Nov. 3, 1931. G. P. CRYSLER 1,830,384

FURNACE WALL LINING OR FACING

Filed June 13, 1927 2 Sheets-Sheet 1

Fig. 1

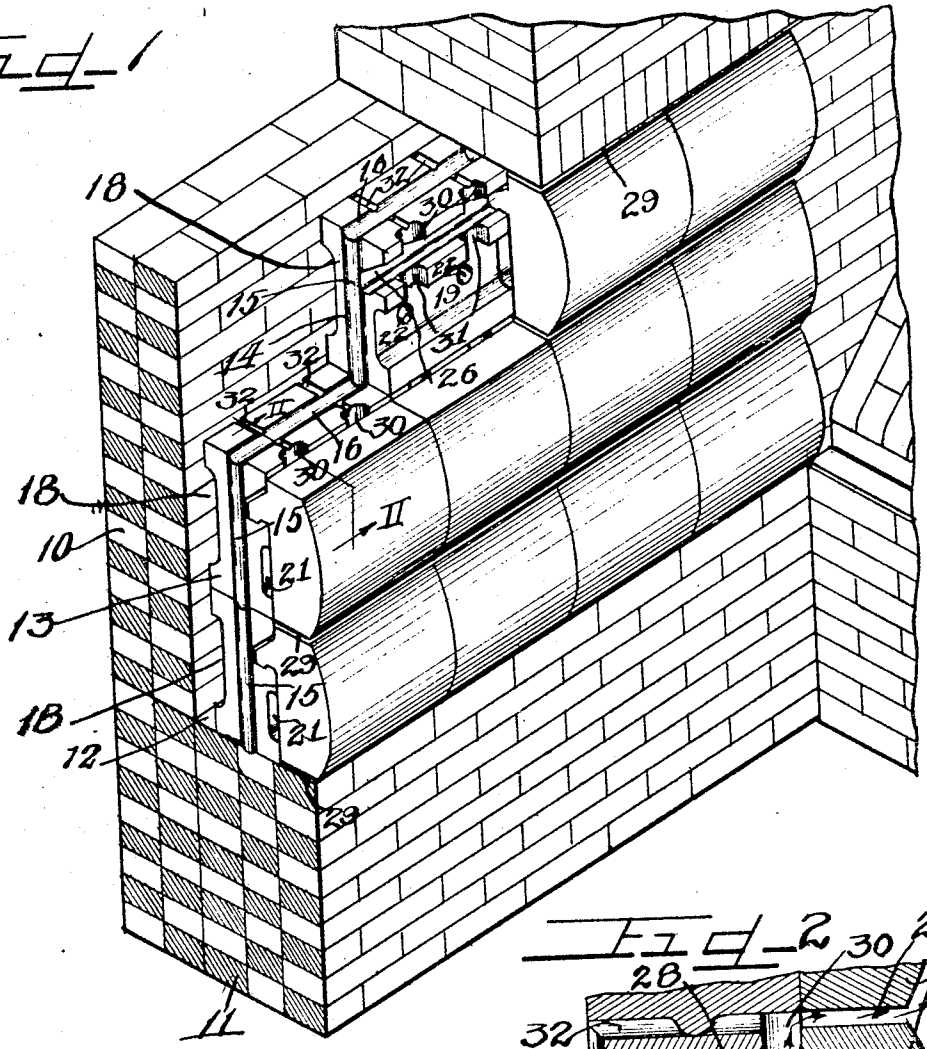
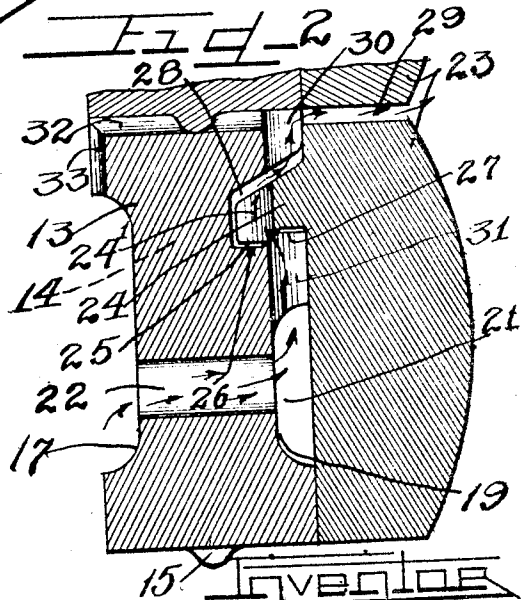


Fig. 2



Inventor

George P. Crysler.

by Charles W. Hills Attys.

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Fig. 3

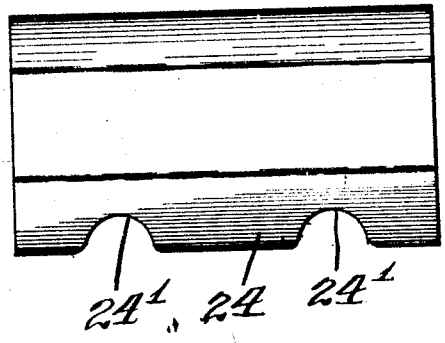


Fig. 4

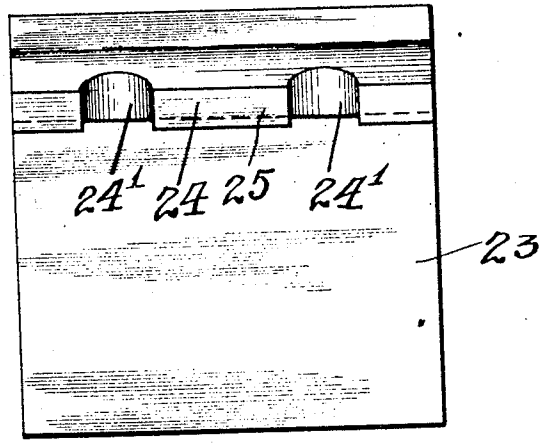


Fig. 5

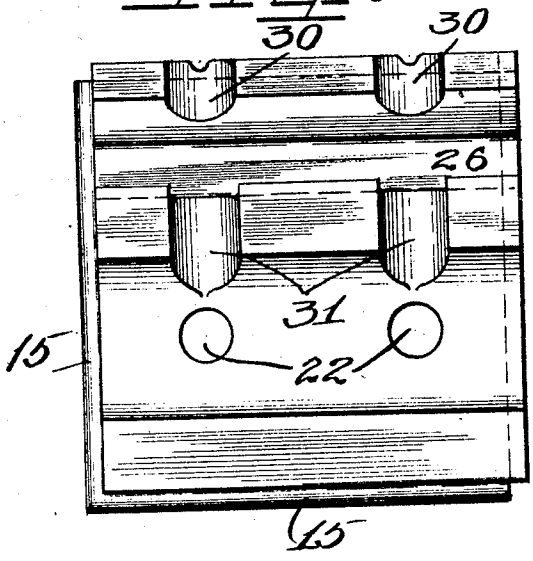
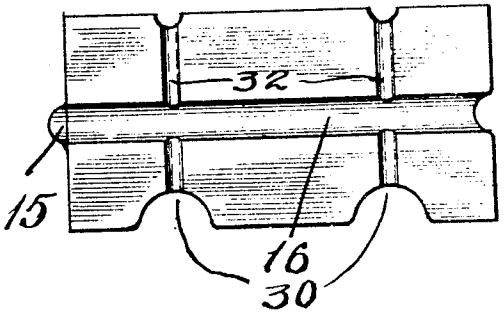


Fig. 6



Inventor

George P. Crysler

by Charles A. Hills Attys

Patented Nov. 3, 1931 1,830,384

UNITED STATES PATENT OFFICE

GEORGE P. CRYSLER, OF CHICAGO, ILLINOIS

FURNACE-WALL LINING OR FACING

Application filed June 13, 1927. Serial No. 198,378.

The invention relates to improvements in linings or facings for furnace walls.

An object of the invention is to provide a furnace wall lining or facing comprising a plurality of blocks of refractory material which are independently supported, and which may be individually removed and replaced without disturbing other blocks of like kind.

Another object is to provide a wall lining composed of a plurality of independently supported and separately removable blocks held in place in such manner that the expansion and contraction or destruction of one block will not affect an adjacent block.

A further object is to provide a furnace lining or facing having tortuous passages therein and therebetween for introduction of air to the combustion chamber, wherein the air is superheated, to thereby accelerate and promote combustion.

A further object is to provide a furnace lining or facing of blocks laid in courses, and the provision of elongated slots between adjacent courses through which to introduce air into the combustion chamber in relatively thin sheets to more intimately enter the gases of combustion at or before they reach the point of combustion and without materially decreasing the temperature of said gases.

Another object is to provide a furnace lining or facing of relatively large unit blocks, of relatively refractory material similar to that of which fire brick or slabs are made, the better to withstand the extreme heat to which the same are to be subjected.

Another object is to provide a wall structure comprising a supporting wall consisting of block units removably supported on the intermediate wall and laid in courses with air admission spaces between the courses and horizontal air conduits between said walls communicating with said spaces whereby to superheat air admitted into the furnace.

Other objects, advantages and benefits of the invention will become obvious to persons versed in the art from a consideration of the following description when taken with the drawings forming a part hereof, wherein:

Figure 1 is an isometric view of a broken away part of the structure in elevation.

Figure 2 is a transverse section enlarged, taken on line II—II of Figure 1, showing the manner of assembling and supporting the facing block units on the intermediate wall.

Figure 3 is a top plan view of a section, unit or block of the facing wall.

Figure 4 is a rear elevation of the same.

Figure 5 is a front elevation of a section, unit or block of the intermediate wall which is shown in Figure 1 supported on the ledge of the rear wall.

Figure 6 is a top plan view of the same.

In all the views, the same reference characters indicate similar parts.

The invention is shown as a lining for a furnace and the illustrated structure will be referred to as a part of a furnace of the type used for steam boilers.

The outer wall 10, when needed, may be made of brick, tile, stone or concrete grouting, as desired. The wall footing 11 provides a ledge 12 upon which the intermediate wall 13 is supported.

The intermediate wall 13 may be made as a single monolithic structure of molded concrete, or preferably, it may be made in block units 14 provided with suitable tongues 15 and interfitting grooves 16 to interlock the blocks together. In some cases, these blocks 14 may be made of relatively refractory material, such, for example, as fire clay or other suitable fire resisting substance, but owing to the cooling effect of the current of air admitted into the furnace and which is made to sweep both of the side surfaces of these blocks by means of which accumulation of heat is substantially prevented, a material of

lower resistance and cheaper quality may be employed instead.

Each of the blocks 14 has a rear horizontal depression 17 to provide, with a rear wall 10, a horizontal air conduit 18. Each of these blocks is also provided with a depression 19 in its front face to form with the facing blocks 23 another horizontal conduit 21. These conduits are continuous and horizontal when the blocks are laid as shown in Figure 1.

The air conduits 18 and 21 are connected by one or more transverse holes 22 made through each block 14 for passage of incoming air from conduit 18 to conduit 21. The inner wall consists of the facing blocks 23.

The facing block 23 should be made of relatively refractory material, as its front surface comes directly in contact with the burning gases of the furnace. A facing block 23 is provided with a rearwardly projecting nose 24 having a ridge 25 on its under surface. This nose is preferably arranged near the top end of the block 23. The nose 24 enters a channel or groove 26 formed in the block 14 which channel or groove has a ridge 27 projecting upwardly at its front edge. The ridge or shoulder 25 on the nose, when the blocks are assembled, is behind the channels 26 which are horizontally arranged in the front faces of the blocks 14 and extend across the width of the same ridge 27 to prevent block 23 from falling away from its support. Thus the block 23 is pendently supported so that its expansion or contraction will not affect adjacent blocks. The nose 24 is illustrated as having notches 24′ in the same. The channel 26 is larger than the nose 24 to provide an air passage 28 therebetween and to permit the nose 24 to be withdrawn from the channel 26. To do so, the block 23 is raised until ridge 25 clears ridge 27 whereupon block 23 may be moved laterally from block 14.

Block 23 is less in height than the intermediate block 14 with its upper end below the top of block 14, thus leaving an air space or slot 29 between facing blocks of adjacent rows, and which permits block 23 to be raised sufficiently to accomplish its removal. Slot 29 also permits an upper block 23 to expand without touching the block 23 immediately beneath it. It will thus be seen that a facing block unit 23 may be separately removed from its support, block 14, for replacement or repair without disturbing other facing blocks, and that the facing blocks are installed and retained in position without the use of mortar or binder of any kind. The block 23 is preferably made with a convex front surface to strengthen the block and to increase its heat radiating effect.

The air conduit 21 communicates with the space 29 by vertical grooves 30—31 in blocks 14 and grooves 32 and 33 in the blocks 23 through which air passes to the horizontal slot 29.

The use and operation of the device is as follows: The horizontally disposed air conduits 21 are below atmospheric pressure because of the sub-atmospheric pressure within the furnace superinduced by the stack draft so that fresh air is drawn into the furnace from conduits 18, through holes 22 of each block 14, into ducts 21, 28, 30 and finds exit through slots 29 into the furnace, as shown by a line of arrows in Figure 2.

The air, as it passes through this described tortuous path, absorbs much heat from the surfaces contacted. This contact superheats the air so that the incandescent gases are not cooled and hence there is no free carbon developed, and smoke is therefore prevented. This operation also tends to lower the temperature of the parts of the composite wall.

The height of the ridges 27 is less than the vertical distance between the tops of the noses 24 and the adjacent walls of the grooves 26 so that an inner wall block may be removed from or applied to the intermediate wall by vertical movement of the inner wall block wholly within the frontal area of its block of the intermediate wall.

In some situations, a central partition wall is required in a furnace, in which event it is within the skill of the ordinary mechanic to place blocks 23 on both sides of the wall 13 by a duplication of construction of the block supporting sides, as shown when this structure is placed entirely within the furnace.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. A wall structure including a wall formed from block units, said blocks having horizontally disposed recesses in the back faces of the same, said blocks having horizontally disposed inwardly extending channels in the front faces thereof near the upper ends of the same and horizontally disposed recesses in the front wall of the same below said channel, facing blocks of similar outline but of less area having projecting noses on the rear faces of the same near the top of said blocks, said noses arranged for entering the channels in said first mentioned blocks, said channels and said noses having interfitting engagement to prevent lateral displacement of said second mentioned blocks, the faces of the second mentioned blocks cooperating with the horizontally disposed recesses in the front faces of the first mentioned blocks for providing air passages, both of said blocks having vertically disposed apertures communicating with said passages.

2. A wall construction comprising a plurality of back blocks and a plurality of front blocks, the front and back blocks being of substantially the same contour in front elevation, the front blocks being of less height than the back blocks, the back blocks having channels formed therein near the upper end of the same extending from side to side of the blocks, the front blocks having projecting noses entering said channels and serving as the sole support of said front blocks, the front and rear faces of the back blocks being recessed, said back blocks having communicating passages between said recesses, the back blocks and the noses having recesses therein which form air passages communicating with a recess in a back block when said blocks are assembled in a wall, the upper surfaces of the noses being spaced from the channel walls opposite the same, the front blocks when assembled defining horizontal air passages communicating with the space between the upper surfaces of the noses and the opposite channel walls and opening outwardly of the faces of the front blocks, said front blocks being removed from and applied to the back blocks by vertical movement within the frontal area of the back blocks.

3. A wall structure formed of a plurality of back blocks and a plurality of front blocks, said blocks being of substantially the same contour in front elevation, the front blocks being of less height than the back blocks, said back blocks having channels extending from side to side thereof and being formed inwardly of the front faces of said blocks, said front blocks having projecting noses for entering said channels, said noses serving as the sole support of said front blocks in said back blocks, said noses and said channels having interlocking engagement to prevent accidental displacement of the front blocks, the front and rear faces of the back blocks being recessed, said back blocks having communicating passages between said recesses, the back blocks and the noses having recesses therein which form air passages communicating with a recess in a back block when the blocks are assembled in a wall, the upper surfaces of the noses being spaced from the opposite walls of the channels, the front blocks when assembled defining horizontal air passages communicating with the spaces between the upper surfaces of the noses and the opposite channel walls and opening outwardly of the outer faces of the front blocks, the blocks being assembled in such manner that the end surfaces of the blocks at one end of the same lie in the same horizontal plane, and said front blocks being removable from and applied to the back blocks by vertical movement within the frontal area of the back blocks.

4. A furnace lining wall made up of inner and intermediate walls, said inner wall including a plurality of facing block units laid in horizontal courses and every block having a rearwardly projecting nose near its upper end, said intermediate wall having communicatng horizontal air conduits in the rear and the front thereof, and a plurality of horizontally extending vertically spaced grooves in its front face, said intermediate walls being fashioned to provide ridges along the front of said horizontal grooves for receiving the noses of the blocks of the inner wall.

5. A masonry facing or lining structure including an inner wall and an intermediate wall, said intermediate wall having a groove formed in the front face thereof and extending inwardly of the front face of said wall, each of said walls being made up of a plurality of blocks, every block of the inner wall having a rear face in sliding engagement with the major portion of the front face of the intermediate wall and having a projection on its rear face adjustably positioned within the groove in the intermediate wall, the said blocks of the inner wall being in engagement with the major portions of the front faces of the blocks of the intermediate wall vertically movable wholly within the vertical height of the blocks of the intermediate wall.

6. A masonry wall facing or lining structure including a fixed intermediate wall having communicating transverse and vertical ducts formed therein and having a horizontally extending channel in its front face, said wall being fashioned with a ridge along the lower portion of said channel adjacent said face, a plurality of facing blocks comprising an inner wall, all of said facing blocks having projecting noses on the rear faces thereof engaging the said ridge, and having means defining, with the intermediate wall, ducts about the major portions of the surfaces of the noses communicating with the aforesaid transverse and vertical ducts, and the said noses and ridge having vertical recesses therein for air passage.

7. A wall facing or lining structure including a fixed wall having a horizontal groove formed in one of its faces, said wall being fashioned to provide a ridge along the edge of said groove adjacent said face, a plurality of facing blocks, every block having a projecting nose on its rear face removably positioned within the groove and engaging the ridge, the said noses having vertical passages formed therein, said fixed wall having vertical passages in the ridge thereof for registering with the vertical passages in the noses when the facing blocks are applied to said wall, the said noses being held in spaced relation to the opposing front surface of the groove of the fixed wall to define communicating horizontal and vertical spaces for the passage of air to cool the nose.

8. A wall construction including an inner wall and an intermediate wall, each wall being formed of a plurality of blocks, said blocks being similar in outline in front elevation, the area of the front of a block of the inner wall being less than the area of the front of a block of the intermediate wall, the blocks of the intermediate wall having horizontally disposed grooves within the same, extending inwardly from the outer faces thereof, the blocks of the inner wall having projecting noses for entering the grooves of the blocks of the intermediate wall, said blocks being assembled as units with a block of the inner wall overlying its block of the intermediate wall and arranged with the nose of the block of the inner wall engaging the grooves of the blocks of the intermediate wall and with the upper edges of the blocks of the inner wall lying below the upper edges of the blocks of the intermediate wall whereby a block of the inner wall may be removed from its association with a block of the intermediate wall by vertical movement within the frontal area of its intermediate block without disturbing adjacent blocks of the inner wall.

9. A masonry furnace lining made up of an inner wall and an intermediate wall, said intermediate wall having horizontal grooves formed in the front face thereof, said intermediate wall being fashioned to provide ridges along the lower edges of said grooves, said inner wall including a plurality of facing blocks, every facing block having a nose on its rear face removably positioned within the groove of the intermediate wall and engaging the ridges thereof, said noses being positioned in spaced relation with respect to the opposing front surfaces of the grooves to form passages for air to cool the noses.

10. A furnace lining including an intermediate wall and an inner wall, the intermediate wall consisting of interlocking blocks having horizontal passages therethrough and horizontal grooves in the outer face thereof, the inner wall consisting of facing blocks, said facing blocks having hook-shaped projections on the rear faces thereof, said projections fitting the grooves of the intermediate wall and detachably and independently supporting said facing blocks thereon, and a portion of the outer faces of the blocks of the intermediate wall and the projections of the facing blocks having vertical grooves therein communicating with said horizontal passages.

11. A furnace wall including as a part thereof a lining consisting of a facing or inner wall and an intermediate wall, said intermediate wall having communicating horizontal air conduits along the front and rear thereof and a horizontal groove in its front, the intermediate wall being fashioned to provide a ridge along the front of said groove and the bottom thereof, said facing or inner wall consisting of a plurality of facing block units all having rearwardly projecting noses near the upper ends thereof, and said noses entering said grooves and having hooking engagement with said ridge.

In testimony whereof I have hereunto subscribed my name at Chicago, Cook County, Illinois.

GEORGE P. CRYSLER.