Oct. 26, 1965 D. M. CULLINAN 3,213,811

REFRACTORY BRICK

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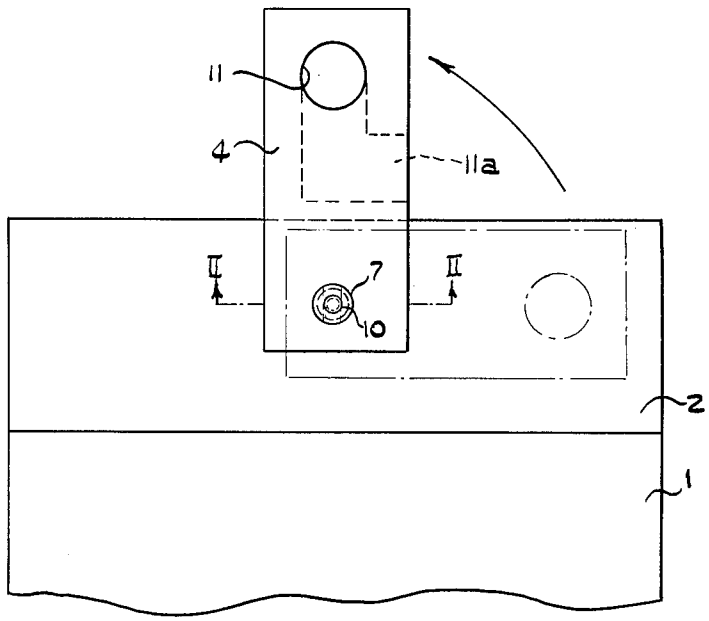


FIG. 1.

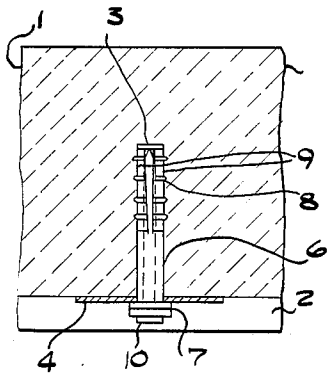


FIG. 2.

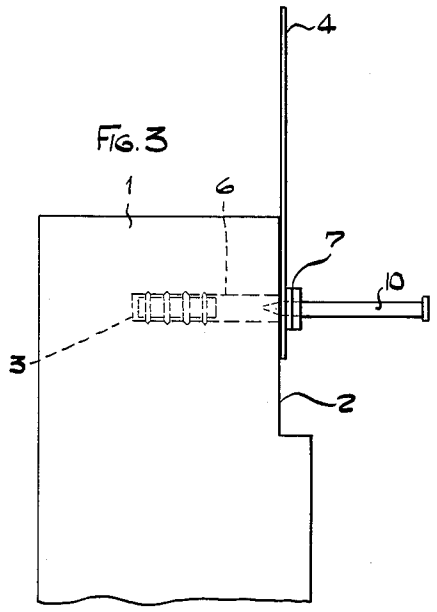


FIG. 3

INVENTOR.
Douglas M. Cullinan
BY
Fennie Edmonds, Morton, Barrows & Taylor
Attorneys

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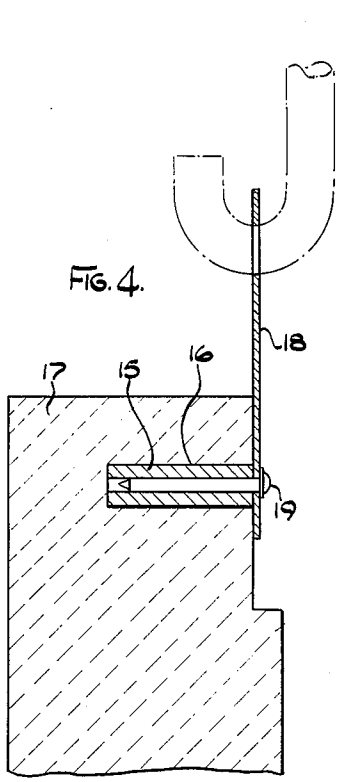


FIG. 4.

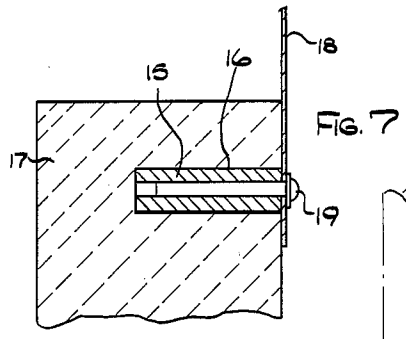


FIG. 7.

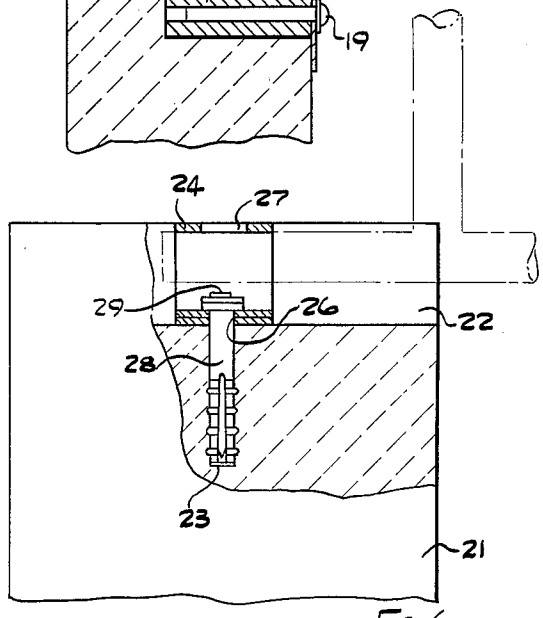


FIG. 6.

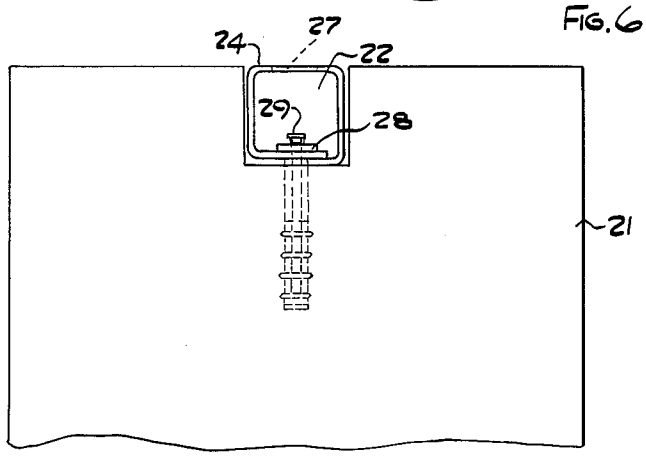


FIG. 5.

INVENTOR.
Douglas M. Cullinan
BY
Pennie, Edmonds, Morton, Barrows & Taylor
Attorneys

United States Patent Office 3,213,811 Patented Oct. 26, 1965

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REFRACTORY BRICK

Douglas M. Cullinan, Olifantsfontein, Transvaal, Republic of South Africa, assignor to Cullinan Refractories Limited, Olifantsfontein, Transvaal, Republic of South Africa

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4 Claims. (Cl. 110—99)

This invention relates to furnace roof blocks used in forming the roofs of industrial furnaces, and more particularly to such blocks having metal hangers.

According to the invention a furnace roof block comprises a refractory brick provided in at least one surface with a bore which extends into the brick, a sheet metal hanger, and anchoring means engaged in the bore, to connect the hanger to the brick; whereby the block may be suspended by the hanger.

The bore may be provided in a recess provided in the surface of the brick, the recess having an inner wall and the bore extending therefrom. The hanger may have a hole aligned with the bore, and the anchoring means may comprise a headed fastener extending through the hole in the hanger and wedged in the bore. The anchoring means may further comprise a tubular stud having an outer end portion with a head thereon, and having an inner end portion provided with at least one longitudinal slot, and a nail-like wedge; the hanger engaging the wall of the brick and having its hole aligned with the bore and the stud extending through the hole into the bore, the head engaging the hanger, and the nail-like wedge driven into the stud and wedging the inner end portion of the stud outwardly into tight engagement with the side of the bore to hold the stud in place.

Alternatively, the anchoring means may comprise an expansible sleeve within the bore, and a nail extending through the hanger hole and expanding the sleeve tightly against the side of the bore to fasten the hanger to the brick.

The recess may be in one side of the brick when it is upright, and the inner wall of the recess from which the bore extends into the brick may then be vertical, and the anchoring means may provide a pivotal connection between the hanger and the brick such that the hanger is arcuately displaceable about the bore axis into a position completely within the recess.

In a further embodiment of the invention, the refractory brick may have a top end and a downwardly extending recess in its top end, the recess extending through at least one side of the brick, and the brick having a vertical bore extending down from the bottom wall of the recess. The sheet metal hanger may be of tubular form disposed on its side in the recess in engagement with the bottom wall of the recess, the upper and lower sides of the hanger being provided with vertical openings therethrough aligned with the bore, and the upper opening being larger than the lower opening. The anchoring means may comprise a fastener extending down through the lower opening and wedged in the bore, the fastener having inside the hanger a head smaller than the upper opening and larger than the lower opening and engaging the hanger around the lower opening to fasten the hanger to the brick.

In case the recess is in the side of the brick, the hanger can be swung down into the recess until ready for use. If the recess is in the top of the brick, the hanger preferably never projects beyond the recess i.e. beyond the profile of the brick.

The invention extends also to a refractory brick provided with a recess having an inner wall from which a bore extends into the brick, the bore being of dimensions to receive anchoring means in engagement to connect a hanger to the brick.

The invention extends yet further to a refractory brick which has a top end and a downwardly extending recess in its top end, the recess extending through at least one side of the brick, and the brick having a vertical bore extending down from the bottom wall of the recess, the recess being of dimensions to receive a tubular metal hanger on its side, and the bore being of dimensions to receive anchoring means in engagement to connect the hanger to the brick.

Various embodiments of the invention are illustrated, by way of example, in the accompanying drawings, and described in the accompanying description.

In the drawings:

FIGURE 1 is a fragmentary side view of the upper end of a furnace block;

FIGURE 2 is a horizontal section taken on the line II—II of FIGURE 1;

FIGURE 3 is a fragmentary view of the block taken at 90° to FIGURE 1 and showing the hanger fastener about to be wedged into place;

FIGURE 4 is a vertical section through a modification of this invention;

FIGURE 5 is a side view of a further embodiment;

FIGURE 6 is a view taken at 90° to FIGURE 5, with part of the block broken away in vertical section; and

FIGURE 7 is a vertical section through the upper part of a further modification of this invention.

Referring to FIGURES 1, 2 and 3 of the drawings, a refractory brick **1** suitable for the roof of an industrial furnace is provided in one side of its upper end with a recess **2** that preferably extends entirely across the brick. Extending inwardly from the center of the vertical inner wall of the recess is a horizontal bore **3** that may be formed by moulding it into the brick originally or by drilling after the brick has been formed. The lower end of a metal hanger **4**, preferably a short length of sheet metal, engages the inner wall of the recess and overlaps the outer end of the bore. The lower end of the hanger is provided with a hole through it that is aligned with the bore. To fasten the hanger to the brick a headed fastener is used that extends through the hole in the hanger and into the bore, where it is tightly wedged. Although the hanger is held tightly against the brick, it can be disposed entirely in recess **2** until the block is ready to be hung, and then swung up to upright position as shown. This has the advantage of making it easier to pack, store and handle the blocks, because the hangers do not project from them and become bent or damaged.

Various types of fasteners may be used. A preferred type of fastener is formed from a tubular metal stud **6** that extends through the hanger and nearly the full length of bore **3**. The outer end of the stud is provided with a head **7** that engages the outer surface of the hanger. The inner end portion of the stud is encircled by radial ribs **8** and is slotted for about half its length to form a pair of opposed segments **9**. A nail-like wedge **10** is slidably mounted in the stud and normally extends out of its outer end as shown in FIGURE 3. After the stud has been inserted in the hole in the hanger and in the brick, the wedge is driven inwardly in the stud to spread apart its two segments **9** and cause the stud to engage tightly the side wall of the bore. The recess **2** should be just deep enough to prevent the fastener from projecting beyond the upwardly extended plane of the side of the brick below the recess.

The upper end of the hanger is provided with an opening **11**, or **11***a* to form a hook-like formation to receive a hook or the like, from which the hanger and brick are suspended. It will be seen that an inexpensive hanger

can be quickly attached to the brick and need not project from the boundary of the brick before the block is used.

In the modification shown in FIGURE 4, the fastener includes split expansible sleeve **15** that is inserted in a horizontal bore **16** in a refractory brick **17** before the hanger **18** is applied. A nail **19** then is inserted in a hole in the lower end of the hanger and driven into the sleeve to force the hanger up against the brick and expand the sleeve tightly against the wall of the bore to securely connect the hanger to the brick.

A different type of hanger is shown in FIGURES 5 and 6 and it is located in a different position. The top of the roof brick **21** is provided with a downwardly extending recess **22** that also extends out through at least one side of the brick. The recess that is illustrated extends entirely across the brick, which is the easiest way to make it. Midway between the ends of the recess its inner or bottom wall has a bore **23** that extends down into the brick a short distance. A hanger **24** is located in the recess at the upper end of this bore. The hanger is a rectangular tube made of sheet metal and has its upper surface flush with the top of the brick or slightly below it. The tube can be formed by rolling a strip of sheet metal into the desired shape and overlapping its end portions to form the bottom of the tube. The bottom has a hole **26** through it in line with bore **23**, while the upper side of the hanger sleeve is provided with a larger opening **27** also aligned with the bore. This hanger may be connected to the brick by a suitable fastener **28** extending through the lower hole in the sleeve and down into the bore. The fastener shown is the same type as used in the first embodiment of the invention described herein. The upper opening **27** in the hanger is larger than the head of the fastener so that the fastener can be inserted far enough for its head to engage the hanger around the lower hole. The fastener wedge **29** then is driven down into the stud by a suitable tool (not shown) extending down through the upper opening in the hanger sleeve.

This hanger not only does not project from the brick before use, but not even in use. It is designed to receive one arm of an inverted T-shaped bar, such as shown in dot-and-dash lines in FIG. 6, from which the block is suspended. The hanger is simple and inexpensive to make and is easily attached to the brick.

Referring to FIGURE 7 of the drawings, the hanger and anchoring means similar to that shown in FIGURE 4 of the drawings is shown, the only difference being that the brick **17** is not provided with a recess. The anchoring means may be the same as that shown in the other drawings.

I claim:

1. In a furnace roof block including a refractory brick provided with a recess in the upper portion thereof, and a sheet metal hanger for suspending the brick in the roof wall of the furnace, in which the hanger includes a suspended portion and an attachment portion the latter of which is attached to the body of the brick in said recess, the improvement in which the brick is provided with a bore extending into the body of the brick through the surface of a wall of the recess, a hole in the attachment portion of the sheet metal hanger, and a hanger-anchoring means comprising a sleeve extending into the bore in the body of the brick, said sheet metal hanger being pivotally mounted about the anchoring means and being pivotable to and from a position in which it is located in the recess and to and from a position in which the suspending portion of the sheet metal hanger projects

from the recess in the body of the brick, said anchoring means including means for wedging the sleeve in tight engagement with the wall of the bore in the body of the brick.

2. In a furnace roof block including a refractory brick provided with a recess in the upper portion thereof, and a sheet metal hanger for suspending the brick in the roof wall of the furnace, in which the hanger includes a suspending portion and an attachment portion the latter of which is attached to the body of the brick in said recess, the improvement in which the brick is initially provided with a bore extending into the body of the brick through the surface of a wall of the recess, a hole in the attachment portion of the sheet metal hanger, and a hanger anchoring means comprising a sleeve extending into the bore in the body of the brick, said sleeve being wedged within the wall of the bore and attaching the hanger to the brick, said sheet metal hanger being pivotally mounted about the anchoring means.

3. The combination of claim **1** wherein the sleeve includes an outer end portion with a head thereon and an inner end portion provided with at least one longitudinal slot, said sleeve extending into the bore with its head engaging the hanger, said wedging means comprising a nail-like wedge which pushes the inner portion of the sleeve outwardly into tight engagement with the sides of the bore to hold the sleeve in place.

4. In a furnace roof block including a refractory brick provided with a recess having a bottom wall, a bore extending through said bottom wall and into the body of the brick, a sheet metal hanger for suspending the brick in the roof wall of the furnace, said metal hanger being in tubular form disposed on its side in the recess in engagement with the bottom wall thereof, the upper and lower sides of the hanger being provided with vertically aligned openings located in alignment with the bore in the brick and a hanger anchoring means comprising a sleeve extending through the lower opening in the hanger into the bore in the body of the brick and a wedging means for maintaining the sleeve in tight engagement with the wall of said bore, the upper opening in the hanger being larger than the lower opening to provide an access opening for inserting the anchoring means through said upper opening into said lower opening and into said bore for anchoring the hanger to the brick.

References Cited by the Examiner

UNITED STATES PATENTS

917,907	4/09	Taylor	85—23
1,120,369	12/14	Booraem et al.	85—23
1,559,619	11/25	Karitzky	85—23
1,601,796	10/26	Gordon	85—23
1,729,721	10/29	Hogan	248—28 X
2,266,892	12/41	Mullen	50—481 X
2,517,876	8/50	Heuer	110—99
2,870,985	1/59	Martin et al.	248—324
2,991,736	7/61	Kivala et al.	110—99
3,034,457	5/62	Heuer	110—99

FOREIGN PATENTS

70,691	8/93	Germany.
862,095	3/61	Great Britain.

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

FREDERICK KETTERER, JAMES W. WESTHAVER, *Examiners.*