

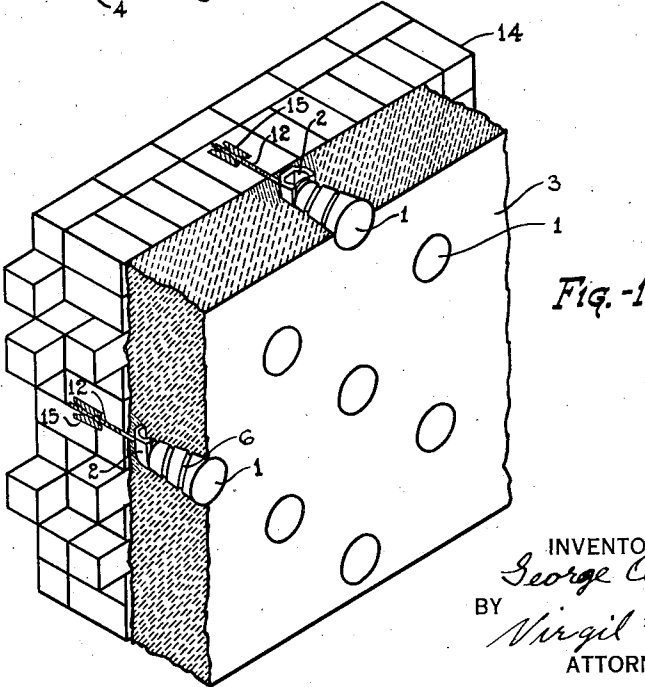
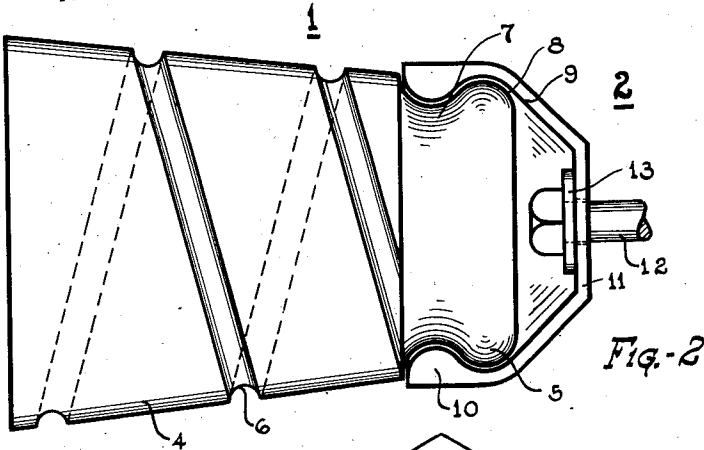
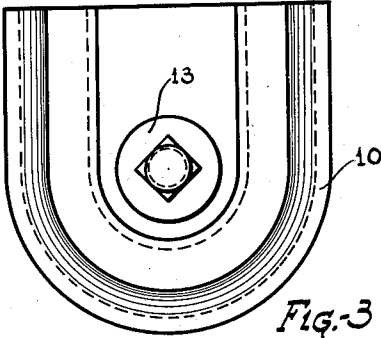
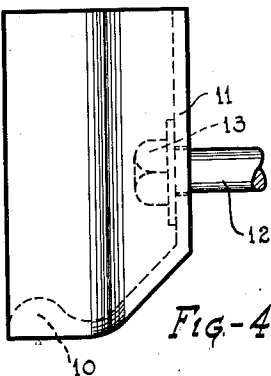
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REFRACTORY ANCHOR

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REFRACTORY ANCHOR

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7 Claims. (Cl. 72-101)

This invention relates in general to the anchoring of monolithic walls and in particular to the anchoring in place of the monolithic refractory linings of furnaces.

Monolithic refractory linings of furnaces, whether of the setting or the packed in types, when put in place have considerable strength and hardness, however, once the furnace is brought up to heat the refractory linings change in character, particularly in strength and hardness. The heat of the furnace will glaze the face of the linings to a depth of a few inches and will cause the remainder of the linings to lose strength and generally approach a clay-like character. In view of this and the fact that there is appreciable movement of the lining due to expansion and contraction it has been found necessary to anchor the monolithic refractory linings to some stable support. It has become the practice to employ anchors which are fastened to an ordinary brick wall, or other stable support, and extend partly into the monolithic refractory lining. Certain of these anchors have been made of metal while others have been made of refractory material similar to the refractory lining. Neither type of anchor has been found satisfactory. The metal anchors are not satisfactory as they corrode and oxidize rapidly and have an extremely short life. The refractory anchors heretofore proposed are also not satisfactory. These anchors usually include T-shaped slots at one end thereof for housing the end of the metal member that supports the anchor on the outer wall. Under the stress and strain attendant ordinary operation of the furnaces, the walls defining the T-shaped slots quickly give way with the result that the refractory linings are not supported as intended and soon collapse. The refractory anchors as well as the metal anchors have the further disadvantage that since they are flat they do not positively grip the monolithic linings in all directions. Furthermore, neither the refractory anchors nor the metallic anchors extend throughout the thickness of the wall and when the hardness of the wall changes due to the effect of the heat of the furnace their supporting function decreases to the minimum.

I have found that all of the disadvantages of the previous anchors can be easily overcome by the provision of a generally conical shaped refractory anchor that extends for the full thickness of the refractory lining and is supported in position by a metallic means which surrounds the small end of the anchor.

It is therefore the principal object of this invention to provide a refractory anchor that extends throughout the thickness of the refractory lining and is supported in position by a metallic housing that surrounds one end of it.

It is also an object of this invention to provide a refractory anchor that extends throughout the thickness of the monolithic refractory lining and is supported in position by a metallic member that surrounds one end of it and is so proportioned relative to that end of the anchor that the anchor has a limited freedom of movement in all directions with the monolithic refractory lining.

Other objects and advantages of the invention will be apparent from a consideration of the following description of a preferred embodiment thereof taken with the accompanying drawing, in which,

Fig. 1 is a fragmentary perspective view showing the present invention applied to a furnace wall and refractory monolithic lining,

Fig. 2 is a plan view of the anchor assembly,

Fig. 3 is a front view of an anchor cup, and

Fig. 4 is a side view of an anchor cup.

The anchor assembly includes preformed refractory anchor 1 and metallic cup member 2. Anchor 1 is preferably made of the same fire brick material as monolithic refractory lining 3. After anchor 1 is formed it is subjected to sufficient heat to glaze it thereby imparting to it strength and hardness. Anchor 1 has a frusto-conical body portion 4 and a small end portion 5. Body portion 4 has a helical groove 6 formed thereon that runs from the small end of portion 5 to substantially the base thereof. Small end portion 5 has a circumferential groove 7 and a circumferential shoulder 8.

Metallic cup member 2 is made of any metal of good heat and oxidation resisting qualities, at present I prefer to make cup 2 out of cast iron though such alloys as 4-6 chrome steel and 18-8 chrome nickel steel may be used. Cup member 2 includes a recess 9 and inwardly directed shoulder 10. Recess 9 and shoulder 10 are somewhat larger than shoulder 8 and circumferential groove 7 so that when small end portion 5 is positioned in cup member 2 refractory anchor 1 has a limited freedom of movement in all directions in cup member 2. Cup member 2 is opened at its top and at its front face to allow the insertion of small end 5 of refractory anchor 1 therein. The back wall 11 of cup member 2 has a hole therein through which the shank of fastening bolt 12 may be passed. The hole just

mentioned is somewhat larger than the shank of bolt 12 so that cup member 2 can have some movement relative to bolt 12. A washer 13 is placed between the head of bolt 12 and wall 11.

5 The outer wall against which monolithic refractory wall 3 is laid may be either a common brick wall as shown or may be a metal wall of the usual construction. Brick wall 14 is built up in the usual manner but at chosen locations
10 standard metal expansion shields 15 are positioned between bricks, if necessary recesses may be formed in the brick to accommodate metal expansion shields 15. After brick wall 14 is completed metallic cup members 2 are positioned.
15 This is done by placing a washer 13 in front of the hole in each of metallic cup members 2, passing a bolt 12 therethrough and then screwing bolts 12 into standard metal expansion shields 15 so that standard metal expansion shields 15
20 grip the shanks of the bolts and hold them fixedly in position. I prefer that bolts 12 be so screwed into standard metal expansion shields 15 that the back surface of each of the metallic cup members 2 is separated from the surface of the
25 brick wall 14 by a distance of about one half of an inch. Heat insulation packing material containing fibrous asbestos is then packed between brick wall 14 and the back of each of metallic cup members 2 as shown in Fig. 1. This is done
30 for the purpose of shielding metallic cup members 2 and also to provide a compressible packing between metallic cup members 2 and brick wall 14.

After cup members 2 are positioned the laying of monolithic refractory wall 3 is commenced. When monolithic refractory wall 3 rises to about the level of the first, or the first horizontal row, of cup members 2, the first, or the first horizontal
40 row, or refractory anchors 1 is positioned in its one, or ones, of cup members 2. Wall 3 is then laid around refractory anchor 1, or refractory anchors 1, so as to assure intimate contact therebetween. As before stated, refractory anchors 1
45 are positioned by slipping them through the tops of cup members 2. This procedure is continued until monolithic refractory wall 3 is completed.

When monolithic refractory wall 3 is completed, refractory anchors 1 are embedded therein and extend substantially the full thickness
50 thereof. Thus by reason of the conical shape of portion 4 and the helical groove 6 refractory anchor 1 is completely tied to monolithic refractory wall 3 and there can be no relative movement between them. Also this will be true for the full
55 useful life of monolithic refractory wall 3 as refractory anchor 1 will burn away with monolithic wall 3.

By reason of the arrangement just described monolithic refractory wall 3 is firmly supported
60 and can move relative to brick wall 14 a limited amount in all directions.

While I have described my invention in connection with a monolithic refractory wall it should
65 be obvious that it is not limited thereto and can be used successfully to support all types of monolithic walls, ceilings and arches.

I claim:

70 1. A fire brick anchor member adapted to be used in supporting plastic fire brick walls which comprises a generally frusto-conical body portion that is reduced adjacent its small end to provide a circumferential groove and a circumferential
75 shoulder therearound.

2. A fire brick anchor member adapted to be

used in supporting fire brick walls which comprises a generally frusto-conical body portion that is reduced adjacent its small end to provide a circumferential groove and a circumferential
5 shoulder, there being a helical groove on the surface of said body portion that extends from said circumferential groove to the large end of said body portion.

3. An anchor device for plastic fire brick walls comprising a generally frusto-conical fire brick
10 member whose small end includes a circumferential groove and a circumferential shoulder, a metallic cup member adapted to house said groove and shouldered end of said frusto-conical member.
15

4. An anchor device for plastic fire brick walls comprising a generally frusto-conical fire brick member whose small end includes a circumferential groove and a circumferential shoulder, and a metallic cup member having an open top and
20 an open face, said cup member including an inwardly directed shoulder adjacent said front face and a recess adjacent said inwardly directed shoulder, said open top permitting insertion and removal of said frusto-conical member in said
25 cup member, said inwardly directed shoulder being adapted to fit in the groove of said frusto-conical member and said shoulder of said frusto-conical member being adapted to fit in said recess.
30

5. An anchor device for plastic fire brick walls comprising a frusto-conical brick member that includes a small end having a circumferential groove and shoulder, and a cup member having
35 an open top and an open face, said cup member including an inwardly directed shoulder adjacent said front face and a recess adjacent said inwardly directed shoulder, said inwardly directed shoulder and said shoulder being adapted to fit
40 in said groove and recess respectively, there being sufficient clearance between said inwardly directed shoulder and said groove and between said shoulder and said recess to allow a limited movement in all directions of said frusto-conical member relative to said cup.
45

6. A furnace construction including an outer wall, an inner wall of plastic fire brick material, preformed frusto-conical members of similar fire brick material embedded in said inner wall with
50 their small ends adjacent said outer wall, each of said small ends being reduced to provide a circumferential groove and a circumferential shoulder, and metallic cup members fastened to said outer wall, each of said cup members engaging
55 the groove and shoulder of a frusto-conical member to support the frusto-conical member for limited movement in all directions.

7. A furnace wall construction including an outer wall, an inner wall of plastic fire brick material, preformed frusto-conical members of similar fire brick material embedded in said inner wall with their small ends adjacent the outer wall, each of said frusto-conical members having
60 a helical groove running the length thereof and each of said frusto-conical members having its small end reduced to provide a circumferential groove and a circumferential shoulder, and metallic cup members fastened to said outer wall, each of said cup members engaging the groove
65 and shoulder of a frusto-conical member to support the frusto-conical member for limited movement in all directions.
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