June 12, 1928. 1,673,640

G. RAU

WALL

Filed March 4, 1927

Fig. 1.

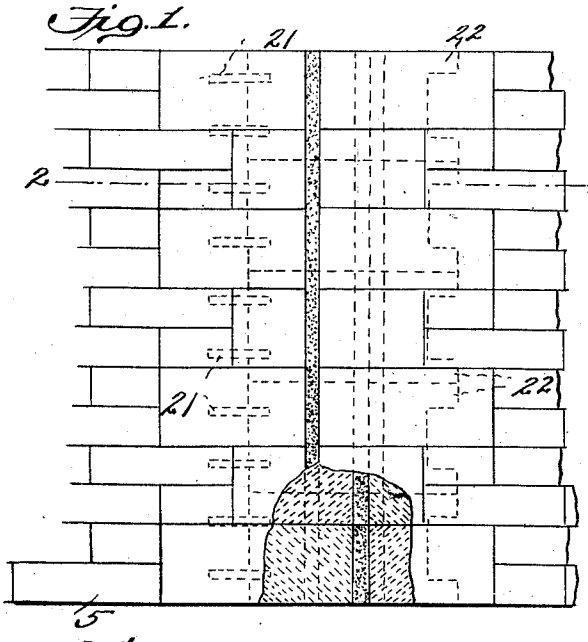


Fig. 3.

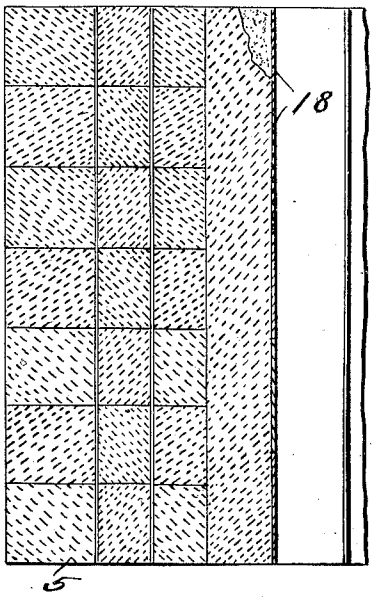


Fig. 2.

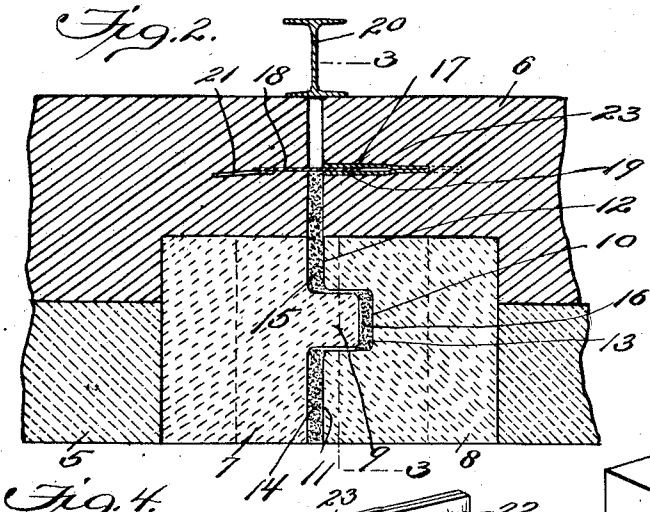


Fig. 5.

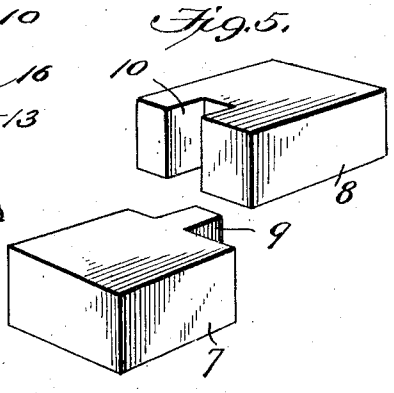
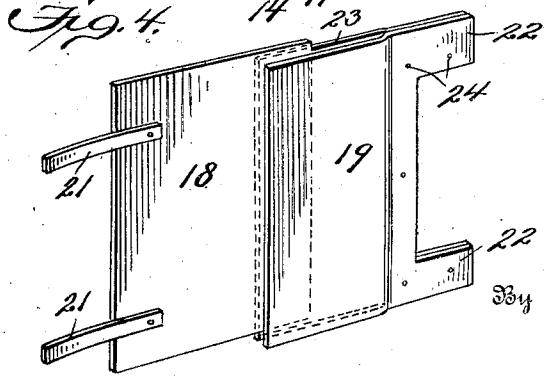


Fig. 4.



Inventor
Gustav Rau

By James L. Norris

Attorney

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UNITED STATES PATENT OFFICE.

GUSTAV RAU, OF KANSAS CITY, MISSOURI, ASSIGNOR TO RAU CONSTRUCTION COMPANY, OF KANSAS CITY, MISSOURI, A CORPORATION OF MISSOURI.

WALL.

Application filed March 4, 1927. Serial No. 172,889.

This invention relates to walls particularly adapted for use in connection with furnaces and the like.

The essential object of the invention is to provide compensating expansion features as a part of the wall construction and also incorporated in the wall, to avoid cracking or bulging of the wall setting by permitting expansion and contraction of the wall to such an extent as to prevent the components of the wall from separating and the wall ends thus loosened from falling inwardly or outwardly with obvious disadvantages in furnace or walls subjected to intensive heat.

A further object of the invention is to generally improve outer and intermediate walls of various applications subjected to intense heat, to materially decrease deterioration of such walls and provide for installation of more durable and economical wall structures for use with furnaces and boilers and the like.

The improved wall structure comprises a novel form of expansive joint means including blocks alternately formed with tongues and grooves assembled to provide joints of greater width than ordinarily used adjacent to the greatest heat area and to utilize in connection therewith an advantageous joint filling, and further to insert a secondary joint expansive controlling means in the portion of the wall which is less affected by the heat.

The invention further consists of the construction and arrangement of the several parts which will be more fully hereinafter described and claimed.

In the drawing:—

Figure 1 is an inside elevation of a portion of a wall, partially broken away, and embodying the features of the invention.

Figure 2 is a horizontal section on the line 2, 2, Figure 1.

Figure 3 is a transverse vertical section on the line 3, 3, Figure 2.

Figure 4 is an enlarged detail perspective view of the secondary expansive means.

Figure 5 is an enlarged detail perspective view of two of the preferred block components of the improved wall.

In addition to being particularly adapted for boiler or furnace walls which are subjected to intensive heat, the improved wall structure is also intended to be used in stills, bake ovens and other similar walls and also utilized in boilers, furnaces, bake ovens, and other walls that may be set in battery and where it may be necessary to dispose the improved blocks and secondary expansive means in the dividing or center walls to permit the latter to expand and contract with the same advantages and economy of wall installation. Hereafter when the word "wall" is referred to in the subjoined description, it will be understood that any wall is intended to be indicated by the specific wall to which reference is made, and moreover, the expansion and contraction of the improved walls will have therein the improved components and joint structures so arranged that compensation will be made for more or less expansion and contraction in accordance with the temperature to which the wall is subjected.

As shown in the accompanying drawing, the wall comprises an inner fire brick lining 5 which is located adjacent to and receives the greatest heat influence, and an outer brick wall 6 which may be considered as the sustaining wall structure. The inner or lining wall, to effectively carry out the features of the invention, has fire brick blocks 7 and 8 interposed therein, each block 7 having a longitudinally projecting tongue or tenon 9 which is fitted in a mortise or recess 10 of slightly greater width than the thickness of the tongue or tenon 9, and between the contiguous faces of the blocks 7 and 8 a comparatively wide joint 11 and 12 is formed, and between the end edge of the tongue or tenon 9 and the wall of the mortise 10, the same dimension of joint space is provided, as at 13. The joint space 11 extends fully through the inner side of the fire brick lining 5, and is preferably filled with wet asbestos 14, the latter extending to the adjacent sides of the several tongues or tenons 9, the joint space 12 which is in transverse alinement with the joint space 11 being filled with dry asbestos, as at 15, and the joint space 13 between the tongue or tenon and the end wall of the recess or mortise 10 being also filled or packed with dry asbestos 16. The blocks 7 and 8 are superposed in regular order through the vertical inner side of the wall, and the joint construction just described likewise continues vertically between the blocks. The joint

space 12 extends outwardly beyond the outer limitations or sides of the blocks 7 and 8 and continues through the outer portion of the wall 6, said joint space 12 being only partially filled with dry asbestos beyond the outer sides of the blocks 7 and 8. The asbestos filling 15 continues outwardly through the outer portion 6 of the wall to a secondary expansive joint controlling means 17 comprising two components 18 and 19, the component 18 being in the form of a rectangular sheet metal plate and the component 19 of a doubled sheet metal plate to movably receive a portion of the plate 18. This secondary expansive means extends across the joint space continuing outwardly from the rear sides of the blocks 7 and 8, and is embedded in the outer side or portion 6 of the wall. The joint space from this secondary expansive means to the outer face of the outer side or portion 6 of the wall is free of filling and thereover will be applied the usual buckstay means 20. Each plate 18 has metal anchor strips 21 projecting from the end thereof and similarly each plate 19 has the doubled metal intermediately cutaway to provide upper and lower anchor strips 22. The metal anchor strips 21 are suitably fastened to each plate 18, and the doubled or bent receptive plate 19 beyond the seat or slot 23 formed therein to receive the companion plate 18, is tightly secured by rivets or other similar fastenings 24, as clearly shown by Figure 4. This secondary metal expansive means serves to prevent the asbestos filling 15 from falling outwardly and also acts as an air seal, and further with the aid of the asbestos between the same and the outer sides of the blocks 7 and 8 infiltration of cold air into the furnace or other device to which the wall is applied is prevented. Furthermore, this secondary expansive metal point means is built into the brick work and is held in place so that the component 18 will have movement relatively to the component 19 without liability of being obstructed in the expansive and contractive function thereof in accordance with the expansion or contraction of the wall in which said metal joint means is mounted.

Wet asbestos filling 14 is used in the inner joint space 11 to prevent the same from falling out of place, after heat is applied in the furnace or other wall and influences the wall, the latter will expand and cause this joint to entirely close and thus hold the wet asbestos in place. Furthermore, asbestos is used as a filling in the several parts of the open joints 11, 16 and 12 to prevent dirt from falling into the joint and also to obstruct the passage of flame through the crevice thus formed and which is further obstructed by the tongue and mortise jointure of the blocks 7 and 8. The provision of the tongues or tenons 9 and the mortises or recesses 10 is to prevent the wall or walls in which said blocks are installed from moving in any other direction except back and forth as the said wall or walls become heated and cooled. Furthermore, the blocks 7 and 8 may vary in length in certain wall constructions, and the difference in dimensions between each tongue or tenon and the mortises or recess 10 is to allow for expansion and contraction as heretofore indicated and also to prevent fracturing of the tenons which would be the case if restricted and stick in the mortises or recesses therefor. In many constructions the metal expansive joint will not be required in the dividing or center walls, the blocks with the tongues or tenons and the mortises or recesses being all that is necessary in use to compensate for the expansion and contraction of the joints in these particular walls. However, where the metal expansive joint means is installed, the plate 18 will be free to slide outwardly from and into the seat 23 of the receptive plate 19.

The improved joint blocks forming the primary expansive means and metal expansive means will be ordinarily continued upwardly through the entire wall, as indicated by dotted lines in Figure 1, and these several joint components always will be maintained in position for effectively functioning in the walls in which they are located. In addition, the secondary metal expansive joint means will also serve as a binding element relatively to the wall in which it is installed, and the two expanding joint structures including the blocks 7 and 8 and the expansive joint metal means will have a close cooperation in rendering the operation of the wall or walls effective in their expansion and contraction.

What is claimed as new is:—

1. A wall of the class specified, consisting of an outer sustaining wall and an inner refractory wall having blocks with movable interfitting tongues and recesses, an open space extending transversely through both portions of the walls and also between the ends of the tongues and the end walls of the recesses therefor, metal expansive means disposed in the outer sustaining wall and comprising an element extending and telescopically fitted in relation to a remaining doubled element, the metallic expansive means forming intermediate closing means, an open joint space extending transversely through both portions of the walls and between the ends of the tongues and the end walls of the recesses for the tongues, and a filling consisting of primary wet asbestos in the inner portion of the joint space up to the tongues of the blocks and dry asbestos in the joint space between the ends of the tongues and end walls of the recesses for the latter and also between the outer sides of the tongues

and to the secondary metallic expansive joint means.

2. A wall of the class specified, consisting of an outer sustaining wall and an inner refractory lining wall including a series of blocks provided with interfitting separating means, an open joint space extending transversely through both portions of the wall and also between the ends of the interfitting separating means of the blocks, a secondary metallic expansive joint means embedded in the outer wall and consisting of a single plate having anchoring means movably associated with a doubled plate provided with a seat recess therefor and also having anchoring means, the secondary expansive joint means extending across the open joint space intermediately of the outer wall and providing an outer closure for a portion of the outer joint space, and a filling of primary wet asbestos in the inner portion of the joint space and dry asbestos between the ends of the interfitting means of the blocks and betwen the outer portion of the said blocks and the secondary expansive joint means.

3. A wall of the class specified, comprising an outer sustaining wall structure and an inner lining wall of a refractory character comprising blocks respectively provided with movable interfitting tongues and recesses, joint spaces being transversely formed through the wall and also between the ends of the tongues and end walls of the recesses and also between the side walls of the tongues and the adjacent similar walls of the recesses, and a filling of primary wet asbestos in the inner portion of the joint space up to the said tongues, and the joint spaces between the ends of the tongues and the end walls of the recesses and the side walls of the tongues and side walls of the recesses and the remaining portions of the joint spaces having a filling of dry asbestos.

In testimony whereof I have hereunto set my hand.

GUSTAV RAU.