

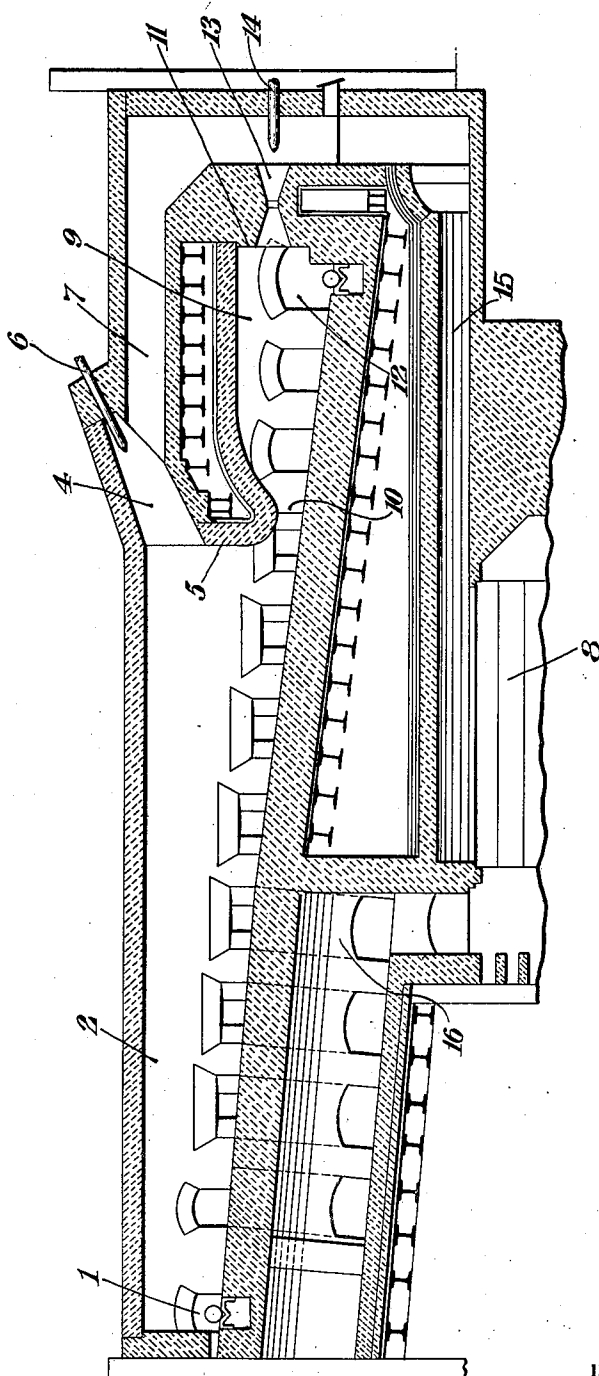
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CONTINUOUS FURNACE

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CONTINUOUS FURNACE

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4 Claims. (Cl. 263—17)

The invention relates to furnaces of the continuous type, i. e. those wherein the material to be heated, for example, billets, ingots, slabs or the like, is continuously introduced at the one end of the furnace, passed through the furnace to bring such material up to the desired temperature, and then discharged from the opposite end of the furnace.

The invention aims primarily to provide such a furnace, or a mode of operating such furnace, according to which material to be heated may be brought more uniformly to the desired temperature without local overheating or undue scaling, and a greater flexibility and control of heating obtained, as well as certain other advantages which will be evident from, or are particularly mentioned in the description hereinafter contained, which description, taken in conjunction with the accompanying drawing, discloses a furnace construction adapted to be operated in accordance with the invention; such disclosure, however, is to be considered as merely illustrative of the principles of the invention. In the drawing—

The single figure is a longitudinal vertical sectional view of a furnace construction adapted to be operated in accordance with the invention.

In accordance with the present invention the material to be heated, after being introduced into the entrance end of a continuous furnace, is passed through a heating chamber which extends partially throughout the length of the furnace, and in which fuel is supplied and burned sufficiently to bring the material up to the desired temperature, which temperature may be, for example, in the neighborhood of 2400° F. for ordinary steel practice.

The material then passes to what may be described as a "soaking" chamber, the primary purpose of which is to supply sufficient heat to the material to maintain it at such desired temperature and permit the heat to become uniformly distributed throughout the mass of the billet or the like which is being heated, although it will be understood that the above mode of operation may be only substantially carried out; in other words the temperature of the material may be somewhat elevated in the "soaking" chamber in case it has not fully attained the desired heat in the heating chamber.

The main advantage of a continuous furnace constructed and operated as above described, is that a hotter flame may be safely applied to the material to be heated in the heating chamber,

without local overheating or scaling, on account of the greater difference in temperature, than is the case after the material has been brought fully or nearly up to the desired temperature; hence, with a furnace constructed and operated as above described, it is possible to maintain a high rate of combustion in the heating chamber without burning the steel; then the objects being heated are passed into the "soaking" chamber where combustion may occur at a lower rate, which need not involve the risk of burning the steel and will serve mainly to permit the temperature to be equalized throughout the billet or like object being heated.

The invention is illustrated in the accompanying drawing as applied to a continuous furnace wherein billets or the like to be heated are passed through a door 1 at the entrance end of the furnace, to an elongated heating chamber 2 which will usually be provided with suitable longitudinal water-cooled skids or the like as is well known in the art, along which the material slides in passing through the furnace.

The chamber 2 is heated in any suitable manner, for example, by a suitable number of burners 4 which are shown as located in a transverse wall 5 at the delivery end of chamber 2. Suitable gaseous fuel may be supplied to each of the burners 4 through a nozzle 6, air for combustion being conducted to each burner through one or more conduits 7 which are illustrated as leading from the recuperator or air preheater indicated diagrammatically at 8. The illustrated recuperator is of the type shown in the patent to Chapman No. 1,713,995 dated May 21, 1929, the preheated air for combustion being delivered by the recuperator to a passageway 15 above the latter (similar to the passageway 7 of the aforesaid patent), and the products of combustion from burners 6 and 14, after passing through chamber 2, being led through a passageway 16 (similar to the passageway 4 of the aforesaid patent) into the recuperator. The above described burner is intended merely as an example of any suitable means for heating the material passing through chamber 2, substantially up to the temperature at which it is desired ultimately to remove the same from the furnace, many different types of burners and air preheaters being well known in the art.

The material to be heated then passes into a "soaking" chamber 9, which latter may be more or less separated or segregated from chamber 2 by a throat 10 interposed between such chambers. As above stated combustion is maintained in the

"soaking" chamber 9 at a rate which will be approximately sufficient to supply only such heat to the material being heated as will maintain it at the temperature at which it is to be delivered from the furnace. In the illustrated form of the invention the "soaking" chamber 9 is heated by a suitable number of ports or burners 13 located in the wall 11 at the delivery end of the furnace, such burners having nozzles 14 similar to the parts 6 above described, and each burner receiving air from one or more conduits 7 leading from the air preheater.

If the furnace is of the side-discharge type, the material being heated may pass out a suitable delivery door indicated diagrammatically at 12.

A furnace of the above type has the advantages of flexibility and easy control of the heat, by regulation of the rate of fuel combustion in chambers 2 and 9, which may be readily obtained by the use of dampers (not illustrated) associated with the supplies of air and gas.

I claim:

1. The method of operating reheating furnaces which consists in passing the materials to be heated successively through a heating chamber into and through a soaking chamber, supplying each piece of material with substantially all of the heat required to raise it to the desired working temperature while in the heating chamber, and permitting the absorbed heat in each piece of material to equalize and become uniform in its passage through the soaking chamber.

2. The method of operating reheating furnaces which consists in passing the material to be heated successively through a heating chamber into and through a soaking chamber, supplying fuel and air to the heating chamber in quantities regulated to rapidly supply the material therein with the desired heat content and supplying fuel and air to the soaking chamber in quantities regulated to care for radiation losses while soaking

the highly heated material to equalize the temperature in each piece of material in its passage through the soaking chamber.

3. The method of operating reheating furnaces which consists in passing the material to be heated successively through a heating chamber into and through a soaking chamber, supplying fuel and air to the heating chamber in quantities regulated to rapidly supply the material therein with substantially the desired heat content and supplying fuel and air to the soaking chamber in quantities substantially regulated to care for radiation losses while soaking the highly heated material to equalize the temperature in each piece of material in its passage through the soaking chamber, withdrawing the spent gases issuing from said chambers from the entrance portion of the heating chamber, and abstracting heat from said spent gases to preheat at least some of said air.

4. The method of operating continuous furnaces which consists in first passing the material to be heated through a heating chamber, passing heating gases through said chamber in a direction opposite to the direction of travel of said material therethrough to supply each piece of material with substantially all the heat required to raise it to the desired working temperature while in the heating chamber, then passing said material from said heating chamber into and through a soaking chamber, and passing heating gases through said soaking chamber and toward the end of the furnace at which the material to be heated enters, in quantities substantially regulated to take care of radiation losses while soaking the highly heated material in said soaking chamber to equalize the temperature thereof in its passage through the soaking chamber.

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