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WALL TIE

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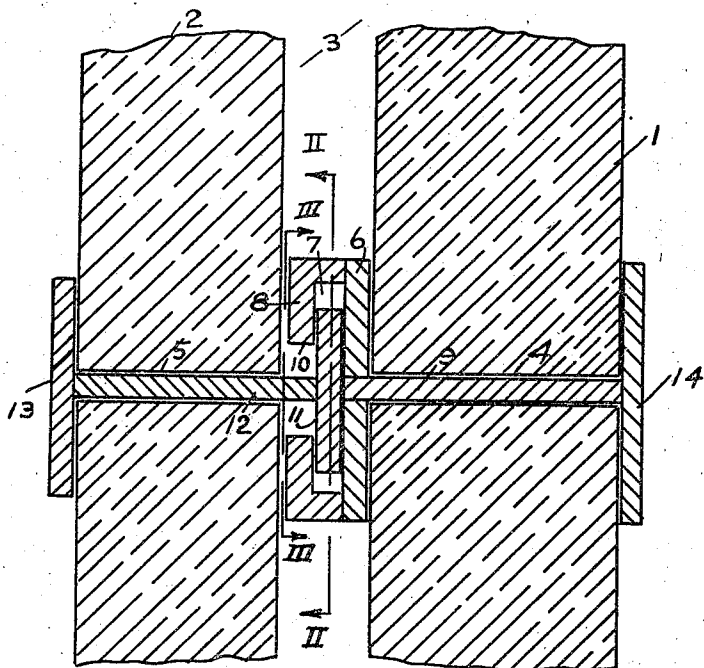


Fig. 1

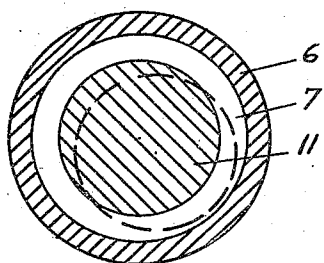


Fig. 2

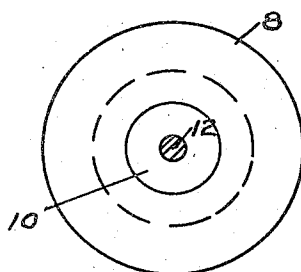


Fig. 3

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WALL TIE

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6 Claims. (Cl. 72-103)

This invention refers to tying means for a pair of walls and particularly to the type thereof permitting lateral relative movement between said pair of walls.

In certain types of building constructions it often happens that a pair of masonry walls are constructed closely together, and are mutually supported by each other, but under conditions which cause them to move from time to time laterally with respect to each other. A frequent example of this is in the construction of large furnaces, wherein the main walls of the furnace are constructed of one type of brick and the fire resistant lining of the furnace is constructed of another type of brick. The two kinds of brick thus involved have different coefficients of expansion and therefore will expand at different rates as the furnace is heated. Further, the fire-brick lining being directly exposed to the furnace heat will become much hotter than the main walls of the furnace and will for this reason also expand differently than the outer walls. A reverse situation occurs when the furnace cools. Due then, to these differences in both rates and amounts of expansion, the main walls of the furnace and the fire-brick lining will move laterally with respect to each other. While this motion is not usually of any great extent, it is accompanied by great forces. Ordinary bolts, even of considerable size, which are used to tie these walls together are often found sheared off at the boundary between the walls.

Similar situations occur where a masonry wall is tied to and supported by steel girders or beams. Since the masonry and the steel will have widely different coefficients of expansion, even ordinary diurnal temperature changes will often cause a substantial amount of relative lateral movement. In various other phases of furnace, building, or other similar construction, it is necessary to hold together elements undergoing different amounts of expansion or contraction and the same problem arises.

Although several attempts have been made to provide tying means for situations of this sort, insofar as I am aware none of them have been entirely satisfactory. Some of them require a considerable space to exit between the two elements. For these, in the case of furnace, their use is limited only to those conditions where it is desirable to have a cooling stream of air pass between the walls, or for some other reason it is permissible to space these walls a substantial distance apart. Other kinds of tying means rely on flexibility to permit the lateral motion

above mentioned and in doing so often sacrifice a great deal of strength.

It is accordingly desirable to provide tying means for a pair of dissimilarly expanding or contracting elements which will permit a small amount of lateral relative movement between said elements and which will require only a small space between them. It is further desirable that said means be such that in the case particularly of masonry walls, the two elements can be placed in contact with each other with only a small amount of additional effort in installation and without impairing the action of the tying means.

Accordingly, the principal object of my invention is to provide means for tying two adjacent dissimilarly expanding and for contracting elements together, which means will permit a small amount of lateral relative motion between the said two elements.

A further object of my invention is to provide a tying means for a pair of elements as aforesaid, such as walls, which will permit said elements to be closely adjacent each other.

A further object of my invention is to provide a tying means as aforesaid which will permit said two elements to be in contact with each other without impairing the action of the portion of said means having the lateral relative movement.

A further object of my invention is to provide tying means as aforesaid which are simple, sturdy and capable of economical manufacture.

A further object of my invention is to provide tying means as aforesaid which is capable of easy modification for application to a wide variety of situations.

Further and similar objects and purposes of my invention will be apparent to those acquainted with this type of device upon the reading of the following specification and inspection of the accompanying drawing.

In the drawing:

Figure 1 is a view in central section of my improved tying means applied to a pair of walls.

Figure 2 is a section taken on the line II-II of Figure 1.

Figure 3 is a section taken on the line III-III of Figure 1.

The construction of my device is simple and may be readily understood. In Figure 1 there is shown masonry wall 1 spaced a small distance from the masonry wall 2. The intermediate space 3 will of course vary in magnitude with the size of the installation but a space of the order of about one inch will be ample for most ordinary

cases. The openings 4 and 5 are provided through the walls 1 and 2 respectively for receiving the tying rods of the hereinafter described device. These openings will often, but not necessarily, exist as a trough in one course of bricks into which the tying rods are laid and then covered by another course of bricks. They may extend all of the way through a wall as shown, or, as in the case of a fire brick furnace lining, the opening will go only part way through the fire brick in order to leave some masonry to protect the metal parts from the furnace heat.

The rod 9 extending through the opening 4 in the masonry wall 1 is made in whatever length is required by the thickness of said wall. At the end remote from the intermediate space 3 there is provided a cross member 14 which may be a bar, a disk, a pivoted arm or any other conventional means suitable for bearing against the surface of the wall or engaging an internal opening within the wall. The other end of said rod is firmly fixed into the center of a circular disk 6. A cup-shaped member 8 cooperates with the disk 6 to provide a circular chamber 7. The disk 6 and the cup-shaped member 8 are firmly fastened together in any convenient manner, as by welding, brazing, or other suitable means for holding the parts tightly against separation.

In the bottom of the cup-shaped member 8 there is provided a circular opening 10 of size somewhat larger than the rod 12. Within the circular chamber 7 there is located a circular plate 11 which fits closely against the walls of said chamber so that there can be no motion of said plate in a direction parallel to the axis of the rod 9 but there is permitted free limited motion of said plate in any direction perpendicular to said axis.

Fixed firmly to the center of said plate is the tying rod 12. This extends through the opening 5 in the wall 2 and has at its end remote from the disk 11 any suitable holding means 13, which holding means will be conventional and selected to provide whatever is needed to meet the requirement of a particular installation.

As the device is installed the disk 11 will be located substantially in the center of the circular chamber 7. In the form of the device shown in the drawing where the backing members 13 and 14 are fixed rigidly with respect to the tying rods 9 and 12, it is contemplated that the openings 4 and 5 will be grooves or troughs cut into the sides of a particular course of bricks so that said rods are laid into said grooves as the wall is being built. In other cases, the backing members, or one of them, may be pivoted to permit entry into any opening after the wall is built. In still other cases, the rods may be threaded for engagement by a nut and washer. This, however, is conventional and of no importance to my invention.

As one wall moves laterally with respect to the other wall, the disk 11 will move laterally within chamber 7 to the limits permitted by the walls of said chamber. In any given installation it will be an easy matter to provide said chamber large enough to permit whatever movement is required. The dotted line in Figure 2 indicates a possible position of said disk 11 after such movement.

In the event that it is desired to place the two masonry walls in contact with each other, it will be a comparatively simple job to provide a recess in either or both of said walls to receive the parts of my device (parts 6, 7, 8 and contents thereof) which are in Figure 1 shown as occupying the intermediate space 3. It will be evident that this

will in no manner interfere with the operation of my device, either as to the firmness of its holding the walls together or as to its ability to permit relative lateral movement.

It will be evident that the embodiment of my invention here chosen as an example to illustrate its principles may be varied widely to fit a considerable variety of circumstances, but all of said variations will be included within the scope of my hereinafter appended claims excepting as said claims expressly provide otherwise.

Having thus fully disclosed and described my invention, I claim:

1. In means for holding a pair of dissimilarly expanding and contracting elements against movement away from each other while permitting limited relative movement thereof parallel to each other, the combination: a first means engaging one element and a second means engaging the other element; a plate operatively affixed to said first means substantially parallel to one of said elements; means defining a chamber substantially parallel to said first means and substantially surrounding said plate, said plate being of smaller dimension in all lateral directions than the corresponding dimensions of said chamber whereby to permit movement of said plate with respect thereto in any direction parallel to said limited relative movement but holding it against movement with respect thereto in a direction perpendicular to said limited relative movement; and said last means operatively affixed to said second tying means.

2. In means for holding a pair of dissimilarly expanding and contracting walls against movement away from each other while permitting limited movement of said walls parallel to each other, the combination: a box member having a chamber therein substantially parallel to the general plane of said walls and an opening through the side thereof; a plate within said chamber said plate being of smaller lateral dimension in all directions than the corresponding dimensions of said chamber; means holding one wall connected to said plate and means holding the other wall connected to said box member.

3. In means for holding a pair of dissimilarly expanding and contracting constructional elements against movement away from each other while permitting limited movement of said elements parallel to each other, the combination: a box member having a chamber therein substantially parallel to the general plane of said elements; a plate within said chamber said plate being of smaller lateral dimension in all directions than the corresponding dimensions of said chamber whereby said plate is movable within said chamber in a plane parallel to the plane of relative movement between said elements; means holding one element affixed to said plate and means holding the other element affixed to said box member.

4. In means for holding a pair of masonry walls against movement away from each other while permitting limited movement of said walls parallel to each other, the combination: a box member having therein a circular chamber provided with flat and parallel end walls and an opening through one of said end walls; a circular plate within said chamber slidably engaging the flat and parallel end walls of said chamber but being of less diameter than said chamber; a rod affixed to said box member and in cooperation with backing means holding said box member fixedly with respect to one wall; a rod extending through said

opening affixed to said plate and in cooperation with backing means holding said plate fixed with respect to said other wall; said plate movable within said chamber in a plane parallel to the plane of movement between said walls.

5. In means for holding a pair of structural walls against movement away from each other while permitting limited movement of said walls substantially parallel to each other the combination: a box member having therein a chamber having an end wall parallel to the plane of movement to be permitted between said structural walls and an opening through said box wall; a plate within said chamber slidably engaging said box wall but being of less lateral extent in all directions than the corresponding extent of said chamber; means affixed to said box member holding it fixedly with respect to one of said walls; means extending through said opening affixed to said plate and holding said plate fixedly with respect to said other wall; said plate

being movable within said chamber in a plane substantially parallel to the plane of movement between said walls.

6. In means for holding a pair of structural walls against movement away from or toward each other while permitting limited movement of said walls substantially parallel to each other, the combination: a plate held fixedly with respect to one of said walls; a second plate held fixedly with respect to the other of said walls closely adjacent and parallel to said first plate and being of smaller lateral extent in all directions than said first plate; means affixed to said first plate extending therefrom and overlapping said second plate by which at least partially to define a chamber of greater lateral extent in all directions than said plate whereby said plate will be movable within said chamber substantially parallel to the plane of movement between said walls.

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