June 2, 1936. A. H. STEWART 2,042,560

FURNACE WALL

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Fig. 1.

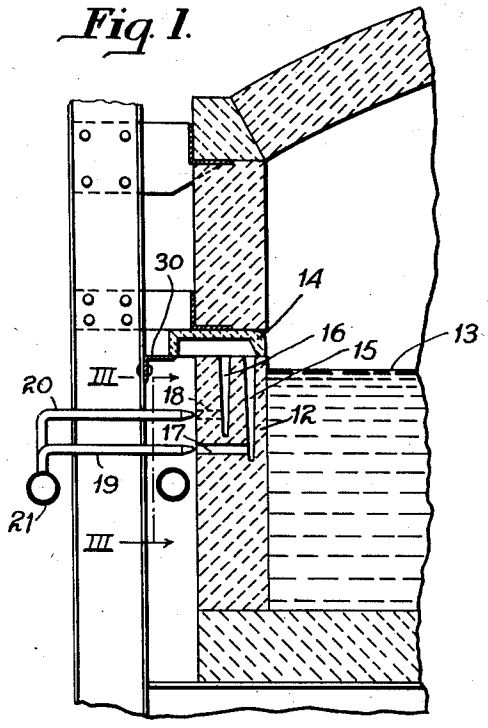
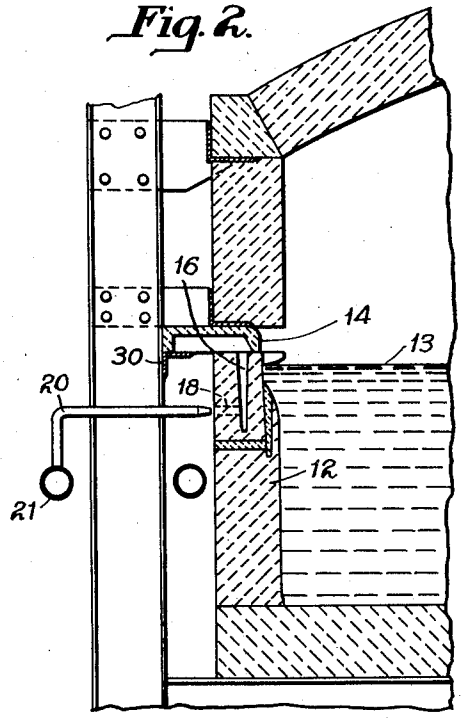


Fig. 2.



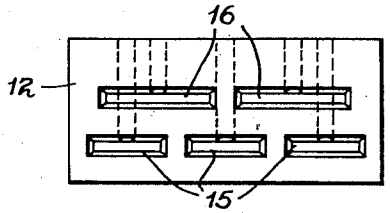


Fig. 5.

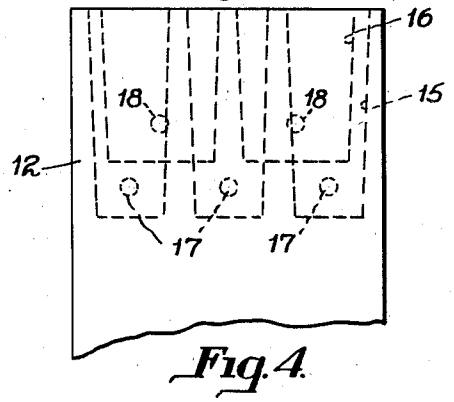
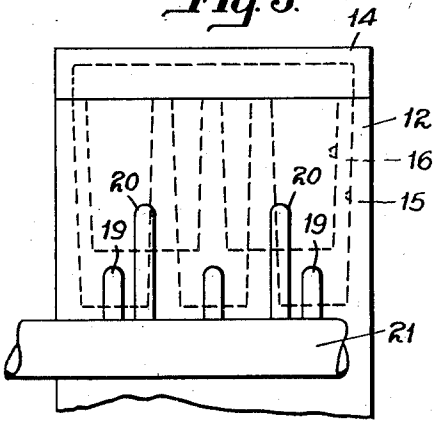


Fig. 4.

Fig. 3.



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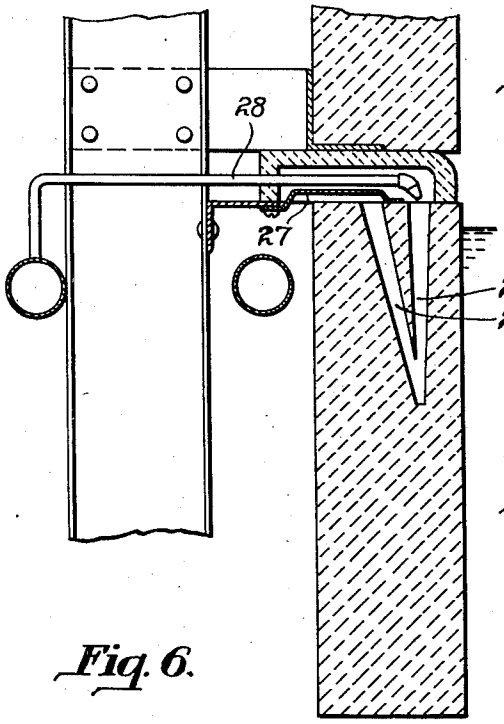


Fig. 8.

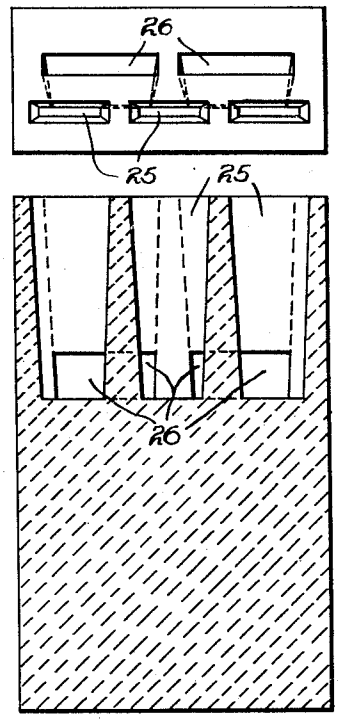


Fig. 7.

Fig. 6.

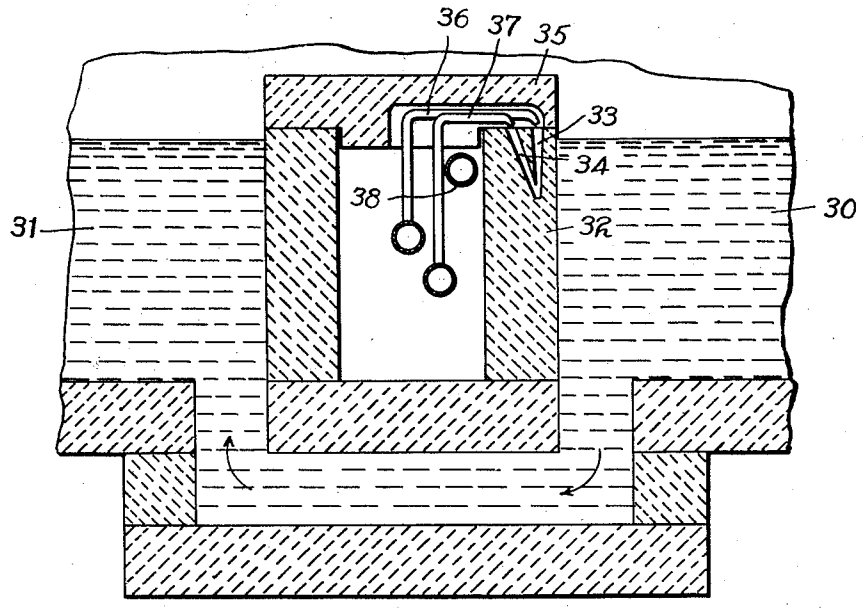


Fig. 9.

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FURNACE WALL

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Application September 28, 1934, Serial No. 745,890

2 Claims. (Cl. 263—44)

My invention relates to furnace walls and more particularly to the walls of furnaces for molten glass or other metals.

In the case of glass-melting furnaces and the like, the molten metal, particularly at what is known as the "metal line" or normal glass level, exerts a gradual progressive erosive action on the clay wall of the furnace. The furnace walls are usually constructed of what is known as tank blocks, and as initially produced, have a somewhat smooth surface. The erosive action of the molten glass is not so rapid on a smooth surface as when the surface is rough or has become pitted and eroded.

Attempts have heretofore been made to increase the life of tank blocks by artificially cooling the same in order to retard the erosive effect of the molten glass. In some cases, air has been blown against the outer sides of the blocks, but if the block is made of sufficient thickness to render it suitable for use in a melting tank, the cooling action of the air is not sufficiently effective, particularly when the block is new and is of its full thickness, because the heat transferred through the block is approximately in direct inverse ratio to the thickness of the block.

One object of my invention is to provide for the cooling of the blocks at zones adjacent to their inner or glass-contacting surfaces.

Another object of my invention is to provide a structure wherein successively smooth surfaces are presented to the glass in the vicinity of the metal line, as the block is eroded or worn away.

Some of the forms which my invention may take are shown in the accompanying drawings, wherein Figure 1 is a sectional view, through a portion of a melting furnace embodying my invention; Fig. 2 is a similar view, but showing a portion of the block eroded or worn away by the molten glass; Fig. 3 is a view taken on the line III—III of Fig. 1; Fig. 4 is an inner face view of one of the blocks; Fig. 5 is a plan view thereof; Fig. 6 is a view similar to Fig. 1, but showing a modified form of block; Fig. 7 is a vertical sectional view of the block of Fig. 6, but taken at right angles to the view of Fig. 6; Fig. 8 is a plan view of the block of Fig. 7, and Fig. 9 shows a manner in which the bridge wall of a furnace may be cooled.

Referring first to Figs. 1 to 4, I show a furnace of somewhat the usual form, but employing specially-formed tank blocks 12 that extends somewhat above the normal glass level 13, and upon which tuck stones or blocks 14 are positioned as is common in structures of this kind, the blocks 12 being replaceable without disturbing the structure above the tuck stones.

The blocks 12 may be cast or molded in any well-known manner, cores of wood or other suitable material being provided to produce the core openings 15 and 16. The cores are preferably of wedge-like or tapered form, so that they can be readily removed from the block before it is fired. Lateral openings 17 and 18 extend from the outer surface of the block to the pocket-like core spaces 15 and 16, respectively, the air pipes 19 and 20 discharging into the passageways 17 and 18, respectively, from an air supply line 21, in which the pressure may be so low as to produce only a gentle flow of the air.

The tuck stones 14 are preferably of channel form and provide a convenient exit for the cooling air that is blown through the pockets 15 and 16.

As is well understood in the art, the tendency of the glass to eat into or erode the blocks 12 is most pronounced at the metal line 13, and the effect on the block is shown more clearly in Fig. 2, wherein the inner wall has been dissolved or eaten away until the glass has entered the inner pockets 15. At this stage, the tuck stones 14 may be left in place or drawn backward somewhat on the supporting angles 30 of the structural work, or replaced by other tuck stones that will overlie only the pockets 16, while molten glass will enter into the recesses or openings 17, and freeze therein, as shown in Fig. 2.

The pockets 15 and 16 are of considerable width as shown more clearly in Figs. 4 and 5, so as to present wide smooth surfaces to the glass as the clay in front of the pockets is distintegrated. The pockets 16 are staggered relative to the pockets 15 so as to not necessarily weaken the block. As above-explained, the wide smooth surfaces of the pockets, when the molten glass has penetrated thus far into the block, are more resistant to erosive action than pitted or rough surfaces. When the molten glass has penetrated to the pockets 15, air is, of course, supplied only to the pockets 16, and after the glass has penetrated to the pockets 16, air can be blown against the outer surface of the block in the usual manner, the pipes 19 and 20 being suitable for this purpose also.

Referring now to Figs. 6, 7 and 8, I show a structure wherein pockets 25 and 26 which correspond somewhat to the pockets 15 and 16, are inclined relative to one another and communicate at their lower ends, as shown more clearly in Figs. 6 and 8. In this structure, discharge

pipes are required only for the pockets **25** since the air that is blown into such pockets will pass out through the pockets **26** and beneath a plate **27** that underlies the tuck stone. If desired, the air could, of course, be blown through the pockets **26** and then passed through the pockets **25**, but it is preferable to have the air in a colder condition supplied to the pockets **25** which are nearest the inner face of the block. When the glass has eaten into the pockets **25**, the plate **27** will be removed and the pipes **28** will be pulled back to discharge directly to the pockets **26**, and finally when the glass has eaten to the pockets **26**, the pipes will be caused to discharge against the outermost face of the block.

In Fig. 9, I show a fragmentary longitudinal sectional view of a furnace wherein the melting end **30** is separated from the refining end **31** by a bridge wall under which the molten glass flows, as indicated by the arrows. The bridge wall is provided with a block or blocks **32** at the side nearest the melting end of the furnace, which end is higher than the refining end. The block **32** is provided with recesses or pockets **33—34** which correspond to the pockets **25** and **26** of Fig. 6.

The cover block **35** is recessed for the placing of air discharge pipes **36** and **37** that discharge into the pockets **33** and **34**. Air will first be supplied through the pipe **36**. After the block **32** has worn away to the pocket **33**, the supply of air through the pipe **36** is cut off, and air is then supplied through the pipe **37**. When the glass has eaten into the pocket **34**, the air supply through the pipe **37** will be cut off, and air will then be directed through the pipe **38** to the rear side of the block **32**.

I claim as my invention:—

1. A melting furnace having refractory walls provided with a series of slots adjacent to the inner surfaces of the walls and widened in directions parallel to the planes of said surfaces, and also provided with recesses in staggered relation to the first-named recesses and located nearer to the outer surfaces of the side walls.

2. A melting furnace having a refractory wall provided with a series of upwardly-exposed recesses at approximately the height of the molten metal level, and provided with a second series of upwardly-exposed recesses between the first-named series and the outer face of the wall, a channel member disposed over the open ends of all of said recesses, and means for directing cooling fluid through said recesses and channel member, the channel member being supported for adjustment transversely of the furnace wall whereby it may be caused to overlie only the second-named series of recesses.

ANDREW H. STEWART.