Feb. 25, 1969 W. T. TREDENNICK ET AL 3,429,487

REFRACTORY FLOOR CONSTRUCTION

Filed July 13, 1967 Sheet 1 of 2

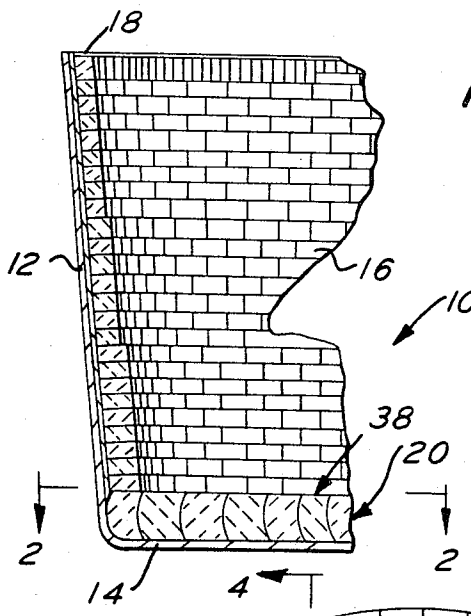


FIG. 1

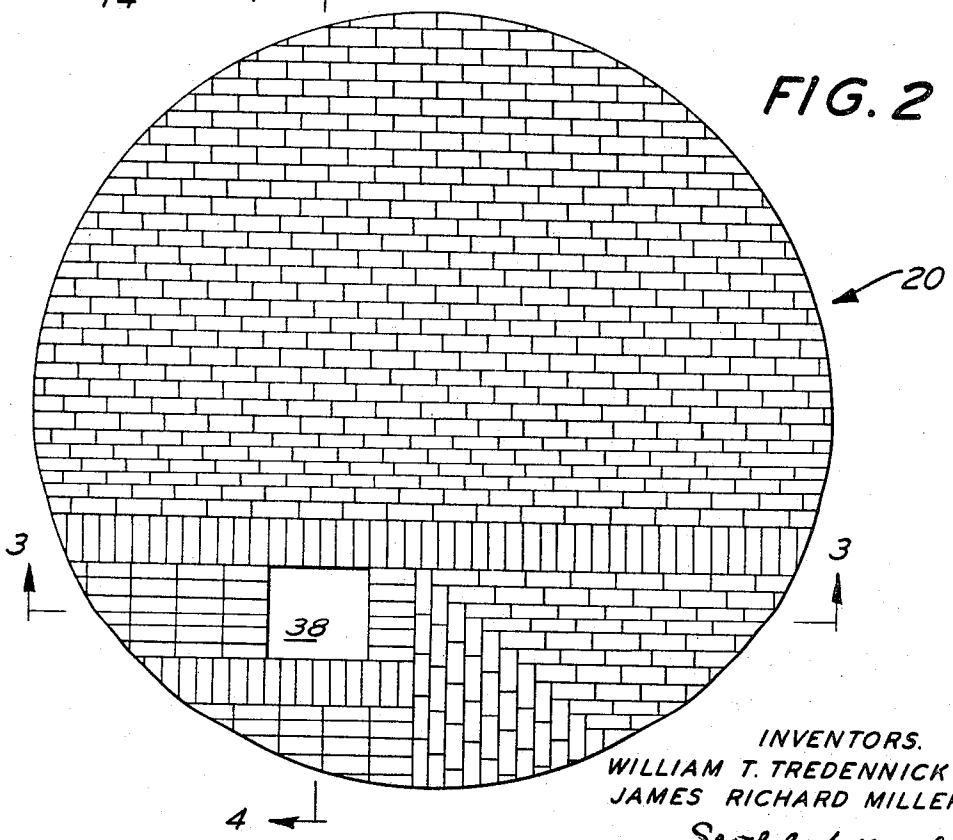


FIG. 2

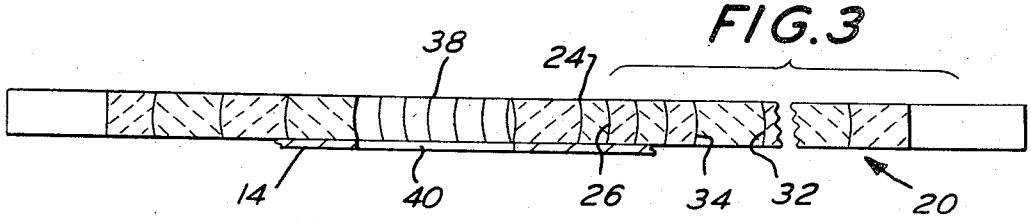
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FIG. 3



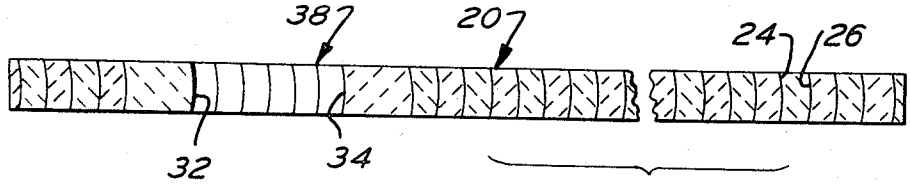


FIG. 4

FIG. 5

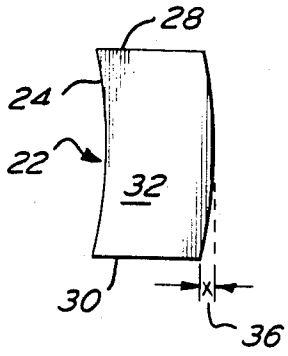
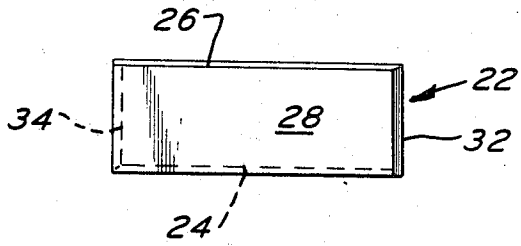


FIG. 6



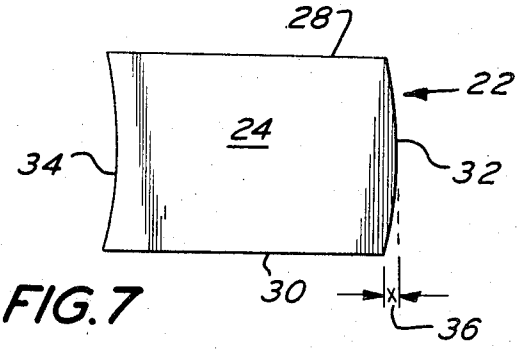


FIG. 7

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REFRACTORY FLOOR CONSTRUCTION

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U.S. Cl. 222—566 6 Claims
Int. Cl. B65d 25/14

ABSTRACT OF THE DISCLOSURE

A floor construction of special refractory brick is provided having concave and convex surfaces on major faces and on end faces so that the bricks interlock into a rigid floor without mortar.

The present invention is directed to a refractory floor construction for vessels used or supporting molten metal, such as ladles. The vessel has a floor constructed of refractory brick preferably of the bloating type. The bricks have a concave surface on one major face and mating convex surface on the opposite major face. The major face of the brick is the face of largest area. The bricks also have a concave surface on one end face and a mating convex surface on the other end face. The floor surface is defined by side faces of the brick as opposed to the major faces which lie in generally upright planes. The convex surfaces on the bricks mate with concave surfaces on adjacent bricks, whereby the bricks bloat when subjected to heat and interlock with one another without use of mortar. Hence, the ladle may be turned upside down for purposes of cleaning slag or the like without the floor falling out of position.

It is an object of the present invention to provide a novel refractory floor construction for vessels adapted to support molten metal.

It is another object of the present invention to provide a novel refractory floor construction comprised of specially designed bricks which will rigidly interlock with one another when subjected to heat without use of mortar.

It is another object of the present invention to provide a novel refractory floor construction using specially designed bricks which may be of varying widths and used to make floors for ladles of varying diameters, with the floor having a tapping aperture.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a partial sectional view of a ladle having a floor constructed in accordance with the present invention.

FIGURE 2 is a view taken along the line 2—2 in FIGURE 1.

FIGURE 3 is a view taken along the line 3—3 in FIGURE 2.

FIGURE 4 is a view taken along the line 4—4 in FIGURE 2.

FIGURE 5 is an end view of a brick.

FIGURE 6 is a side view of the brick shown in FIGURE 5.

FIGURE 7 is a top view of the brick shown in FIGURES 5 and 6.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 a vessel adapted to contain molten metal such as a ladle designated generally as **10**.

The ladle **10** includes a metallic shell **12** having a bottom **14** and lined with a wall **16** which may be constructed as per Patents 2,818,248 or 3,140,333. The top of the ladle includes a plate **18** partially overlying the upper course of bricks. The ladle **10** is provided with a floor **20** constructed in accordance with the present invention.

The floor **20** is constructed of refractory bloating brick designated generally as **22**. Each brick **22** has a major or top face **24** which is concave and a major or bottom face **26** which is convex, planar side faces **28** and **30**, a convex end face **32** and a concave end face **34**. All of the bricks **22** utilized in forming the bottom wall **20** are identical and of the same dimensions. The width of the bricks may be varied as desired depending upon the size of the ladle.

In conjunction with a ladle having a 12 foot diameter, we prefer to use bricks **22** which are basically 6 inches by 3 inches. Thus, the height of the bricks between surfaces **24** and **26** is 3 inches, and the width of the bricks between surfaces **28** and **30** is 6 inches. The dimension **36** illustrated in FIGURES 5 and 7 is .325 inch, with the radius of curvature for the surfaces **24**, **26**, **32** and **34** being 14 inches. Also, the length of the bricks between surfaces **32** and **34** was 8.250 inches. These dimensions are exemplary of an embodiment of the present invention and may be modified as desired depending upon the size of the ladle as referred to above.

The ladle **10** may be of the type having a tapping aperture **38** in its bottom wall **20**. As shown more clearly in FIGURES 3 and 4, the aperture **38** is defined by end faces **32** or **34** on the bricks **22**. The bottom **14** of shell **12** supports the floor **20** and is provided with an aperture **40** in line with the aperture **38**. The plug or other structure utilized to close the aperture **30** is not shown. The shape of apertures **38** and **40** may be varied as desired.

Per se, bloating brick is known. When the floor **20** formed of bloating brick is constructed in accordance with the present invention, and contacted with molten metal having a temperature such as 2300° F., the brick may permanently expand in volume as much as 35–50 percent with no shrinkage. Such expansion is accommodated by the fact that each face **28** is unrestrained. Such permanent expansion of the brick interlocks the various bricks wherein each concave surface mates with a convex surface on the major and end faces of the bricks. The side faces **28** of the bricks define the floor surface. Thus, the rigid interlocking of the bricks without use of mortar results in a floor **20** which will not fall apart when the ladle is turned upside down for purposes of cleaning, dispensing of molten metal, etc.

While a bloating brick is preferred for steel teeming ladles, volume stable brick can be used in some environments. In other environments, a brick having an aluminum content of about 50% with a bloat of about 10% can be used. Due to the above described construction of the bricks, it is possible to construct bottoms for furnaces, bottoms for vessels other than those adapted to contain molten metal, furnace arches or roofs, etc.

The radius of curvature for the concave and covex surface on each brick is the same. The amount of this radius varies with the width of the brick. For bricks whose width is 4 inches, the radius of curvature would be 8 inches. For bricks whose width is 8 inches, the radius of curvature would be 16 inches. Hence, the radius of curvature varies between 8 and 16 inches depending on the size of the brick which varies depending on the size of the ladle to be built.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

We claim:

1. In a vessel adapted to support molten metal, the vessel having a floor constructed of refractory brick and supported by a shell, the floor being comprised of refractory bloating bricks having a concave surface on one major face and a mating convex surface on the opposite major face, said brick also having a concave surface on one end face and a convex surface on the other end face, the floor surface being defined by side faces of said bricks, the convex surfaces mating with a concave surface on adjacent bricks, whereby the bricks bloat when subjected to heat and interlock with one another without use of mortar.

2. In a vessel in accordance with claim 1 wherein the radius of curvature on said concave and convex faces is all identical.

3. In a vessel in accordance with claim 1 including a tapping aperture in said floor, said aperture being defined by end faces on said bricks, and said floor consisting of one course of said bricks.

4. A refractory brick having a concave surface on one major face, a convex surface on the opposite major face, a concave end face at one end and a convex end face at the other end, all of said surfaces having the same radius of curvature.

5. A brick in accordance with claim 4 wherein the side faces are planar, and the radius of curvature for said surfaces being between 8 and 16 inches.

6. A brick in accordance with claim 4 wherein said brick has a bloat of at least 10 percent at 2300° F., and has an aluminum content of about 50 percent.

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U.S. Cl. X.R.

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