

May 8, 1934.

G. P. CRYSLER

1,957,820

WALL CONSTRUCTION

Filed Oct. 29, 1931

2 Sheets-Sheet 1

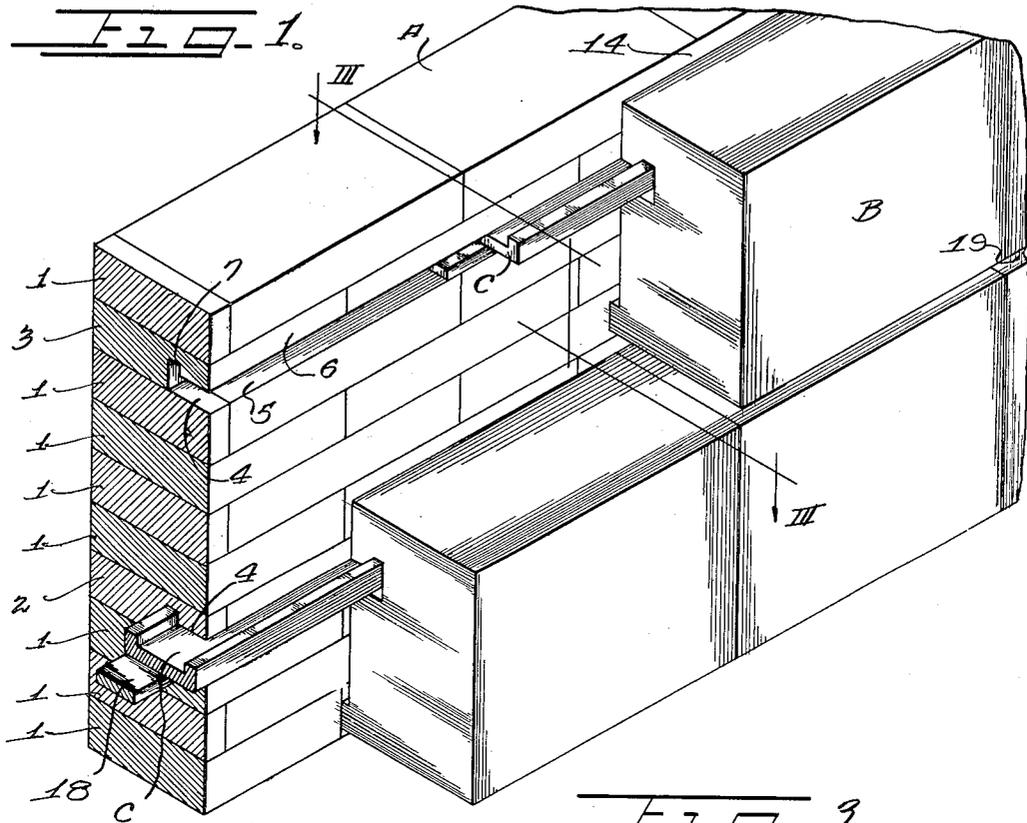


Fig. 2.

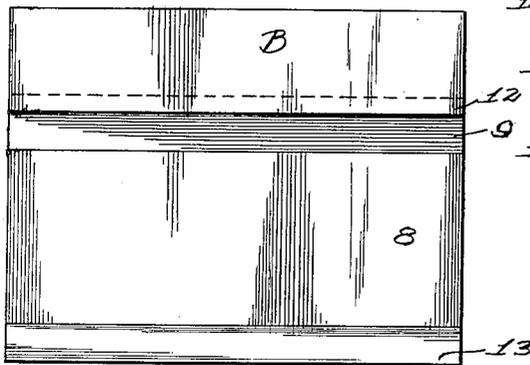
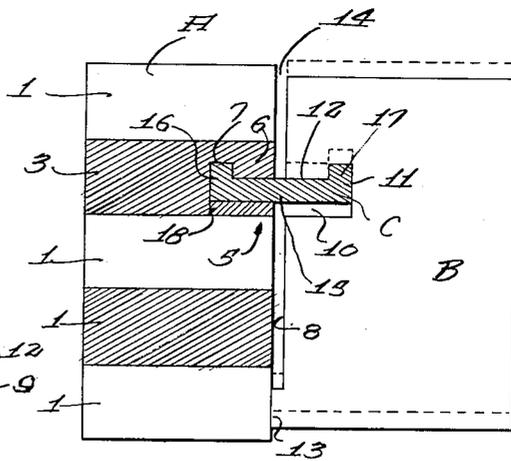


Fig. 3.



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FIG. 4.

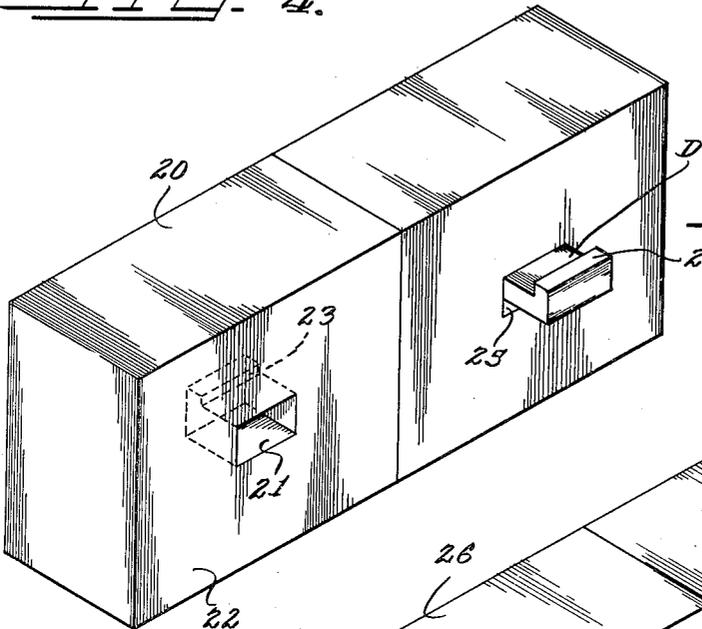


FIG. 5.

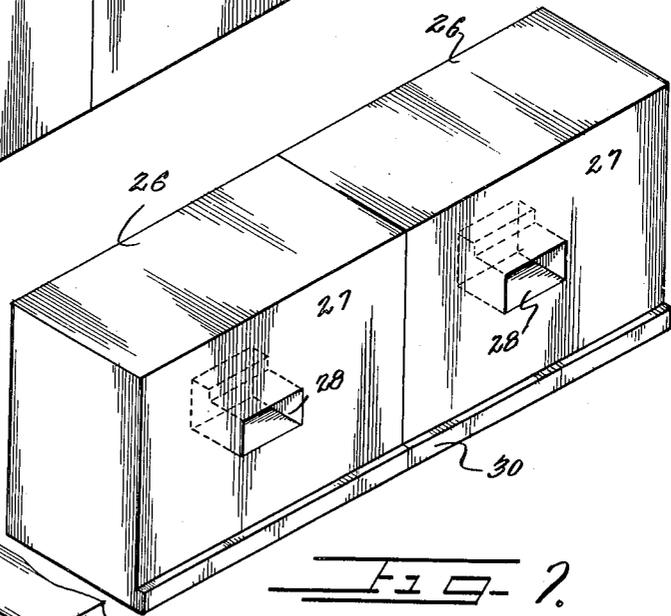


FIG. 6.

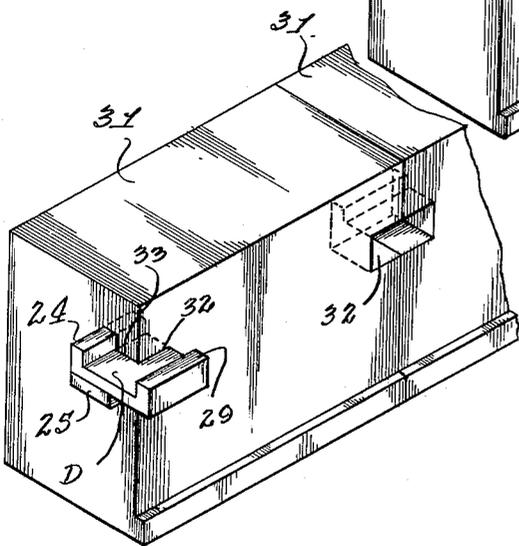
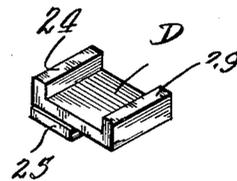


FIG. 7.



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# UNITED STATES PATENT OFFICE

1,957,820

## WALL CONSTRUCTION

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Application October 29, 1931, Serial No. 571,731

18 Claims. (Cl. 72—101)

Generally speaking, the invention contemplates a masonry wall which may be composed of courses of fire brick with courses of special brick having recesses formed in the outer faces of such special brick, or the wall might be of monolithic construction, if desired, with recesses formed in the face of such wall.

An object of the present invention is to provide a furnace wall or lining construction having the facing thereof of refractory units pendulously supported and which units may be removed by a simple lifting movement.

Another object of the invention is to provide a furnace wall or lining construction wherein any facing unit may be readily removed by a simple lifting movement without moving or displacing adjacent facing units.

A still further object of the invention is to provide a furnace wall construction including a masonry wall and a facing section with air passages between the wall and facing section whereby incoming air is preheated for accelerating combustion and at the same time the facing section is cooled thus prolonging the life of the facing section.

Another and yet further object of the invention is to provide facings for furnaces which facings consist of relatively large blocks of refractory material which are pendulously supported for ready removal and replacement by key or holding members.

A still further object of the invention is to provide refractory facing blocks supported in position by metallic key members removably engaging the blocks and a wall for supporting the facing blocks in position.

An additional object of the present invention is to provide a furnace or like wall construction comprising heat resisting parts having the apposed surfaces provided with recesses, and key members removably applied in such recesses for connecting together the heat resisting parts of the wall.

The invention further contemplates the provision of facing block units having similarly shaped recesses formed in the inner faces of the same for engagement by key members.

The invention contemplates also the provision of separate key or locking members which are removably secured in the recesses of the masonry or monolithic wall for pendulously supporting the facing blocks with the recesses of the latter engaging the key or holding members.

The above, other, and further objects of the invention will be apparent from the following de-

scription, accompanying drawings, and appended claims.

Exemplifications of the present invention are illustrated in the accompanying drawings and the views thereof are as follows:

Figure 1 is an isometric view of a fragmental portion of a furnace wall showing a part of an inner masonry wall and a part of the facing section with the facing units pendulously supported by key or holding members carried in the masonry wall.

Figure 2 is an elevational view of the inner face of one of the facing blocks as illustrated in Figure 1.

Figure 3 is a transverse sectional view taken substantially in the plane of line III—III of Figure 1 showing in full lines the position of a facing block unit pendulously supported on a key member and in dotted lines the position of the facing unit when lifted for removal from the key member.

Figure 4 is an isometric view of two refractory blocks which may be utilized in the masonry wall, which blocks are provided each with a recess in its outer face for the reception of a key member.

Figure 5 is an isometric view of the inner faces of two facing block units having a recess in its inner face extending inwardly of such face for hooking engagement with the key member supported in the wall blocks of Figure 4.

Figure 6 is an isometric view of one inner block unit and a fragmental portion of another inner block unit having the recesses formed in the ends of these blocks for receiving the key member.

Figure 7 is an isometric view of a key member unit such as would be employed in a wall consisting of the wall blocks of Figure 4 and with facing blocks of Figure 5 and also with the wall blocks of Figure 6.

The drawings will now be explained.

It is presumed at the outset that the showings of the drawings will be clearly apparent to those skilled in the art of furnace wall construction as to enable ready understanding of the present invention without having to show a complete furnace with both side walls, the top wall and the grate.

Figure 1 illustrates a masonry wall which herein will be for convenience designated as the inner wall and is identified as A. The use of the term "inner" wall is merely for convenience and is not by way of limitation.

The wall A is illustrated as comprising a plurality of courses of fire brick designated 1 and two courses 2 and 3 of special brick of refractory

material. The wall A is illustrated as including two courses 2 and 3 of the special brick thus providing two vertically spaced horizontally disposed grooves or channels 4 shown as extending throughout the length of the wall A. The grooves, recesses or channels 4 have bottoms 5 and ridges 6 depending from the top 7 of the grooves or recesses adjacent the outer face of the wall the ridges 6 forming shoulders or stops for the key members to be later described.

The fire bricks in the courses 1 and the special bricks in the courses 2 and 3 are of refractory material, preferably, to withstand heat and prolong the life of the wall.

It is understood of course that a wall A might be made with more than two channels, grooves or recesses 4 depending on the height of the wall A and also on the sizes of the facing block units.

Facing block units B are formed of refractory material and facing blocks described with reference to Figures 1, 2, and 3 have formed on the inner faces 8 thereof recesses, grooves or channels 9 which are similarly shaped to the recesses, grooves or channels 4 in the wall A. That is to say, that a facing block unit B is provided with a recess or groove 10 having an uppercut portion indicated at 11 thus providing a ridge 12 which depends from the top of the portion 11 forming a ridge or stop along the top of the recess 10. The unit B is furthermore provided with a ledge 13 extending along the lower portion of the inner face 8 thereof for serving as a spacer when the block B is applied to the wall A thus providing therebetween air passage 14 through which air passes to the combustion chamber becoming preheated due to the heat of the blocks B and at the same time serving to cool the blocks B thus prolonging the lives of these blocks.

The key or holding member illustrated in Figures 1 and 3 consists of a channel member 15 having flanges 16 and 17. The key member will for convenience be designated as a whole by the reference character C. The key members C are of metal and are inserted in the recesses or grooves 4 of the wall A with their flanges 16 and 17 extending upwardly. The height of the channels 16 and 17 is such as to readily pass beneath the ridges 6 of the grooves 4 and the ridges 12 of the grooves or recesses 10 of the facing blocks B. When a key member C has been inserted in the groove or recess 4 of the wall A it is bodily lifted and a filler block 18 inserted underneath the key member C to hold the same in raised position so that the flange 16 thereof engages in hooked relation with the depending ridge or stop 6 of the recess thus securing the key member C in position in the wall A.

The width of the key members C is such that when inserted in the wall A substantially half of the key members will project beyond the outer surface of the same for receiving the facing blocks B.

The facing blocks B are then applied to the key members C individually by raising the blocks a sufficient distance so that the lower margin of the ridge or stop 12 will pass over the flange 17 of the key members C whereupon the block B is moved inwardly towards the wall A until the end of the key member C strikes the back of the recess 10 whereupon the block is lowered so that the ridge or stop 12 thereof will become hooked with the flange 17 of the key member thus pendulously supporting the facing block unit B on the key member C. The ledge 13 contacts the outer face of the wall A providing the air space 14 as

heretofore described. The full and dotted lines in Figure 3 illustrate the amount of vertical movement necessary in applying a facing block B to or removing it from engagement with the key member C such extent of movement being governed by the amount of upward projection of the flange 17 of the key member C.

It will be observed that between the bottom of the key member C and the top of the lower portion of the recess 10 of the facing block unit B a space is formed which serves as air passage whereby the key member C is cooled as well as the facing block unit B.

As many of the units B are applied to the wall A as may be necessary to provide a facing section. It will be observed from Figure 1 that when the units are applied in position an upper block is spaced from a lower facing block which space is equal to substantially the amount of vertical movement necessary to raise a lower block unit from hooking engagement with its key member C. These spaces 19 serve as air passages for the escape of air to the combustion chamber and serve also as aids in cooling the facing block units B.

As before stated the wall A might be of monolithic construction or constructed of blocks of refractory material of substantially the same or slightly larger size than the facing block units B. In such event such inner wall blocks would be provided with the grooves or recesses corresponding to the grooves or recesses 4 of the wall A for receiving the key members C for supporting the facing block units B.

The key members C, in Figure 1, are shown as long members which may be the length of the wall A or may be of shorter length as desired. Whatever the length of the units C the filler block 18 will preferably be made of the same length for ease in application to and removal from the wall A.

Figure 4 illustrates a refractory block 20 for assembly in an inner wall similar to wall A, which block 20 is provided with a recess 21 centrally disposed of the outer face 22 of the block and extending inwardly from such face which recess is provided with a shoulder or ridge 23 for engagement by a flange 24 of key or holding members D, one of which is illustrated in Figure 7.

A wall made up of blocks 20 would have the blocks assembled in contacting position except of course for any mortar that might be used in securing these blocks together in the wall. The key members D are then inserted in the recesses 21 and raised so that the flanges 24 thereof engage behind the shoulder 23 in the recesses whereupon filler blocks 25 are inserted underneath the key members D in the several recesses 21 to maintain the keys in hooking engagement with the ridges or shoulders 23 interiorly of the blocks 20.

Figure 5 illustrates facing block units 26 which blocks on the inner surface 27 thereof are provided with recesses 28 which are similar in all respects to the recesses 21 of the blocks 20. These blocks 26 are applied to a wall composed of the blocks 20 reversing the position of the blocks as shown in Figure 5 so that the face 27 thereof will appose or be juxtaposed to the outer face 22 of the blocks 20 whereupon the block 26 is raised so that the same enters over the flange 29 of the key member D thus hooking the facing block unit 26 on such member and supporting the same pendulously as described with reference to the block units B of Figure 1.

The facing blocks 26 are provided with the ledges 30 extending along the lower portions of the inner faces 27 of said blocks for spacing the major portion of said blocks from the faces 22 of the blocks 20 to provide air spaces as described with reference to the air spaces 14 of Figures 1 and 3. The facing block units 26 when applied in a wall will be vertically spaced from the blocks in upper and lower courses as shown in Figure 1 for providing air spaces equivalent to air spaces 19 of Figure 1. In like manner air spaces will be provided below the bottom of the key member D in its engagement with the facing block units 26.

Figure 6 illustrates wall block units 31 which, instead of having the recesses formed centrally of the outer faces of said blocks have near each end thereof shallow recesses 32 formed in the blocks. The depth of such recesses is substantially half the depth of a key member D so that when such member is inserted endwise in one of these recesses substantially half the depth thereof will project beyond the adjacent face of the block as is clearly illustrated in Figure 6.

The recesses formed in the blocks 31 are provided with the projections or ridges 33 for hooking engagement with the flanges 24 of the key members D which hooking engagement is maintained by insertion of the filler blocks 25.

When a wall is constructed utilizing blocks of the type shown in Figure 6 the filler blocks D are inserted endwise in the recesses as the blocks are laid up in courses in the wall so that when the wall is completed every recess is provided with its key member D having the flanges 29 thereof projecting outwardly to receive facing block units.

Facing block units are used with a wall constructed of blocks as shown in Figure 6 would be made similarly to the blocks 31 that is with recesses in the ends of the same and applied over the key members D by a simple lifting and lowering movement. The face blocks used in connection with a wall comprising blocks 31 of Figure 6 would in height be slightly less than the height of the blocks 31 so as to provide space for removal of the facing blocks of the several courses and also providing the horizontal air passages equivalent to the passages 19 of the construction of Figure 1.

Key members D such as illustrated in Figure 7 might be employed in a wall as constructed in Figure 1 instead of the longer key members C. This however is a matter of selection and cost and ease of installation.

It will be observed that the blocks of the present invention are rectangular and except for the ledges 13 and 30 on some of the facing block units there are no projecting parts on these blocks to be broken or knocked off in transit or in storage or in use thus reducing materially the cost of installation and also reducing materially the losses incidental to transportation or blocks having projections which are readily broken.

It will be furthermore observed that the present invention contemplates facing sections for furnace walls and the like comprising facing block units which are pendulously supported so that any unit which has been worn out in service may be readily removed and replaced by a new unit without having to demolish the whole facing wall.

The spacing of the facing blocks to provide the air passages equivalent to the air passages 19 of Figure 1 is beneficial rather than detrimental as these air passages allow escape of air from

the passages 14 into the combustion chamber such air passage taking up heat from the facing block units thus preheating the air and accelerating combustion and at the same time cooling the facing block units thus prolonging the lives of the same.

The cooling of the facing block units makes it possible to provide facing block units which are of less depth from front to back than would be necessary were there no cooling passages provided. This tends to reduce the cost of manufacture of the facing block units thus materially reducing the cost of a facing section for furnaces constructed of facing block units of the present invention.

The gist of the present invention resides in the provision of an inner wall having recesses therein, facing block units having recesses in such blocks and removable key members for pendulously supporting the facing block units in position.

The utilization of the filler blocks 18 and 25 makes it possible to complete the wall A or a wall consisting of units 20 or 21 before the key members are applied to the recesses in such walls. No matter what the length is of the key members C or D these may be readily made or cut to size to fit the grooves or recesses 4 or 28 or 21 or 32 as the case may be thus reducing materially the cost of installation and erection and installation of furnace facing sections.

The invention has been described herein more or less precisely as to details yet it is to be understood that the invention is not to be limited thereby as changes may be made in the arrangement and proportion of parts and equivalents may be substituted without departing from the spirit and scope of the invention.

The invention is claimed as follows:

1. A furnace or lining wall construction including an inner wall section and a facing section said inner wall section comprising courses of fire brick and intervening courses of special brick vertically spaced, said special brick having recesses therein extending inwardly from the outer faces of the same, said recesses at the inner ends thereof extending upwardly within the brick thus forming shoulders or ridges in the tops of said recesses adjacent the outer faces of said special bricks, and the facing section comprising facing bricks having similarly shaped recesses formed in the inner faces thereof, removable key members inserted in the recesses in the special bricks and maintained in engagement with the shoulders thereof by filler blocks inserted between the bottoms of said recesses and the bottoms of said key members, the key members having parts thereof projecting outwardly of the outer faces of the special bricks, and the facing blocks being hooked over the projecting portions of said key members by engagement of the recesses of said facing blocks with said key members, said facing blocks having ledges along the bottoms of the same to space the inner faces of said facing blocks from the outer face of the wall section to provide air passage, the facing blocks of one course being vertically spaced from the facing blocks of an adjacent course providing spaces therebetween for air passage and also for removal of any facing blocks without displacement of adjacent facing blocks.

2. A wall comprising a section of mortared brick and a section of spaced bricks in side by side relation, the sections having recesses in portions of the contiguous parts thereof, metal key

- members insertable in the recesses of the first named section, filler blocks engageable with said key members to prevent displacement of said key members with respect to said first mentioned section, the second mentioned section being hung on said key members by hook action and removable therefrom by unhooking action, the key members being removable from the recesses of certain of said first mentioned sections by removal of the filler blocks.
3. A wall comprising a section of mortared brick and a section of spaced bricks in side by side relation, the sections having recesses in portions of the contiguous parts thereof, metal key members insertable in the recesses of the first named section, filler blocks engageable with said key members to prevent displacement of said key members with respect to said first mentioned section, the second mentioned section being hung on said key members by hook action and removable therefrom by unhooking action, the key members being removable from the recesses of said first mentioned section by removal of the filler blocks, the recesses in the said sections having depending ridges, said key members having upturned flanges at each end, the flange at one end of a hook member engaging the ridge of a recess by bodily elevation of the key member after insertion in said recess, and a filler block for said key for maintaining said flange in engagement with said ridge.
4. A furnace wall including in combination heat resisting members having apposed surfaces provided with shouldered recesses, members loose in said recesses for connecting together said heat resisting members and filler means engaging said members in certain of said recesses for retaining said members against the shoulders of such recesses.
5. A furnace wall comprising an inner section and a facing section, said sections having apposed faces provided with recesses which are L-shaped in cross section forming ridges in said recesses, and separate key members in said recesses engaging said ridges for supporting said facing sections pendulously by said inner section.
6. A furnace wall comprising an inner wall section and a facing section, said sections having the adjacent faces thereof provided with inwardly extending angle-like recesses, channel shaped key members in said recesses for suspending one section by the other, and means engaging said key members for maintaining said members in hooking engagement with the recesses of the inner wall section.
7. A furnace wall construction including wall sections arranged in side by side relation and having the juxtaposed faces provided with recesses, keys in said recesses supporting one section on the other, said one section having a portion in surface contact with said other section and another portion out of contact therewith for providing air spaces between said sections.
8. A wall construction including an inner section and an outer section, said sections having recesses in the apposed faces thereof, a separable key member wedged in a recess of the inner section, the outer section being hooked over said key member for suspending said section by said inner section, said outer section being applied to and removed from said key member by vertical movement of said outer section with respect to said inner section, said key being removable from the recess of said inner section by removal of its wedge to allow dropping of said key member for lateral withdrawal from the recess.
9. A wall construction including an inner section and an outer section, said sections having recesses in the apposed faces thereof, ridges along the upper edges of said recesses, key members having hooks at both ends insertable in said recesses, blocks inserted beneath the key members in the inner section to engage the hooks at similar ends of said key members with the ridges in said recess and thus retain said key member in position in said section, the outer section being engageable over the hooks at opposite ends of said key members to hang said outer section on said key members, the ridges in the recesses of said outer section engaging the hooks at the opposite ends of the keys members to prevent accidental displacement of said outer section.
10. A wall construction including an inner section and an outer section, said sections having recesses in the apposed faces thereof, ridges along the upper edges of said recesses, key members having hooks at both ends insertable in said recesses, blocks inserted beneath the key members in the inner section to engage the hooks at similar ends of said key members with the ridges in said recess and thus retain said key member in position in said section, the outer section being engageable over the hooks at opposite ends of said key members to hang said outer section on said key members, the ridges in the recesses of said outer section engaging the hooks at the opposite ends of the key members to prevent accidental displacement of said outer section, and said outer section being removable from said key members by upward movement of said section to disengage the ridge thereof from the hooks of said key members.
11. A wall construction including an inner wall section and a facing section, the inner wall section having a plurality of horizontally extending vertically spaced recesses in its front face, said wall being fashioned with ridges along the upper portions of the recesses adjacent the wall face, a plurality of facing blocks constituting the facing section, said facing blocks having similarly shaped channels in the rear faces thereof, and channel shaped key members insertable in the recesses of said inner wall and having portions entering the recesses of the face blocks for pendulously supporting said facing blocks in position.
12. A wall construction including an inner wall section and a facing section said inner wall section having horizontal grooves formed in the front face thereof, said wall being fashioned to provide ridges along the upper edges of said grooves, said facing section including a plurality of facing blocks, every facing block having a groove in its rear face shaped similarly to the grooves in the inner wall, key members engaging in the grooves of the inner wall and the facing blocks for supporting the facing blocks on said inner wall, said facing blocks being in the main spaced from said inner wall to provide air passage to cool the facing blocks.
13. A furnace or lining wall construction including an inner wall section and a facing section, said inner wall section comprising courses of fire brick and intervening courses of special brick vertically spaced by the fire brick, said special brick having recesses therein extending inwardly from the outer faces of the brick, the recesses at the inner ends thereof extending upwardly thus forming shoulders or ridges in the tops of said recesses adjacent the outer faces of

said special bricks, said facing section comprising facing bricks having similarly shaped recesses formed in the inner faces thereof, removable key members insertible in the recesses in the special bricks and maintained in engagement with the shoulders thereof by filler blocks inserted between the bottoms of said recesses and the bottoms of said key members, the key members having parts thereof projecting outwardly of the outer faces of the special bricks, and the facing bricks being pendulously supported by said key members by the projecting parts of said key members engaging the recesses of said facing bricks.

14. A furnace wall consisting of an inner section and a facing section, said inner section having therein a recess L-shaped in cross section, the facing section having a recess in the rear face thereof also L-shaped in cross section, and a removable channel-shaped hook member in such recesses connecting together said sections and pendulously supporting the facing section on the inner section.

15. A permanent wall having a plurality of horizontally extending and vertically spaced channel-shaped hangers removably supported therein, the hangers having the flanges thereof projecting upwardly and arranged in said wall with parts of the hangers extending outwardly beyond the face of said wall to provide supports for a replaceable wall, and facing bricks constituting the replaceable wall pendulously supported on the extended parts of said hangers, the extended parts of said hangers constituting the sole supporting means for the replaceable wall.

16. A permanent wall having a plurality of horizontally extending and vertically spaced channel-shaped hangers removably supported therein, the hangers having the flanges thereof projecting upwardly and arranged in said wall with parts of the hangers extending outwardly

beyond the face of said wall to provide supports for a replaceable wall, and facing bricks constituting the replaceable wall pendulously supported on the extended parts of said hangers, the extended parts of said hangers constituting the sole supporting means for the replaceable wall, the facing bricks being engageable and disengageable with respect to said hangers by hooking and unhooking movements vertically of the wall.

17. A permanent wall having a plurality of horizontally extending and vertically spaced channel-shaped hangers removably supported therein, the hangers having the flanges thereof projecting upwardly and arranged in said wall with parts of the hangers extending outwardly beyond the face of said wall to provide supports for a replaceable wall, and facing bricks constituting the replaceable wall pendulously supported on the extended parts of said hangers, the extended parts of said hangers constituting the sole supporting means for the replaceable wall, and wedge means maintaining said hangers in engagement with said permanent wall.

18. A permanent wall having a plurality of horizontally extending and vertically spaced channel-shaped hangers removably supported therein, the hangers having the flanges thereof projecting upwardly and arranged in said wall with parts of the hangers extending outwardly beyond the face of said wall to provide supports for a replaceable wall, and facing bricks constituting the replaceable wall pendulously supported on the extended parts of said hangers, the extended parts of said hangers constituting the sole supporting means for the replacement wall, and wedge means maintaining said hangers in engagement with said permanent wall, said hangers being removable from said permanent wall on removal of said wedge means.

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