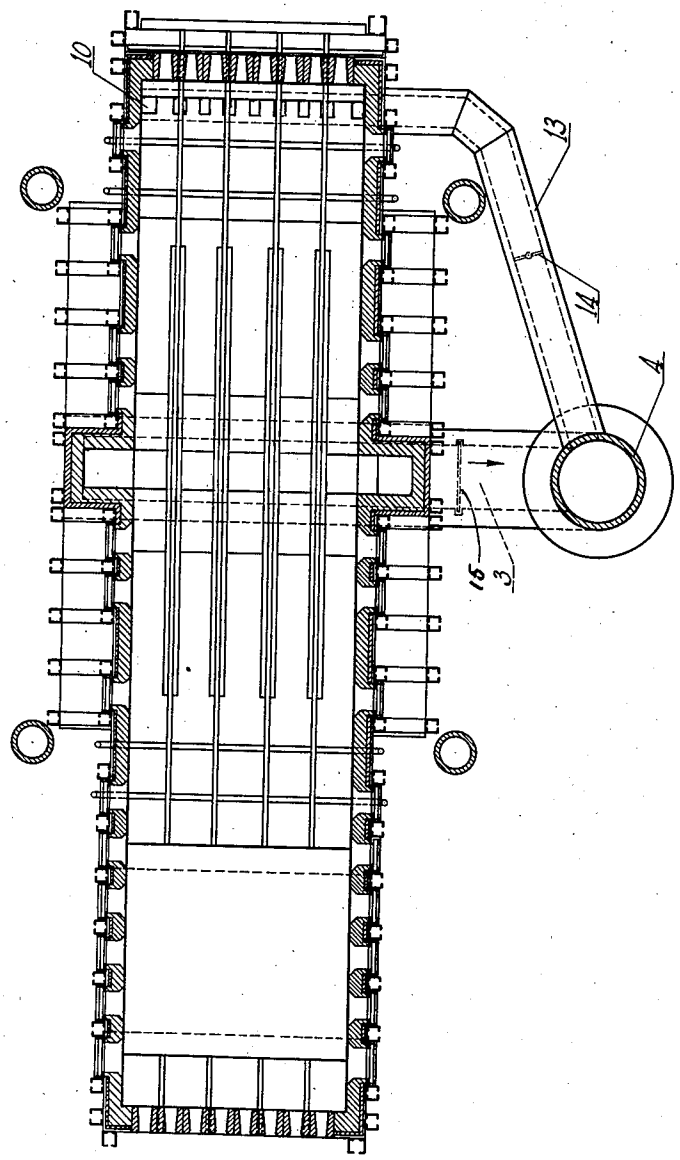
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CONTINUOUS HEATING FURNACE

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Fig. 1



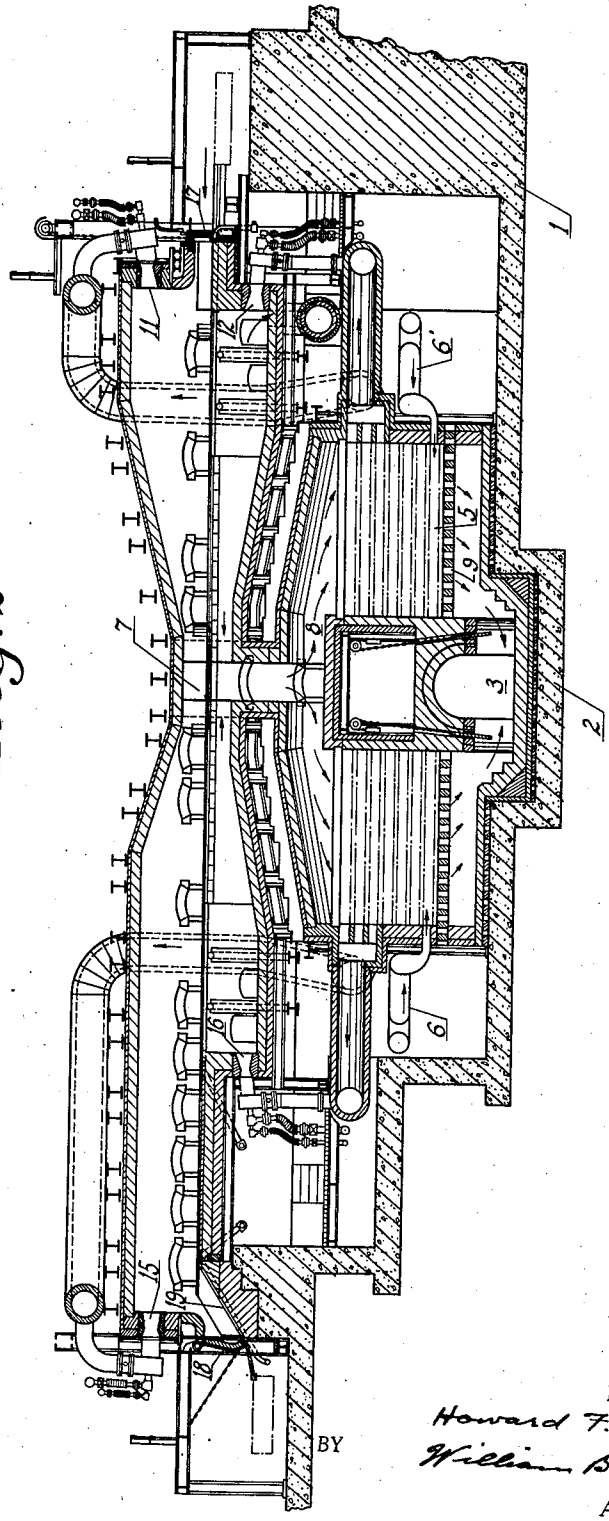
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Fig. 2



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Patented Nov. 5, 1940 2,220,585

UNITED STATES PATENT OFFICE

2,220,585

CONTINUOUS HEATING FURNACE

Howard F. Spencer, Pittsburgh, Pa., assignor to Amco, Incorporated, Pittsburgh, Pa., a corporation of Pennsylvania

Application January 21, 1939, Serial No. 252,083

1 Claim. (Cl. 263—52)

This invention relates to new and useful improvements in continuous heating furnaces of the type wherein material such as billets or the like are continuously charged into one end of the furnace chamber and discharged at the other end, the material, while passing through the furnace, being subjected to the heat from combustion of gaseous or liquid fuels.

In a Patent No. 2,133,673 granted to me jointly with William A. Morton, on October 18, 1938, is disclosed and described an improved type of continuous heating furnace in which provision is made to initially subject the billets charged into the furnace to a temperature in excess of the final desired temperature of the billets, then passing the billets through an extended zone having the temperature decelerating to a temperature slightly higher than the final desired temperature in the billets, and then passing the billets through a zone of uniform temperature to complete the desired heating cycle.

To accomplish this result, burners were provided adjacent the charging end of the furnace as well as the discharge end both above and below the hearth or skid, and the products of combustion are exited at a point substantially midway of the end firing zones.

The present invention contemplates the use of a furnace of the same general construction and location of burners and waste gas exhaust passage, and in addition thereto it provides a waste gas exit adjacent the charging end of the furnace through which to exhaust some of the products of combustion when the furnace is delayed for roll changes, etc. of the strip mill to which the billets are delivered from the furnace. In the event of such shutdowns, when the billets remain stationary in the furnace, the products of combustion tend to pass back to the charging end of the furnace, and with the waste gas exit at the center part of the furnace, the temperature gradient of the steel will be lowered at an intermediate point of the furnace hearth.

It is undesirable to permit the temperature of the steel to fall during the heating cycle, which would result in a toughening of the billets that would show up in the subsequent rolling operation. It is, therefore, desirable during mill stand-by periods to permit a portion of the waste gases to be removed at the charging end of the furnace as a means of controlling the temperature gradient in the steel, and this is accomplished by the use of an auxiliary exhaust, as will be described in connection with the accompanying drawings constituting a part hereof in which like reference characters designate like parts and in which:

Fig. 1 is a cross-sectional view of a continuous heating furnace embodying the principles of this invention; and

Fig. 2 is a vertical cross-sectional view extending longitudinally of the furnace.

With reference to the several figures of the drawings, the structure therein illustrated comprises the usual concrete foundation 1 depressed at its central portion 2 to form an ash-pit and waste gas passage 3 communicating with a stack 4, Fig. 1. A checker-work tile structure 5 is provided on opposite sides of the waste gas passage 3, communicating with a stack 4, Fig. 1. A checker-work tile structure 5 is provided on opposite sides of the waste gas passage 3, having preheated air passages through which air is conducted by blowers 6 and 6' and through which waste gases are conducted from a main passage 7 substantially centrally of the furnace into a collecting chamber 8 from which they are distributed through a checker-work tile and drawn through openings 9 into the waste gas passage 3, the dampers 15 being provided to regulate the exit of the waste gas through passage 7 from the furnace.

As shown in Fig. 1 of the drawings, a plurality of waste gas passages 10 are provided adjacent the charging end of the furnace directly beneath burner ports 11 and 12 and a portion of the waste gases may be withdrawn through a passage 13 direct to the stack 4, damper 14 regulating the volume of gases withdrawn through the passages 10. The furnace is also provided with burner ports 15 and 16 as in the hereinbefore-mentioned patent to supply the necessary heat to the heating and soaking zones from above and below the billets.

In operation, billets are charged into the furnace through the charging door 17 and discharged through an opening controlled by the door 18, the billets travelling down a skid 19 as is the usual practice.

In the event of a mill shut down, the damper 14 on the auxiliary down-take 13 are opened and the damper 15 of the main down take is partially closed to permit a certain portion of the waste gases to be removed at the charging end of the furnace.

The end burners may also be adjusted to reduce the furnace firing at the charging end during the shut down period to accelerate the removal of the gases through the waste gas pas-

sage 18 as a means for controlling the temperature gradient in the steel.

It will be evident to those skilled in the art that by means of the burner and waste gas exit arrangements, the desirable temperature gradient can be maintained in the steel throughout the length of the furnace as it continues to move over the hearth in a regularly scheduled manner and that by means of the auxiliary waste gas exit at the charging end of the furnace, this gradient may be maintained during the temporary shut down periods, which are so frequent in rolling mill operation.

Although one embodiment of the invention has been herein illustrated and described, it is evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

The method of heating billets in a continuous furnace which comprises charging the billets into a furnace at one end and passing them unidirectionally through the heating chamber to the discharge end of the furnace, heating the furnace chamber adjacent the charge and discharge ends of the furnace, exhausting a substantial volume of the products of combustion at a point intermediate the firing ends of the furnace and exhausting a portion of the products of combustion adjacent the charging end of the furnace chamber.

HOWARD F. SPENCER.