

July 4, 1944.

A. L. PASQUIER

2,352,860

GLASS FURNACE

Filed Nov. 27, 1939

2 Sheets-Sheet 1

Fig. 1.

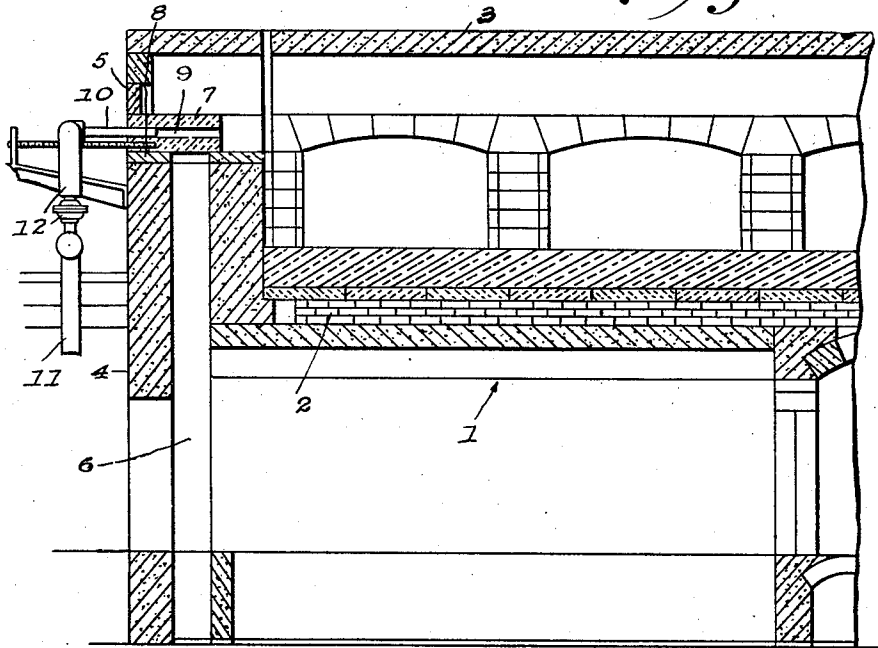
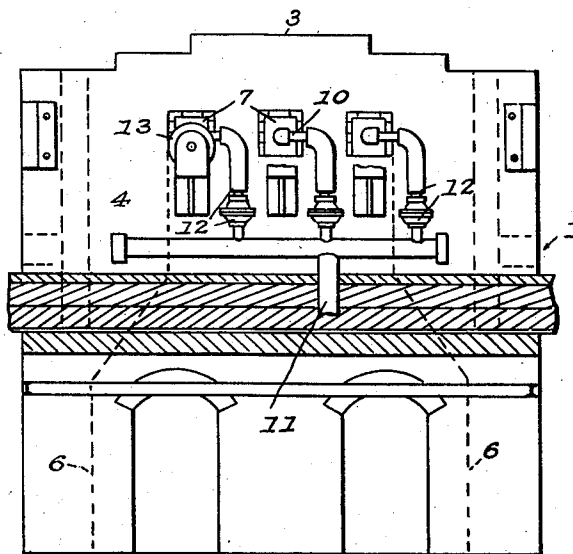


Fig. 2.



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Fig. 3.

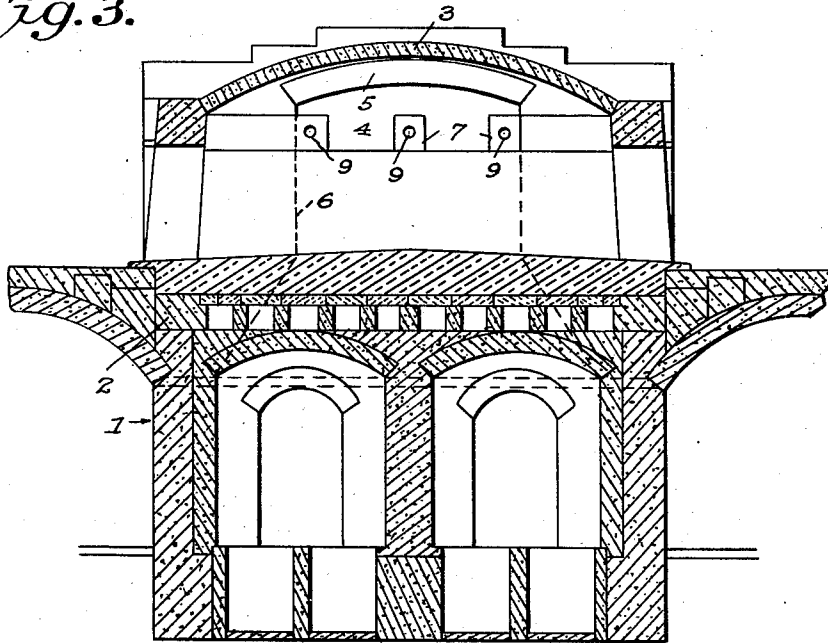
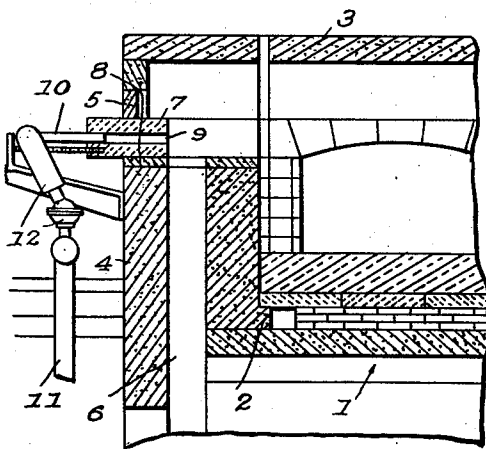


Fig. 4.

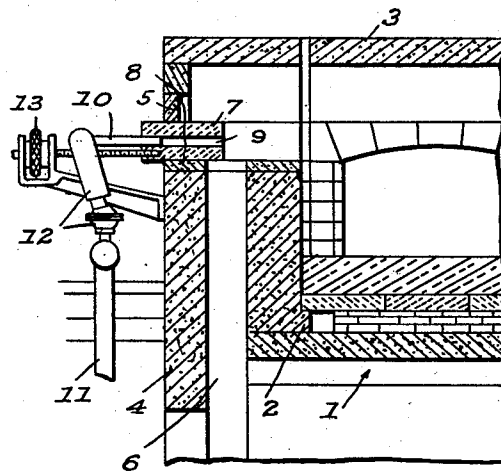


Fig. 5.

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UNITED STATES PATENT OFFICE

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GLASS FURNACE

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Application November 27, 1939, Serial No. 306,375

3 Claims. (Cl. 49—54)

In heating of furnaces by natural or artificial gas with high calorific value, the main problem to be faced is the control of the flame, both in character (oxidizing, reducing, etc.) and in length. This problem is more difficult when the calorific content of the gas is high, i. e., as with natural gas, than when low. With rich gas, an uncontrolled combustion may produce a neutral flame when the amount of air furnished is equal to the amount of air required by the gas to produce a complete combustion, which results in an intense flame, able to burn and melt very quickly the crown, the pots and the refractories of the furnace itself. On the other hand, this flame being neutral, is at the same time non-luminous, which results in a flame of poor heating power for the materials to be melted, especially in the glass furnaces where the melting and the refining of the glass is accomplished principally by radiation. Absence in this neutral flame of tiny particles of carbon which are brought to incandescence and produce a luminous flame having strong radiant heating effects, is the reason a neutral flame, while hot and very often harmful to refractories, does not produce an efficient heat for melting and refining the glass, which is the purpose of the furnaces.

Efforts have been made to produce a soft, lazy or long flame. Many of these schemes are complicated, some going as far as to dilute the gas with inert gas in order to reduce the calorific value of the fuel. In the present invention the flame is controlled not only as to the amounts of gas and air required to produce the desired type of combustion, but the manner in which the gas is admitted to the heated air from the checkers or regenerator is varied to produce the lazy or rolling flame desired.

Further details of the invention will be understood when read in connection with the accompanying drawings, in which:

Figure 1 is a partial longitudinal section of the rear or firing end of a glass furnace, showing the burner block across the checker up-take.

Figure 2 is an elevation of the firing end of the furnace.

Figure 3 is a transverse section of the furnace looking in the direction of the burners.

Figure 4 is a view similar to Figure 1 showing the position of the burner block fully removed from the up-take or checker flue.

Figure 5 is a view similar to Figure 4, but showing the burner block occupying a position intermediate that shown in Figures 1 and 4.

The type of furnace illustrated is a pot furnace,

in which a number of pots are arranged side by side, being inserted and removed transversely of the axis of the furnace, and in which the burners are located at the ends, but it is to be understood that my invention may be used with other types of furnaces.

1 indicates generally the firing end of a glass furnace having the usual bottom 2, crown 3 and end wall 4. This end wall near its top is fashioned to provide the arch 5. Within the furnace wall 4 is the up-take or checker flue 6, the lower end of which is connected to the checker system and the upper end of which opens through the base 8 of the arch.

In the illustrative embodiment herein shown a plurality of spaced burner blocks 7 of a refractory material rest upon the upper surface of the base 8 and are movable transversely of the end wall, and across the upper end of the up-take 6. Each burner block has a bore 9, cylindrical or conical as the type of installation may require, and receives at its rear end a nozzle 10 connected with the fuel supply line 11 through the intermediary of a sliding and universal connection 12 so as to permit a horizontal or vertical movement of the nozzle or a combination of these movements. The combined width of the burner blocks is much less than the width of the flue 6.

Each burner block 7 may be moved by means of an iron bar introduced in the burner hole of the block or from the outside of the furnace by means of individual hand wheels 13 the screws of which are connected to their respective burner blocks.

In starting operations, the calorific value of the fuel is determined together with the necessary amount of air required to produce combustion, the amount of air being insufficient to the quantity required for perfect combustion. Air in the quantity thus indicated is measured under pressure, say, by a diaphragm meter, and after being allowed to expand is passed into the checkers from which it passes into the furnace through the flue 6 and this at a substantially constant rate irrespective of the transverse positions of the blocks. By setting the burner block 7 entirely forward over the up-take 6 leading from the checkers, as shown in Figure 1, the gas issuing from the blocks is projected into the furnace in the direction of movement of the hot air fed thereto by the up-take 6 and a slow, lazy or rolling flame will be produced which can be extended to any practical length of furnace. By moving the block backward to a position where

the up-take 6 is fully uncovered as shown in Figure 4, and the gas is projected across the air issuing from the flue 6, a much more turbulent shorter flame is produced. This type of flame except in some instances, is objectionable in that it produces an unsatisfactory exchange of heat to the glass constituents and will produce a scrubbing action upon and rapid erosion of the furnace walls. By adjusting the burner block 7 to a position intermediate of the extremes shown in Figures 1 and 4, for example, see Fig. 5, a suitable type of flame may be obtained and maintained so that the desired features of a slow, lazy or rolling flame may be extended on the one hand and the erosive action of the shorter and intense flame modified or eliminated on the other hand.

By utilizing the apparatus and the method above described practice has shown a marked increase in the life of the glass melting furnaces and of pot furnaces and the pots contained therein. Similarly, a better refining and melting of the glass is obtained.

What is claimed is:

1. In a glass furnace the combination of a crown and an external wall having a flue therein terminating below the crown of the furnace and containing an air-port opening in the top of the said wall, a hollow burner block mounted on the top of said wall and movable transversely thereof over the open end of said flue to varying extents and means for feeding gas into the cavity of the block.

2. In a glass melting furnace having a crown at the top thereof, an end wall formed with a

flue therein for guiding preheated air to said furnace, said flue terminating below said crown, a burner block mounted at the upper end of said flue and provided with a nozzle extending substantially horizontally for feeding a predetermined amount of combustible gas into the furnace for intermixture with the air, said block being adjustable transversely of said flue to control the point of exit of the combustible gas relative to the air current in its upward travel through said flue and turning toward said crown, whereby a lazy non-erosive flame of desired length is produced extending above and beyond said flue.

3. In a glass melting furnace having a crown at the top thereof, an end wall formed with a wide flue of small depth therein for guiding preheated air to said furnace, said flue terminating below said crown, a plurality of burner blocks mounted at the upper end of said flue and capable of bridging said flue at displaced points along the width thereof, each of said burner blocks provided with a nozzle extending substantially horizontally for feeding a predetermined amount of combustible gas into the furnace for intermixture with the air, said blocks being adjustable transversely of said flue to control the point of exit of the combustible gas relative to the air current in its upward travel through said flue and turning toward said crown, whereby a lazy non-erosive flame of desired length is produced extending above and beyond said flue.

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