

UNITED STATES PATENT OFFICE.

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AIR-COOLED FURNACE-WALL CONSTRUCTION.

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My invention relates to air cooled wall constructions for furnaces, and has for its principal object the provision of such a structure which will cause uniform cooling of the wall throughout the entire length thereof.

Another object of the invention is to provide a construction of this character which will remove the greater part of the compression on the ordinary lining of fire brick, which, as is well known, cannot resist any great amount of weight or compression.

It has been proposed in constructing air cooled walls of furnaces to provide a plurality of horizontal and vertical ducts in the wall which are interconnected to give a plurality of horizontal and vertical paths through which the cooling medium may pass. Difficulty has been encountered with such a construction, however, due to the fact that a greater pressure may be set up in one portion of the wall on account of the heating of the air or cooling medium, and this causes pulsation of the air because it will pass up one set of the vertical paths and passing horizontally to the next vertical path exert a downward pressure thereon which locks the air from passing up, and this causes local heating at certain spots along the furnace wall which may result in burning out of the section that would otherwise withstand the heat.

It is the purpose of this invention to so construct the air passages within the furnace wall as to connect all of them in series whereby the air must pass along a single path which extends throughout the wall, and thus cools it evenly at all points.

Another purpose of the invention is to provide a construction of this character wherein the means for dividing the passage between the inner and outer sections of the wall also serves to support the inner section of refractory material in relatively narrow, horizontally-extending layers each of which is independent of the one next above or below. This simplifies repairing, since any layer or section may be removed and replaced without disturbing any of the others.

Other objects and advantages of the invention will appear as the description proceeds, when taken in connection with the accompanying drawings. However, I wish it to be distinctly understood that I do not intend to limit myself to the exact details shown and described, but that I intend to avail myself

of all such modifications as would occur to one skilled in this art and as fall within the scope of the claims.

In the drawing,—

Fig. 1 is a vertical section taken longitudinally of the furnace wall along the line 1—1 of Fig. 2;

Fig. 2 is a transverse section through the furnace wall, showing the manner in which the blocks forming the cross tie between the inner and outer sections of the wall are secured and supported in the outer wall; and

Fig. 3 is a perspective view of one of the cross-tie blocks.

Referring now in detail to the drawings, the furnace wall is shown as constructed of an outer section 5, which may be of ordinary brick or any other suitable material, and an inner section 6 of refractory, brick-like elements. These two walls are spaced from each other, as shown, to form an air space 7 therebetween. In order to connect the two walls and to avoid the heavy weight on the refractory materials, I provide a series of rows of cross ties extending longitudinally of the wall and represented in this instance by the numeral 8. These cross-tie rows, as shown clearly in Fig. 1, extend from one end of the wall, leaving a sufficient space to permit the passage of air from the duct below one row to the duct thereabove.

As shown in Fig. 1, the rows 8 alternate with similar rows 9 which terminate short of the end wall opposite that at which the rows 8 terminate short of the end. This, it will be seen, divides the passage 7 into a plurality of horizontal ducts 10 which are connected in series by means of the vertical passageways 11 to provide a single path extending from the lower portion of the wall to the upper portion thereof. The horizontal rows are formed of refractory, brick-like elements which extend inwardly and abut against the outer wall at 12, as shown in Fig. 2, and are supported by means of the brick-like elements 13 embedded in the outer wall 5.

Each of the brick-like elements 8 and 13 is provided with a transversely extending projection 14 on one side face thereof, which in the present form is shown in Fig. 3 as being substantially semicylindrical in shape and extending approximately half way across the block. Abutting the end of this

projection there is provided a groove 15 extending to the other side edge of the block. This groove, as shown, is also semicylindrical and so constructed as to receive a projection

14. Thus in constructing the wall the blocks 8 are placed on the blocks 13, which extend in rows lengthwise of the wall, with the projections and recesses 14 and 15 engaging corresponding projections and recesses in the blocks 13. The space between each block 8 and the next block 13 thereabove is then filled with refractory, brick-like elements 16, whereby the blocks 8 are firmly held in position and locked by means of the projections and grooves against removal from the outer wall until the refractory elements 16 are removed. The inner wall of refractory, brick-like elements 17 is then built in on top of the inner ends of the brick-like elements 8 to form a plurality of horizontal sections of refractory brick. The bricks 8, of course, are also constructed of refractory material, so that the inner lining or wall is composed wholly of refractory material.

From the above description it will be seen that each layer 18 of the inner wall of refractory material is supported by means of a row of the cross-tie elements 8 independently of the section next below or next above it. This makes it possible, in case one of these sections should burn out or become injured due to poor construction, to take this section out and repair it without disturbing the others, and thus reduce the time, as well as the cost, of repairing the furnace wall.

It will also be noted that by the provision of this interlocking cross-tie structure the cross ties are made to perform the dual purpose of dividing the space between the inner and outer sections into a plurality of horizontal ducts in series and of supporting the inner refractory wall in a plurality of sections so as to avoid undue pressure on the common refractory brick which are used in making the inner refractory wall.

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

1. An air cooled furnace wall of the character described consisting of an outer section made of brick-like elements, an inner section of brick-like elements of refractory material and spaced from said outer section, and means forming cross-ties between said sections and dividing the space between said sections into a plurality of horizontal ducts connected in series, said means comprising rows of brick-like elements at spaced intervals throughout the height of said wall, alternate rows terminating short of opposite ends of said wall to connect said ducts, said outer wall having means therein interlocking with said cross-ties to prevent them from moving away from said outer wall.

2. An air cooled furnace wall of the char-

acter described consisting of an outer section made of brick-like elements, an inner section of brick-like elements of refractory material and spaced from said outer section, and means forming cross-ties between said sections and dividing the space between said sections into a plurality of horizontal ducts connected in series, said means comprising rows of brick-like elements at spaced intervals throughout the height of said wall, forming a plurality of horizontal ducts, said rows providing openings connecting one end of each horizontal duct with the duct next above and the other end thereof with the duct next below said outer wall having removable courses of brick-like elements for holding said cross-tie means in position.

3. An air cooled furnace wall of the character described consisting of an outer section made of brick-like elements, an inner section of brick-like elements of refractory material and spaced from said outer section, and means forming cross-ties between said sections and dividing the space between said sections into a plurality of horizontal ducts connected in series, said means comprising rows of brick-like elements at spaced intervals throughout the height of said wall, forming a plurality of horizontal ducts, said rows providing openings connecting one end of each horizontal duct with the duct next above and the other end thereof with the duct next below, said rows of brick-like elements being anchored in said outer section and supporting the superposed refractory elements constituting the said inner section.

4. An air cooled furnace wall of the character described consisting of an outer section made of brick-like elements, an inner section of brick-like elements of refractory material and spaced from said outer section, and means forming cross-ties between said sections and dividing the space between said sections into a plurality of horizontal ducts connected in series, said means comprising rows of brick-like elements at spaced intervals throughout the height of said wall, alternate rows terminating short of opposite ends of said wall to connect said ducts, said rows of brick-like elements having alternate projections and recesses thereon and said outer section having means therein engaging said projections and recesses to anchor said rows in said outer section.

5. An air cooled furnace wall of the character described consisting of an outer section made of brick-like elements, an inner section of brick-like elements of refractory material and spaced from said outer section, and means forming cross-ties between said sections and dividing the space between said sections into a plurality of horizontal ducts connected in series, said means comprising rows of brick-like elements at spaced intervals throughout the height of said wall,

forming a plurality of horizontal ducts, said rows providing openings connecting one end of each horizontal duct with the duct next above and the other end thereof with the duct next below, said rows of brick-like elements having portions extending into said outer section provided with interlocking means thereon and rows of brick-like elements within said outer section having means interlocking with said portions to anchor the same in said outer section. 18

In witness whereof, I hereunto subscribe my name this 5th day of March A. D., 1927.
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