Sept. 22, 1942. W. H. MARCHANT 2,296,391

SUSPENDED FURNACE WALL

Filed Feb. 28, 1940

Fig. 1.

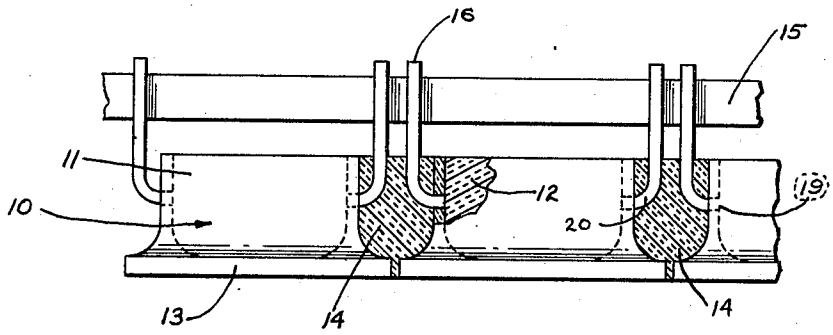
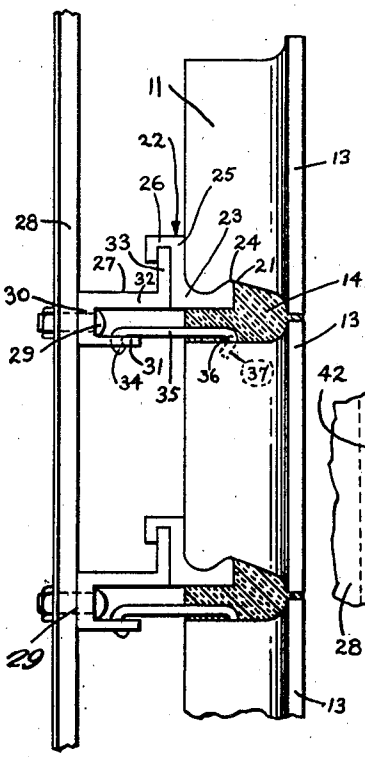


Fig. 4.

Fig. 2.



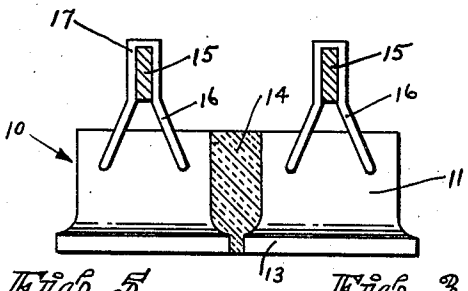


Fig. 5.

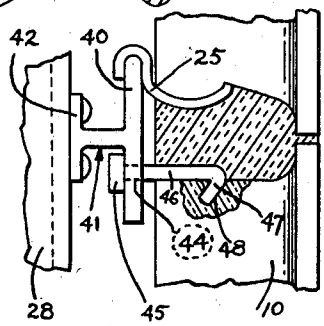
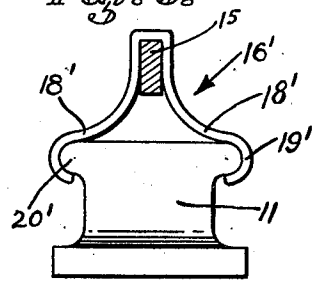


Fig. 3.



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SUSPENDED FURNACE WALL

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3 Claims. (Cl. 72—101)

This invention relates to furnaces and the like and particularly pertains to a method and means of constructing a suspended furnace wall.

In the construction of structures subject to the action of high temperature, such as furnaces, stills and other heat treating apparatus, it is desirable to provide the heat enclosing chambers with walls of heat resisting materials and in certain instances heat insulating materials, said walls being of composite construction whereby the separate wall elements may be readily hung in position and heat sealed with relation to each other in a manner to insure that the elements may be readily installed or removed separately, and to further insure that they may expand and contract independently without restriction from their hangings, thereby preventing cracking of the walls and allowing them to be assembled readily or dismantled. It is the principal object of the present invention to provide a suspended furnace wall structure capable of use in ceilings or side walls, and which structure embodies the use of separate units of refractory material designed to cooperate with hanging and supporting elements whereby the units may be mounted separately and individually to form a composite wall or ceiling structure, the units being capable of independent movement with relation to each other and allowing for their independent expansion and contraction without placing a damaging strain upon the entire wall of which they are a part.

The present invention contemplates the provision of separate refractory elements designed to be assembled to provide a relatively continuous refractory face in a wall or ceiling structure, and which elements are fitted with hanging or support members to hold them in position individually and independently of each other whereby a composite wall is formed, the individual units of which are capable of expansion and contraction with relation to each other and their hangings or supports.

The invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a fragmentary view in elevation of an element of which the present invention is concerned, showing the manner in which it is hung to provide a ceiling.

Fig. 2 is a fragmentary view in transverse section and elevation showing the manner in which the ceiling elements and their hangers are associated.

Fig. 3 is a view showing another type of ceiling hanger.

Fig. 4 is a fragmentary view in side elevation showing the manner in which the side wall elements are supported to be held in position and to prevent tipping.

Fig. 5 is a fragmentary view showing another form of side wall hanger.

Referring more particularly to the drawing, 10 indicates a refractory unit which may be of the type indicated in my co-pending application entitled "Heat resisting unit" and in which a shell 11 was provided formed of refractory material and filled with a mass of heat insulating material 12. In this particular type of structure a slab 13 was formed on the inner face of the shell and was presented to the action of heat within a heat chamber constructed therefrom. The body of the shell 11 is a box-like structure, the dimensions of which are less than those of the slab 13, thus insuring that when the contiguous edges of the slabs 13 are substantially together a clearance space 14 will occur entirely around the perimeter of the box-like portion of the shell to receive a suitable material such as a plastic, whereby the courses formed by the units 10 may be heat sealed. The spaces 14 also provide for the introduction of supporting brackets or hangers which interlock with the refractory units and are held in position by the plastic material filling the spaces 14. For ceilings it is preferable to use the refractory units 10 as indicated in Fig. 1 of the drawing. Here it will be seen that bars 15 extend horizontally, and as indicated in Fig. 2 are disposed with their greater width lying in a vertical plane. It will be understood, of course, that other types of structural elements may be used instead of the flat bar as here shown. The supporting bars 15 carry hangers 16. These hangers are bent upon themselves to form a U-shaped crotch 17 which fits over the bars 15 and has outwardly and downwardly extending legs 18. These legs terminate in prongs 19 which project substantially at right angles to the plane of the hangers and extend into pockets 20 formed in the faces of the walls of the shell 11.

In Fig. 3 of the drawing another form of ceiling hanger is disclosed. This structure is substantially the same as that disclosed in Figs. 1 and 2 of the drawing except that the hangers 16' have legs 18' terminating in hooks 19'. These engage ribs 20' along the sides of the shell 11.

While it is possible to assemble a side wall by the use of the means shown in Figs. 1, 2 and 3 of the drawing, it may be preferable to use hangers of the type shown in Figs. 4 and 5 for the side wall elements. In the form of the invention dis-

closed in Fig. 4 the refractory units 10 are disposed with their slab portions 13 in a vertical plane and the shell portion 11 projecting horizontally and outwardly therefrom. The lower wall of the shell is formed with a transverse recess 21 to receive an angle hanger 22. This hanger has a horizontal leg 23 extending beneath the shell portion 11 of the unit and terminating in an upturned rib 24 which seats within the recess 21. A vertical leg of the hanger is indicated at 25 as extending upwardly over the back face of the shell 11 and is bent upon itself to form a hook 26.

A supporting bracket 27 is secured to a structural upright 28 by such means as for example the bolt 29. This bracket has a vertical portion 30 conforming to the face of the upright 28 and has parallel horizontal legs 31 and 32 extending therefrom. The upper leg 32 terminates in a vertical portion 33 which fits within the hooked end 26 of the hanger 22. The lower leg 31 is formed with an eye receiving prong 34 of a tie bar 35. The tie bar 35 is fitted at its opened end with a prong 36 which is bent downwardly and inwardly toward the main body of the bar to seat within an obliquely disposed pocket 37 formed in the wall of the shell 11. By this arrangement it will be seen that brackets and hangers projecting from a vertical support will engage the contiguous ends of the shells, and that when a mass of plastic material is placed within the space 14 the structure will remain in its assembled position.

In the form of the invention shown in Fig. 5 of the drawing the hanger 25 engages the upper lip 40 of a bracket 41. The back element 42 of the bracket is secured to the upright 28. A lower leg 42 of the bracket 41 is formed with a transverse slot 44. This slot receives the T-shaped end 45 of a tie bar 46. The forward end of the toe bar 46 is formed with a hook 47 which fits within a pocket 48 occurring within the end of the element 10. If desired, the tie bar 46 may be formed with an end similar to that shown in Fig. 3 so that the unit may be embraced rather than hooked by the member 47.

It is to be understood that while the present invention is described as involving the use of the refractory unit 10 having the face slab 13 and the shell 11 that the invention is not limited to this type of unit or block but that the invention may be utilized with any type of wall or ceiling unit which is separately tied or carried by exteriorly disposed frame elements.

In the operation of the present invention a frame structure is erected which may embody the bars 15 and the uprights 28. The brackets 27 may then be secured in position and the hangers 16 disposed over the bars 15. The side wall refractory units 10 are then placed in position by resting them upon the angle shaped hangers 22 and then tying them at their upper edges by the use of the tie bars 35. It will be seen that by this arrangement the side wall units are completely and directly supported from the uprights 28 and that the tie bars prevent the units from tipping. This insures that the individual units 10 will be held in position so that the outer surfaces of their portions 13 will assume positions in alignment in a vertical plane to form a composite wall. The units 10 used in the ceiling are assembled with the hangers 16 so that their prongs 20 seat within the pockets 19 at the opposite ends or sides of the units. The wall or ceiling may then be finished by filling a fire-resistant plastic material into the spaces 14. Attention is directed to the fact that with this particular type of refractory unit the joints between the shell portions 11 as represented by the spaces 14 will be protected from the direct action of the heat since the slabs 13 form a substantially continuous wall surface and shield the spaces 14. In shielding the spaces 14 by the portions 13 the plastic material is protected from the action of heat, and the hangers which are used and which are imbedded within the plastic material are likewise protected. With a wall or ceiling constructed according to the teachings of the invention here shown it will be evident that the intermediate spaces 14 and the sealing material therein will act as expansion joints for the structure, and that the various hanging elements will permit individual expansion of the units without disturbing the relationship of the hangers with the units or the hangers with the exterior supports.

It will thus be seen that the method and means of constructing a suspended furnace wall as here shown provides for a relatively rigid exteriorly disposed frame structure, hangers carried thereby and separate refractory units interlocking with the hangers and individually supported by said frame structure, whereby a continuous furnace wall is provided of cheap and simple construction and of a character permitting expansion and contraction without cracking.

While I have shown the preferred construction of my suspended wall and preferred method of making the same, it is to be understood that various changes might be made in the steps of the procedure or the combination, construction and arrangement of parts by those skilled in the art without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A suspended wall structure comprising a rigid vertical upright, a bracket secured thereto and extending horizontally therefrom, an angle member attachably connected to the bracket and providing a ledge on which a wall unit may rest, a tie bar detachably connected to the bracket and at its outer end providing means interlocking with an underlying wall unit to hold the same in position.

2. A side wall hanger for heat-resisting blocks comprising a bracket member carried by a vertically extending fixed support and having upper and lower protuberances thereon, a hanger interlocking with the upper protuberance and being carried thereby to support the lower edge of a block, and a tie bar detachably interlocking with the lower portion of the bracket and engaging the contiguous face of a heat-resistant block.

3. A side wall hanger for heat resisting wall blocks, said blocks being arranged in courses vertically of the wall, vertical fixed supports, bracket members fixed on said supports and extending therefrom at substantially the horizontal planes of joints between the wall blocks, said bracket members each having an upper and lower protuberance, a separate hanger element carried by the upper protuberance and engaging the lower wall of a wall block whereby to support the same, and a separate tie bar detachably interlocking with the lower portion of the bracket and engaging the contiguous upper face of a wall block disposed beneath the wall block supported upon the hanger.

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