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HEAT TREATING FURNACE

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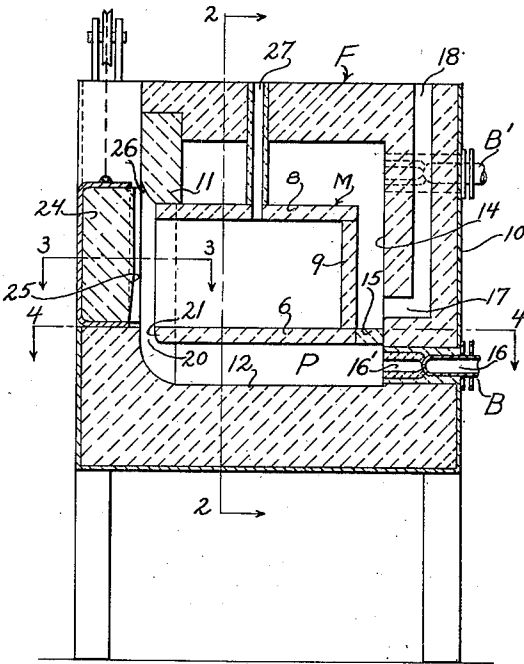


FIG. 1

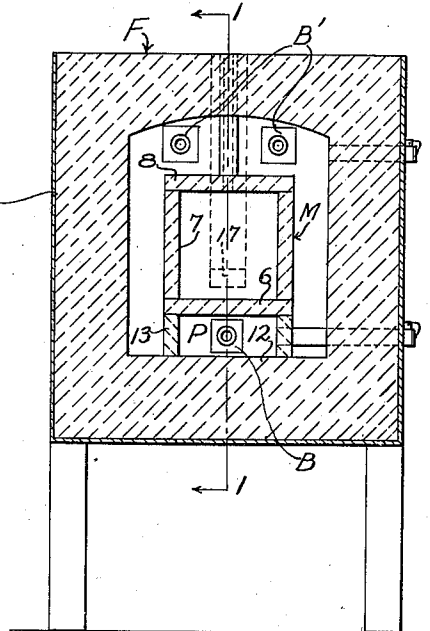


FIG. 2

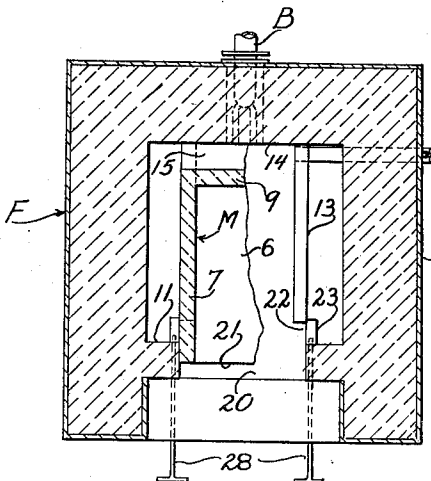


FIG. 4

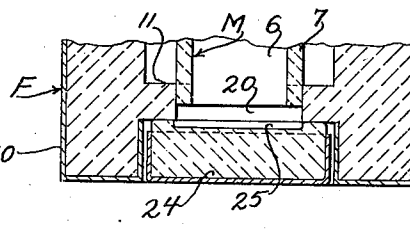


FIG. 3

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HEAT TREATING FURNACE

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8 Claims. (Cl. 263—42)

This invention relates to heat-treating furnaces of the type commonly employed for heat treating tools and the like and has for its object to provide improved ways and means for preventing the inflow of air to the heat-treating chamber.

Referring to the drawing wherein the preferred form of the invention is shown,

Fig. 1 is a vertical longitudinal section through a muffle furnace embodying the invention;

Fig. 2 is a vertical transverse section of the furnace on line 2—2 of Fig. 1;

Fig. 3 is a horizontal cross section on line 3—3 of Fig. 1, and

Fig. 4 is a horizontal section on line 4—4 of Fig. 1, the view showing a slight modification of certain details.

The furnace comprises a chambered refractory structure F wherein is a muffle which is generally indicated at M, and which comprises a floor or hearth 6, side walls 7, a roof 8 and an end wall 9, one end of the muffle being open, the muffle being of refractory material.

The muffle M projects into the chamber of the structure F from one end wall 11 thereof, and is supported above the floor 12 of said chamber by a pair of laterally spaced supports 13 which preferably extend between the front and rear walls 11 and 14, respectively, of the said chamber. A slab 15 is disposed across the supports 13 between the end wall 9 of the muffle and the adjacent wall 14 of the said chamber. It will, therefore, be seen that there is formed a compartment or chamber P below the muffle, the supports 13 forming the side wall of the compartment.

Firing into the compartment P through the rear end wall 14 of the furnace is a gas burner B of a type adapted to burn preformed mixtures of air and gas, the mixture being supplied under pressure from a suitable source of supply. As shown, the burner comprises a nozzle 16 set to discharge into an expansion combustion chamber 16', the burner as a whole being removably positioned in the furnace wall. Burners of this type are well known in the art. Similar burners B' fire into the upper portion of the furnace chamber and the spent gases from the burners B' leave the furnace chamber through a suitable port or ports 17 in communication with an exhaust flue 18 formed in the wall structure of the furnace. The burners B' are the main heating burners for the muffle as will be readily appreciated.

While the burner B which fires into the compartment P serves to heat the floor of the muffle

its primary function is to provide gaseous products of combustion for excluding air from the muffle. Said products of combustion leave the compartment P by way of an elongated port or slot 20 at the front or entrance end of the muffle M, the front wall 11 of the furnace chamber being recessed for that purpose. In other words, the compartment P may be said to extend to a point in advance of the terminal end 21 of the muffle floor whereby to provide the port 20, the port being coextensive in length with the width of the muffle and being relatively restricted in width. The combustion gases from the compartment P will therefore flow upwardly through the port 20 and form, as it were, a gaseous curtain in front of the muffle.

It will be noted that the burner B discharges in a direction toward the port 20 and consequently, even in the absence of the compartment side walls 13, the gases from the burner B would tend to flow towards and exhaust from the port 20 rather than through the exhaust port 17. Moreover, in the absence of the side walls 13 it would merely be necessary to restrict the outlet from the flue 18 to such degree that combustion gases from the burner B (or from the burners B' in the absence of the burner B) would flow through the port 20, it being noted that except for the ports 17 and 20 the furnace chamber surrounding the muffle is closed. However, inasmuch as means must be provided for spacing the muffle floor from the furnace chamber floor, it is preferred to make the supporting means 13 continuous as shown. As shown in Fig. 4, the means 13 may terminate short of the front wall 11 of the furnace to provide side ports 22 for the escape of gas from the compartment P, the effective discharge area of the ports being controlled by movable dampers 23 adapted to be adjusted as by rods 28 extending outside of the furnace. The volume of gases flowing through the port 20 from the burner B may therefore be regulated as desired. It will also be understood that by regulating the proportions of air and gas in the mixture supplied to the burner B the character of the combustion gases and hence the atmosphere in the muffle can be controlled as desired, it being understood that some of the gases flowing from the port 20 will enter the muffle especially when the furnace is provided with a door 24 positioned as shown.

It is preferred to provide a door in front of the muffle, the door being arranged to be moved vertically. The door is recessed on its muffle side to provide an upright channel 25 wherethrough the

gases coming from the port 20 may flow upwardly and out to the atmosphere. It will be noted that the furnace wall adjacent the top of the door cooperates with the door to form a relatively restricted outlet 26. A pressure above that of the atmosphere will therefore tend to prevail in front of the muffle and hence the entry of air into the muffle is effectively prevented. There may be provided a vent 27 from the muffle to insure circulation of gases within the muffle especially when the door 24 is closed. This vent may also serve for the introduction of a pyrometer into the muffle.

What is claimed is:

1. In combination, a furnace chamber, a muffle extending into said chamber, a door spaced from the entrance to the muffle, and means for directing gases from within said chamber upwardly along the muffle side of the door in front of the entrance to the muffle.
2. In combination, a muffle open at one end, means cooperating with the muffle to form a closed chamber underneath the muffle, a burner firing into said chamber, and an outlet from said chamber, said outlet comprising a relatively restricted passage extending transversely across the bottom of the muffle immediately in front of the entrance thereto whereby gases from said chamber will discharge across said entrance.
3. In combination, a muffle open at one end, means cooperating with the muffle to form a chamber therebelow, means for introducing gases under pressure into said chamber, a relatively restricted elongated outlet from said chamber positioned to discharge across the entrance to the muffle, an exhaust passage independent of said outlet, and means for regulating the flow of gases from said chamber to said exhaust passage.
4. In combination, a muffle open at one end, a furnace surrounding the muffle, means dividing the space about the muffle into upper and lower compartments, an exhaust passage from the upper compartment, an outlet from the lower compartment arranged to discharge upwardly across the entrance to said muffle, means for supplying heating gases to the respective compartments,

and means for regulating the degree of communication between said compartments.

5. In combination, a furnace chamber, a muffle in said chamber, a slot substantially as long as the muffle is wide immediately in front of the entrance to the muffle whereby gases from the furnace may flow upwardly in front of said entrance, and a door disposed in front of said entrance, said door being provided with a vertically extending recess in its muffle side to form a passage through which gases may flow away from said entrance.

6. A heat treating furnace comprising in combination, a heating chamber, a passageway at the front communicating with the heating chamber, a combustion chamber separate from the heating chamber but positioned so that the heat of combustion is transmitted to the said heating chamber, and a duct communicating with the combustion chamber and terminating in a narrow transverse slot extending entirely across the said passageway, the said duct serving to conduct the hot gases of combustion from the combustion chamber to the passageway so as to form a moving gaseous curtain at the front of the heating chamber.

7. A furnace as set forth in claim 6, wherein the slot is at the bottom of the passageway and the gases move upward therefrom.

8. The combination in a heat treating furnace, of a heating chamber, a passageway at the front communicating with the heating chamber, a combustion chamber separate from the heating chamber but positioned so that the heat of combustion is transmitted to the said heating chamber, and a duct communicating with the combustion chamber and terminating in a narrow transverse slot extending across the bottom of the passageway so as to form a curtain of upward moving gases at the front of the heating chamber, a recess being formed at the top of the passageway above the duct for receiving the said upward moving gases.

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