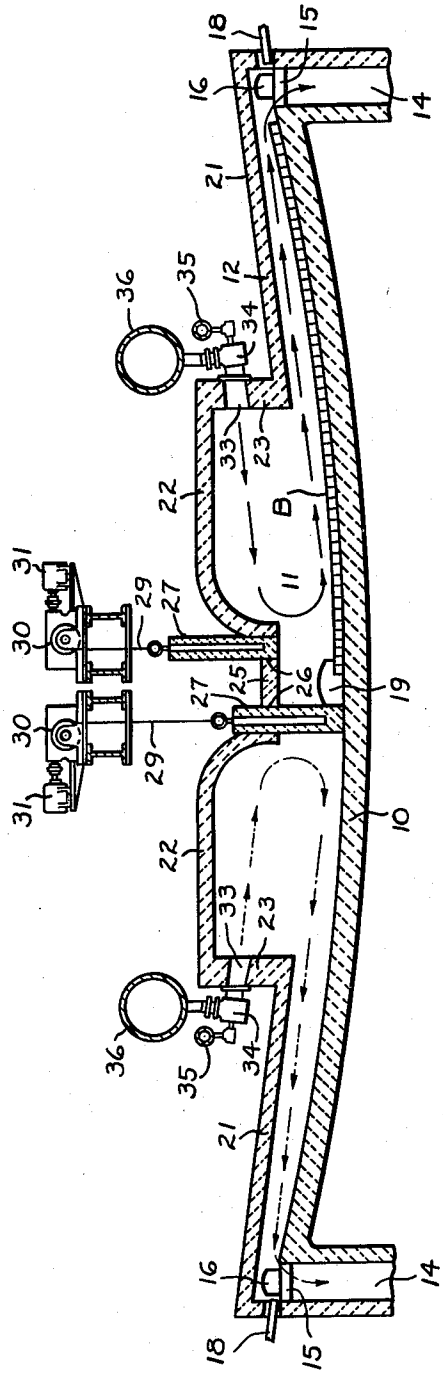
Nov. 4, 1952 M. MORGAN 2,616,679

FURNACE FOR HEATING METAL BARS

Filed March 31, 1949



INVENTOR.
MYLES MORGAN
BY
Albert G. Blodgett
ATTORNEY

Patented Nov. 4, 1952 2,616,679

UNITED STATES PATENT OFFICE

2,616,679

FURNACE FOR HEATING METAL BARS

Myles Morgan, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts

Application March 31, 1949, Serial No. 84,600

1 Claim. (Cl. 263—36)

1

This invention relates to furnaces, and more particularly to furnaces for heating metal bars such as steel billets, slabs, and the like, for subsequent reduction in a rolling mill.

Rolling mills are frequently arranged to deliver a wide variety of product, and the tonnage of output per hour may vary greatly, since it will depend to a considerable extent upon the size and shape of the rolled product. Furthermore, when the product is changed, it is often necessary to change the size or shape of the bars which are to be heated and delivered to the mill. This requires a furnace having a wide range in heating capacity and adapted to handle bars of divergent sizes and shapes. Prior furnaces have been lacking in these requirements.

It is accordingly one object of the invention to provide a furnace for heating metal bars to be delivered to a rolling mill, the furnace being capable of satisfactory operation over a wide range of capacity and with bars of widely differing shapes and sizes.

It is a further object of the invention to provide a heating furnace which will be relatively simple and inexpensive to construct, and adapted to operate efficiently at both high and low capacities.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claim appended hereto.

Referring to the drawings illustrating one embodiment of the invention and in which like reference numerals indicate like parts, the single figure is a longitudinal section through a heating furnace.

The embodiment illustrated comprises an elongated hearth 10 having an upper surface which is shaped throughout substantially its entire length as an upwardly concave arc. This hearth is symmetrically formed, with its lowermost point adjacent the center. Sidewalls 11 (one only being shown) are provided at opposite sides of the hearth, and a roof 12 extends between the sidewalls above the hearth. A downwardly directed offtake flue 14 is provided at each end of the hearth, and spaced bridge members 15 extend across each flue in known manner. One of the sidewalls is provided with an opening 16 adjacent each flue 14 so that bars to be heated may be pushed endwise therethrough into the furnace to rest upon the members 15 in known manner and then be pushed broadside along the hearth by means of reciprocable rams 18. Each

2

sidewall is provided with an opening 19 at the center of the furnace, so that heated bars may be pushed endwise out of the furnace through one of these openings in known manner for subsequent reduction by a rolling mill.

The two outer end portions 21 of the roof 12 are relatively low, and approximately midway between each end of the furnace and its center the roof is offset upwardly to provide two elevated portions 22 each of which is connected to the adjacent outer portion 21 by an upright portion or wall 23. The elevated portions 22 curve downwardly at their inner ends toward a somewhat lower central roof portion 25. This central portion 25 is provided with two transverse slots 26 located on opposite sides of the outlet opening 19 and each receiving a vertically slidable gate 27. Each of these gates is connected by cables 29 to a separate hoist 30, each having its individual reversible driving motor 31 under the control of the operator. Thus the two gates may be raised and lowered independently. The gates are located close to the opening 19.

Provision is made for firing each half of the furnace independently. For this purpose each of the two walls 23 is provided with a horizontal row of burner openings 33, and rows of burners 34 are mounted adjacent these openings. The burners in each row are supplied with a suitable fuel, such as gas, from a pipe 35, and with air from a pipe 36.

The operation of the invention will now be apparent from the above disclosure. Assuming that the heating requirements are relatively low, only one half of the furnace (say the right-hand half) will be in service. Under these conditions the left-hand gate 27 will be lowered and the right-hand gate 27 will be raised. Bars B will be pushed endwise into the furnace through the right-hand opening 16 and then pushed broadside along the hearth 10 by the reciprocable rams 18, the right-hand portion of the hearth being substantially covered by a layer of bars. Flame from the right-hand row of burners 34 will travel inwardly beneath the elevated portion 22 of the roof and then downwardly in a reverse turn, as indicated by the arrows, thence traveling outwardly close to the layer of bars, beneath the outer portion 21 of the roof, and downwardly through the flue 14. Heated bars will be pushed endwise out of the furnace through the central opening 19. Each time a heated bar is thus discharged, a cold bar will be introduced through the opening 16, and the entire layer of bars will be pushed inwardly a distance equal to the width of

one bar. During this inward movement, the pushing forces will have downwardly directed components, because of the concave shape of the hearth. These components, aided by gravity, will prevent any upward buckling of the layer of bars. Consequently the broadside movement of the bars will take place in a thoroughly dependable manner, and the innermost bar of the layer will always be opposite the central opening 19 in position for discharge therethrough whenever desired. The particular arrangement of the burners and furnace provides a reversing flame with a long flame travel. Furthermore the region of flame reversal, which is a very high temperature zone in the flame, is located near the central portion of the furnace where the bars are supposed to be at their highest temperature. This is of considerable value in increasing the overall efficiency of heat transfer through the resultant counterflow relationship of the flame travel and the bar travel. With the positions of the gates 27 reversed, the left-hand half of the furnace may be placed in operation. If the heating requirements are too great for one half of the furnace alone, both of the gates 27 will be raised and both sets of burners 34 will be placed in service. There will then be a layer of bars in each half of the furnace, each layer moving inwardly, with the innermost bar in each layer located opposite the discharge opening 19. Under such conditions bars will be discharged from the respective layers alternately, and the capacity of the furnace will be doubled.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A heating furnace for metal bars comprising an elongated hearth, side walls on opposite sides of the hearth, a roof connecting the side walls above the hearth, one of the side walls having an opening therethrough for the endwise discharge of heated bars from the central portion of the furnace, two independently-operable, vertically-slidable gates extending across the furnace close to the discharge opening and on opposite sides thereof, means adjacent each end of the furnace for pushing a layer of bars broadside along the hearth toward the central portion of the furnace, two independently-operable means for introducing fuel into the respective halves of the furnace for combustion above the respective layers of bars, and means providing an outlet flue adjacent each end of the furnace for the escape of gaseous products of combustion, the roof for each half of the furnace including a relatively low outer end portion and an elevated portion connected to the outer portion by an upright wall, the said means of introducing fuel being situated on said upright wall and being directed toward its respective gate to provide a flame which travels inwardly beneath the elevated portion, then downwardly in a reverse curve, and then outwardly above the adjacent layer of bars, the elevated portions of the roof curving downwardly at their inner ends toward a somewhat lower central roof portion having two transverse slots therein to receive the vertically slidable gates.

MYLES MORGAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
653,480	Morgan	July 10, 1900
699,130	Allis	May 6, 1902
1,462,899	Benjamin	July 24, 1923
1,937,812	Culbertson	Dec. 5, 1933
1,968,443	Clark	July 31, 1934
2,113,681	Dennis	Apr. 12, 1938