

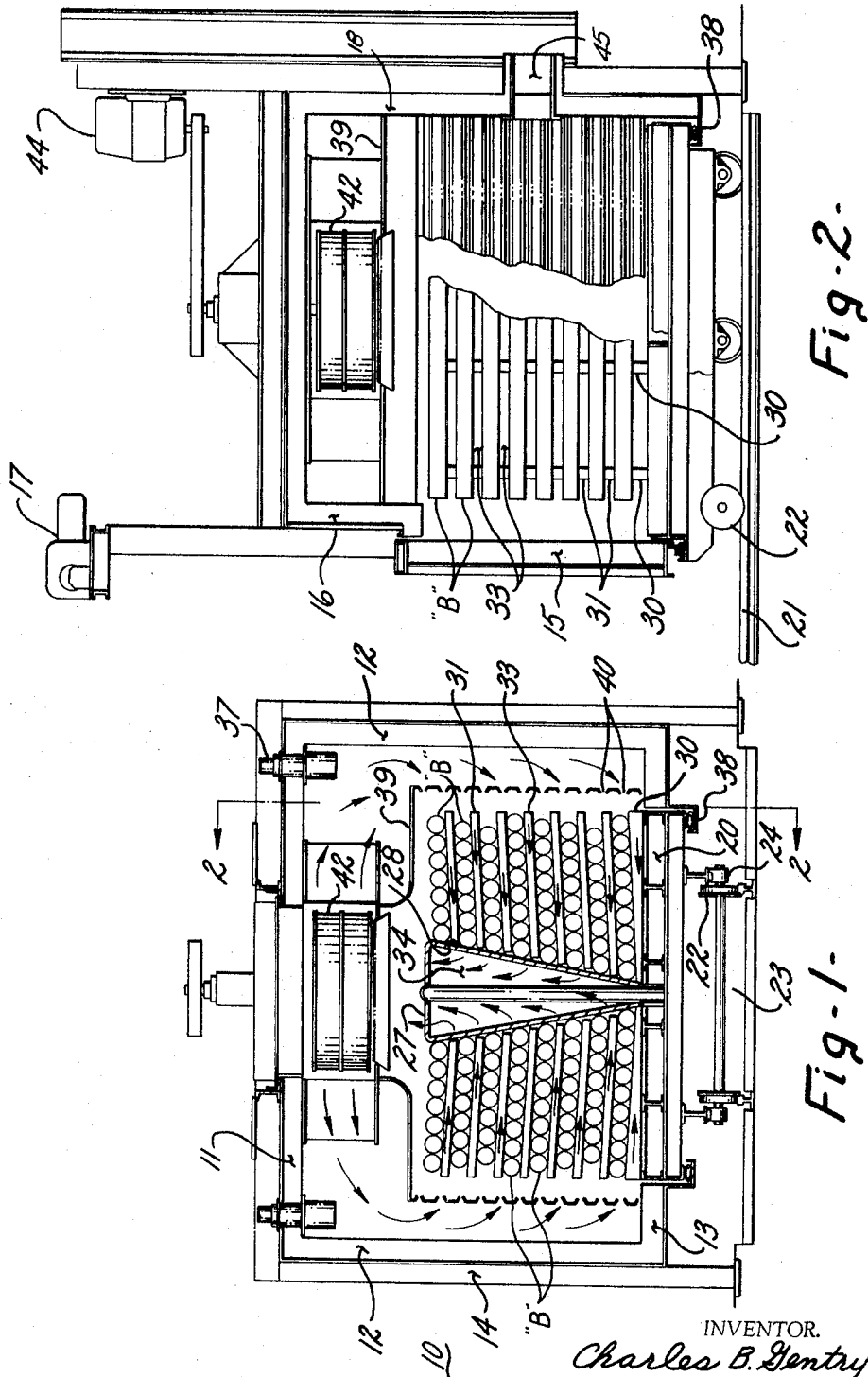
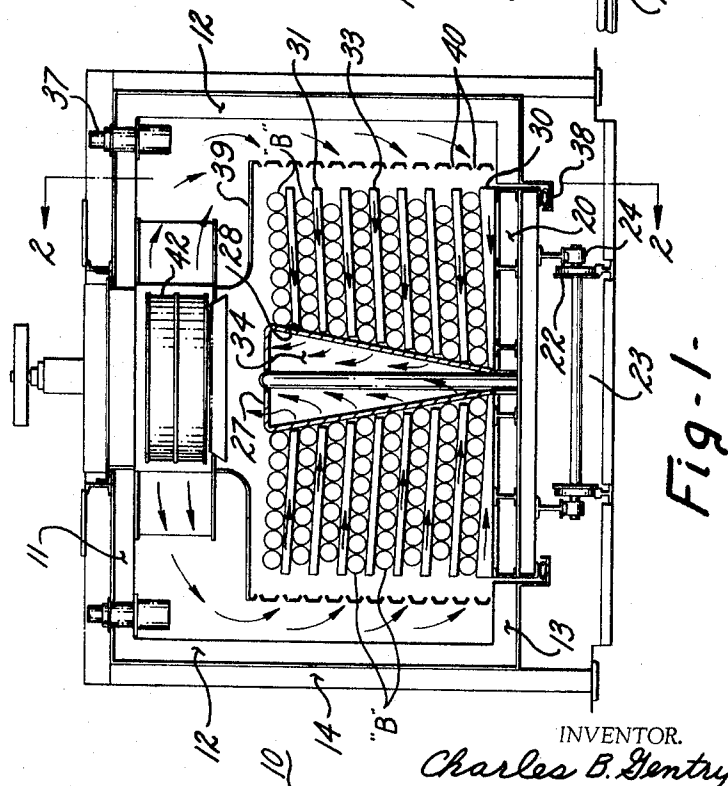
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C. B. GENTRY

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METAL BILLET HOMOGENIZING FURNACE

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INVENTOR.

INVENTOR:
Charles B. Gentry

BY

George R. Clark
attorney:

1

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METAL BILLET HOMOGENIZING FURNACE
Charles B. Gentry, Mayfield Heights, Ohio, assignor to
Sunbeam Equipment Corporation, Meadville, Pa., a
corporation of Delaware

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This invention relates to car furnaces for homogenizing metal billets and more particularly to improvements in furnaces having a removable car for receiving a metal charge stacked thereon.

Furnaces of the removable bottom wall or car type must be designed for efficiently and quickly loading metal billets on the mobile car which is normally supported on a rail system. In addition, the billets stacked on the mobile car must afford a plurality of passageways therethrough in order that the individual billets may be uniformly heated. That is to say, in the ideal situation, all billets disposed within the furnace are uniformly raised in temperature. Another important requirement is that the billets be stacked on the mobile car in such a manner as to receive a maximum number of billets. It is common practice to stack the billets on the mobile car by positioning the billets in rows with horizontal spacer bars transversely positioned in-between each level. In some instances, the billets are spaced along horizontal rows. Not only was this process time consuming, but it was also difficult to uniformly heat the pile of billets. Inasmuch as aluminum billets are normally formed in a cylindrical shape, safeguards should be taken to prevent the heavy load from shifting or rolling as the mobile car is moved into or out of the furnace.

It is, therefore, an object of the present invention to provide an improved removable car furnace.

Another object of the invention is to provide a removable car furnace with an improved car having means to efficiently stack metal billets thereon.

A further object of the present invention is to provide a removable car furnace having a structure mounted on the removable car to receive metal billets and space them in such a manner as to allow the billets to be uniformly and efficiently heated by hot gases passing through passageways formed in the billet stack.

The features of the invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings.

In the drawings, FIG. 1 is a front end sectional view of the removable bottom furnace; and

FIG. 2 is a side elevational section view taken substantially along line 2—2 of FIG. 1.

Referring now particularly to the drawings, there is illustrated a particular embodiment of the invention wherein the furnace is generally referred to by reference numeral 10. The furnace enclosure includes a top or roof 11, front wall 16, side walls 12, rear wall 18 and a stationary bottom wall or floor 13 to form a furnace chamber therein. This inverted cup-shaped structure is supported by a plurality of steel columns 14. As may be seen in FIG. 2, a front door 15 covers an opening defined in the front wall 16 and is adapted to slide in a vertical plane under the control of an elevating mechanism 17, as is well known in the art.

According to the present invention, a removable car or conveyor 20 is movably supported on rails 21 by means of flanged wheels 22 which are carried on axles 23 rotatably supported in pillow blocks 24 which are rigidly secured to the bottom of the car. Preferably, a

2

plurality of axles carrying flanged wheels are provided to effectively support and distribute the weight of the car 20. It is readily understood that the furnace car 20 may be easily rolled into the furnace and subsequently withdrawn therefrom. Centrally disposed on the car 20 are relatively thin triangularly or wedge-shaped spacers 27 transversely oriented with respect to said car. The narrow end of the spacers faces the conveyor 20 so that the side walls 28 of the spacer 27 slopes outwardly and upwardly. A plurality of spacers 27 are provided along the center axis of the car 20 and are in longitudinal alignment. In the preferred embodiment illustrated in the drawings, the spacers 27 are fabricated from 1/4" steel plate but they could be equally fabricated from piping or other structural members bent into the same configuration. A plurality of wedge-shaped members 30 is transversely disposed along the car 20 and is positioned to slope downwardly toward the spacers 27. The angle of inclination on the top surface of members 30 is sufficient to roll aluminum billets which have been placed at the outer edge by gravitational force against the spacer 27. The aluminum billets or the charge in the drawings are indicated by the reference letter B. It can, therefore, be readily understood that cylindrical billets may be easily loaded on the mobile bottom wall by merely placing the billets at the outer edge of the wedge-shaped members 30 and allowing them to roll towards the spacer 27. In this manner, the billets in abutting relationship will form a continuous slightly inclined surface and are prevented from uncontrolled movement thereof. Positioned between the various levels of billet rows are a plurality of separators 31 having parallel bottom and top surfaces in order that each row of billets will be disposed at the same angle of inclination as the bottom or first row of billets. Thus, as each successive row of billets is positioned on the bottom wall or conveyor 20, the billets will correspondingly be urged toward the spacer 27 by gravitational force and will remain in a stable position.

In effect, the separators 31 form parallel passageways 33 which run transversely towards the separator 27. It may be readily seen that the conveyor 20 when fully loaded with billets has a vertical flue or gas passageway 34 formed in the center due to the cooperation of the spacers 27 and the billets rolled thereagainst. Due to the triangular configuration of spacer 27, the vertical passage 34 increases in volume in an upwardly direction. The significance of the configuration of vertical passage 34 will be described in more detail hereinafter.

Preferably a plurality of heaters 37 are vertically disposed through the furnace roof 11 in order to introduce a source of heat into the furnace chamber. It is understood by those skilled in the art that the heaters may also be disposed in the side walls 12 or rear walls 18. Preventing the escape of hot gases between the furnace floor 13, front door 15 and the mobile car 20 in a seal 38 of the expanding hose type. Preferably, an inverted U-shaped air flow baffle 39 extends longitudinally around the fully loaded conveyor 20 between the front wall 16 and the rear wall 18. A plurality of longitudinally or vertical extending vents 40 are defined in the sides of the baffle 39 and are positioned to uniformly pass hot gases therethrough adjacent the outer rows of aluminum billets B. At least one large central opening is positioned in the top of the baffle to each receive a centrifugal fan assembly 42 which is externally driven by a motor 44 through either a belt transmission shown in the drawing or by direct drive.

In operation, fan or fans 42 recirculates the hot gases from the central vertical passage 34 to the outside of baffle 39. The flow of hot gases within the furnace is illustrated by arrows in FIG. 1. It may be seen that the hot gases are generated in the furnace by means of burners, radiant

3

tubes or electrically heated elements 37 and pass through the vents 40 in baffle 39 to adjacent the outer ends of the billet rows. The hot gases flow through the passageways 33 into the vertical passage 34. A salient feature of the present invention is the triangular shape of the vertical passage 34 which permits constant flow of hot gas through each of the passageways 33. This is accomplished by having an increasing volume in vertical passage 34 to accept an approximately equal volume of gas passing through each passageway 33. As the hot gases pass through the vertical passage 34, the fan, or fans, recirculates it to outside of the baffle 39 where the hot gases again pass through the vent openings 40. An exhaust flue 45 is provided when gas burners are employed at the furnace wall to permit the egression of hot gases therefrom. With the uniform hot gas flow through each passageway 33, the billets in each row are heated at substantially the same rate.

While there have been illustrated and described a particular embodiment of a homogenizing metal billet furnace improvement, it will be appreciated that numerous changes and modifications thereof will occur to those skilled in the art, and it is intended in the appended claims to cover all those changes and modifications that fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letter Patent of the United States is:

1. A furnace to uniformly heat a charge therein comprising a furnace enclosure having an open bottom and a sliding front door, a bottom car for said furnace enclosure mounted on a track for moving into and out of a closed position in a longitudinal direction along said track, a plurality of wedged shaped spacers centrally disposed on said car and spaced in the longitudinal direction, said spacers being provided with transverse outer surfaces which slope upwardly and outwardly, a plurality of wedge-shaped members transversely disposed on said car and adapted for receiving the first row of charge thereon whereby the charge forms a continuous surface which slopes downwardly toward said spacers, a plurality of separators having parallel top and bottom surfaces adapted for being transversely positioned with respect to said car between the vertically stacked rows of charge whereby the rows form passageways leading to said spacers, said separators being disposed at the same angle of inclination as the wedge shaped members to urge the rows of charge against said spacers, said spacers cooperating with the charge rows to form a vertical flue having a uniformly increasing volume in the upward direction, an inverted U-shaped baffle extending longitudinally on both sides and over said car and having a plurality of vents extending longitudinally adjacent the rows of charge, means for establishing hot gases inside said furnace enclosure and outside said baffle, a fan for circulating the hot gases upwardly from said vertical flue, outside said baffle and through said baffle vents into said passageways to uniformly heat the charge.

2. A conveyor for use in a homogenizing furnace comprising a movable bottom car, a plurality of relatively thin triangularly shaped spacers centrally disposed on said car and spaced in alignment with the direction of car movement, the narrow end of said triangularly shaped spacers facing downwardly toward said car, a plurality of wedge-shaped members transversely positioned on said car and sloping downwardly toward said spacers, said members adapted for receiving a charge thereon to form a first row which slopes downwardly toward said spacer and lies thereagainst to form a continuous surface, a plurality of separators adapted for being positioned trans-

4

versely to said car between rows of charge to form passageways therebetween, said spacers cooperating with said charge rows to form a vertical flue having a larger volume at the top in order to afford uniform flow of hot gases through said passageways.

3. A billet homogenizing furnace comprising a furnace enclosure having a removable bottom car, a plurality of triangularly shaped spacers centrally disposed on said bottom car with the narrow ends thereof pointing downwardly, wedge-shaped members of said car adapted for supporting the first row of metal charge so that the charge tends to move toward said spacer by gravity, transversely positioned separators adapted for being disposed between rows of charge to form a plurality of passageways leading to said spacers and to maintain the rows at an inclination which tends to move the charge against said spacers, at least one heater for heating gases inside said furnace enclosure, a baffle associated with said furnace enclosure to uniformly channel hot gases to the side charge rows remote from said spacers whereby hot gases can flow through said passageways, fan means within said furnace enclosure for circulating hot gases through said baffle and passageways.

4. In a furnace comprising stationary front, top, sides, rear and bottom walls, a vertically slideable door adapted for closing an opening in said front wall, said bottom wall defining an opening, a car mounted on a track for rolling into and out of engagement with said bottom wall to close the opening therein, sealing means to prevent the escape of gas between said car and said bottom wall and door, a plurality of relatively thin triangularly shaped spacers extending vertically from said conveyor and transversely oriented with respect to direction of movement of said car, said spacers being in longitudinal alignment in said car, a plurality of parallel spaced wedge-shaped members on said car having an upper surface sloping downwardly toward said spacers and being parallel to said spacers, said members being adapted for receiving a plurality of cylindrically-shaped charges disposed longitudinally thereon and forced by gravity toward said spacers, a plurality of separators having parallel top and bottom surfaces adapted for being transversely positioned with respect to said conveyor between vertically stacked rows of charge to form passageways leading toward said spacers and supporting the rows of charge so that they are inclined downwardly toward said spacers thereby preventing uncontrolled movement thereof, said spacers and the charge adapted for forming a vertical flue having uniformly increasing volume in the upward direction, an inverted U-shaped baffle extending longitudinally on both side and over said car between said front and rear walls, said baffle defining a plurality of vents adjacent said passageways, at least one burner associated with said furnace for producing hot gas therein, and fan means associated with said baffle for circulating the hot gas through said vents, passageways and vertical flue whereby the rows of charge are uniformly heated.

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FREDERICK L. MATTESON, JR., *Primary Examiner.*

J. J. CAMBY, *Assistant Examiner.*