Aug. 26, 1947. A. SONTZ 2,426,568

FURNACE DOOR

Filed March 7, 1944

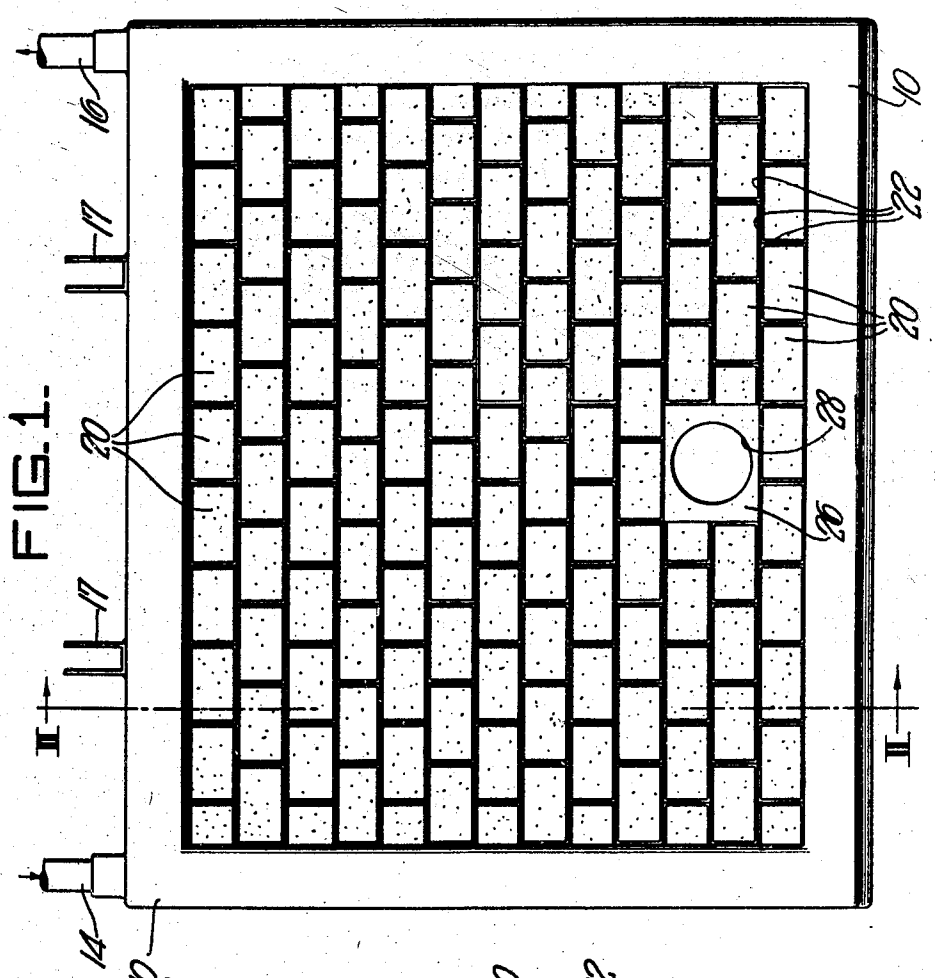

FIG. 1.

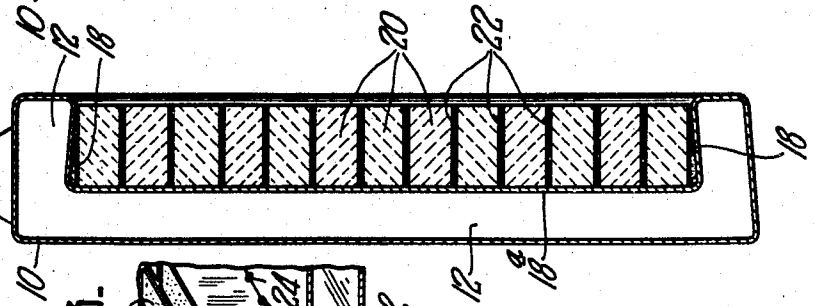

FIG. 2.

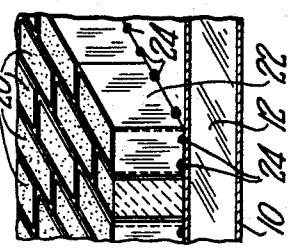

FIG. 3.

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Patented Aug. 26, 1947 2,426,568

UNITED STATES PATENT OFFICE

2,426,568

FURNACE DOOR

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Application March 7, 1944, Serial No. 525,469

2 Claims. (Cl. 110—173)

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The present invention relates to basic open hearth furnace doors.

The objects and advantages of the invention will be fully apparent from the following specification and appended claims when read in connection with the accompanying drawings, in which:

Figure 1 is an inside face view of an open hearth furnace door embodying the present invention.

Figure 2 is a vertical section on line II—II of Figure 1.

Figure 3 is a fragmentary sectional perspective view illustrating the manner of tack welding metal-clad refractory bricks to the body of the furnace door.

The majority of basic open hearth furnace doors as constructed prior to my invention frequently consist of a steel water-cooled frame which encloses one flat face and the four edges of a panel of fire-clay. Because of the open hearth temperatures, which range from approximately 2700° F. to 2900° F., the fluxing action of lime and iron oxide in the furnace atmosphere, and the mechanical and thermal shocks to which door linings are subjected, their lives are very short, and replacements have frequently been required for each door after approximately every fifteen heats, which in normal operation means approximately every week. Since the average open hearth furnace has five doors, it is evident that in a steel mill containing several furnaces, an inordinate amount of maintenance time and labor must be devoted to changing and relining the doors.

In recent years various attempts have been made to improve the useful lives of open hearth door linings. Chief among these has been the development of stud-type doors, which have materially increased door life. In construction, however, such stud-type doors consist of basic monolithic refractories of chrome ore, magnesite, olivine or various combinations of these, rammed into the water-cooled recesses of the door frame into which steel studs or bolts have been secured. These studs serve both to anchor the refractory in place and to provide for a rapid heat transfer to the cooling water, thus cooling the refractory face and prolonging the life of the door. However, the installation cost of a stud-type door is several times that of a brick-lined door. The primary disadvantage of the stud-type door lies in the time and labor required in the preparation and installation of the ramming mixture and the removal and replacement of the studs after use.

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The present invention aims to overcome the shortcomings of the prior practices above referred to, and at the same time to provide a door which will have increased service life.

Referring particularly to the drawings, my improved door comprises a hollow body such as indicated at 10, so as to provide a water chamber 12 which is suitably connected with an inlet pipe 14 and an outlet pipe 16 to permit circulation of a coolant such as water in a manner well known to those skilled in the art. Lugs 17 are adapted to connect with any conventional form of door support. The body of the door is provided with a recessed portion 18 adapted to accommodate a multiplicity of refractory bricks 20. Each of these bricks is substantially in the form of a rectangular prism, and is clad on four sides with sheet metal. For example, each brick may be surrounded with a metallic sleeve 22. The inner edge portions of each sleeve 22 are integrated with the metal of the door body by tack-welded joints such as indicated at 24. By this means each brick is thus individually anchored to the door body, and cannot become loosened and fall out as the result of shrinkage or mechanical abuse. When the metal-clad bricks are initially installed in the cavity 18 of the door, there will be a slight clearance space between adjacent bricks which may range from $\frac{1}{16}$ inch to $\frac{1}{8}$ inch in practice. When the door is put into use, expansion effectively seals the spaces between the bricks. By the use of metal-clad basic brick constructed and arranged in the manner herein shown and described, it is possible to obtain an essentially basic lining of greater density and greater erosion-resistance than is obtainable with the rammed door linings heretofore available, and at the same time provide positive assurance against the type of door failure common to both fire-clay and basic brick linings laid up in the conventional manner.

The brick-lined door illustrated is preferably constructed from 9" x 4½" x 3" metal-encased basic brick in which the metal encloses the four larger faces while no metal is present on the two ends. In order to utilize all of the metal, in which instance one edge of the metal casing of each brick must touch the water-cooled door and the opposite edge terminate in the inner surface of the door, I cut each 9-inch brick in half, thus obtaining two metal-clad bricks each 4½ inches long. The bricks are then placed in the door cavity 18, with one of the exposed faces turned outwardly and the other abutting against the wall 18a of the door cavity. Then the two edges

of the metal casing are tack-welded to the door frame at a plurality of points 24 around the perimeter of the casing in the region of the intersection of the casing with the wall 18a of the cavity. The work of installing these metal-clad brick should generally progress from the four outer corners of the door cavity toward the door tile 26 which has a peek-hole 28 therein registering with the usual peek-hole formed in the door body. In this way all of the brick are readily accessible for tack-welding to the door body in a manner which will be readily apparent to those skilled in the art.

Various modifications may be made without departure from the invention as defined in the appended claims.

I claim:

1. A metal furnace door comprising a body portion having a face which is adapted to be disposed over a furnace door opening, a multiplicity of separately preformed refractory bricks disposed upon and covering said face, each surrounded on four faces by an individual unitary sheet metal sleeve having the edges at one end thereof tack welded to said face of the body of the door by a series of spaced welded joints of restricted areas to individually anchor the inner edges of the sleeve to the door, the arrangement being such that there are two thicknesses of sheet sleeve metal between all adjacent bricks, the metal sleeve surrounding each brick being in contact with the metal sleeves of the bricks adjacent thereto.

2. A furnace door of the character described, comprising a hollow metallic door body adapted to have a coolant circulated therethrough and formed with a face which is adapted to be disposed over a furnace door opening, said face

being formed with a recessed portion, a protective lining substantially filling said recessed portion comprising a multiplicity of separately preformed refractory bricks, each surrounded on four faces by a unitary sheet metal sleeve which at the edges at one end thereof is secured to said door body within the said recessed portion by a series of spaced bodies of tack welded metal to thus individually anchor each metal encased brick to the door body, the construction and arrangement thus being such that there are two thicknesses of sheet sleeve metal between all adjacent bricks, the metal sleeve surrounding each brick being in contact with the metal sleeves of the bricks adjacent thereto.

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