with the atmosphere and to open communication between said one conduit and said common region.

2. In a blast furnace installation of hot blast stoves, a hot blast stove, a gas supply conduit, an arm supply conduit, said conduits leading to a common region, one of said conduits including a casing having a pair of valve seats, and valve means within said casing adapted to cooperate with said two valve seats, said valve when positioned on one of said seats being adapted to close communication between said one conduit and said common region and to open communication between said common region and the atmosphere, and in the other of said positions to close communication of the stove with the atmosphere and to open communication between said one conduit and said common region, said valve being responsive to the pressure within said one conduit.

3. A blast furnace installation, comprising a hot blast stove, air supply means and gas supply means therefor, and a relief valve in said air supply means, said relief valve being biased to a position to close communication between said air supply means and said stove, said relief valve being operable in response to the pressure of fluid within said air supply means for opening communication between said air supply means and said stove and for controlling communication of the stove to the atmosphere.

4. In a blast furnace installation, a hot blast stove, a conduit for supplying gas to said stove, a conduit for supplying air to said stove, which conduits lead to a common region, and a relief valve in said air supply conduit, said valve having a pair of alternative positions one for shutting off said air supply conduit and opening communication between said common region and the atmosphere, and the other for opening said air supply conduit and closing communication of the stove to the atmosphere, said valve being responsive to the pressure within said air supply conduit.

5. In combination, a hot blast stove, an air supply main, a gas supply main, conduits connecting said mains with said stove, a valve for controlling communication between said mains and said stove, and a relief valve in the conduit between said air main and said stove, said relief valve having a pair of predetermined positions, one for shutting off communication of the stove with the air main conduit and for opening communication between the stove and the atmosphere, and the other position closing communication of the stove to the atmosphere and opening communication between the corresponding air conduit and said stove.

6. In combination, a hot blast stove, an air main, a gas supply main, conduits connecting said mains with said stove, and a relief valve in the conduit between said air main and said stove, said relief valve having a pair of predetermined positions, one for shutting off communication of the stove with said air main conduit and for opening communication between said stove and the atmosphere, and the other position closing communication of the stove to the atmosphere and opening communication between said air conduit and said stove, said relief valve being responsive to the fluid pressure within said air main conduit.

Signed at Chicago, Illinois, this 7th day of July, 1925.

FREDERICK H. WILLCOX.