No. 811,223. PATENTED JAN. 30, 1906.

L. J. HOUZE.

REFRACTORY WALL FOR GLASS TANKS.

APPLICATION FILED AUG. 7, 1905.

FIG. 1

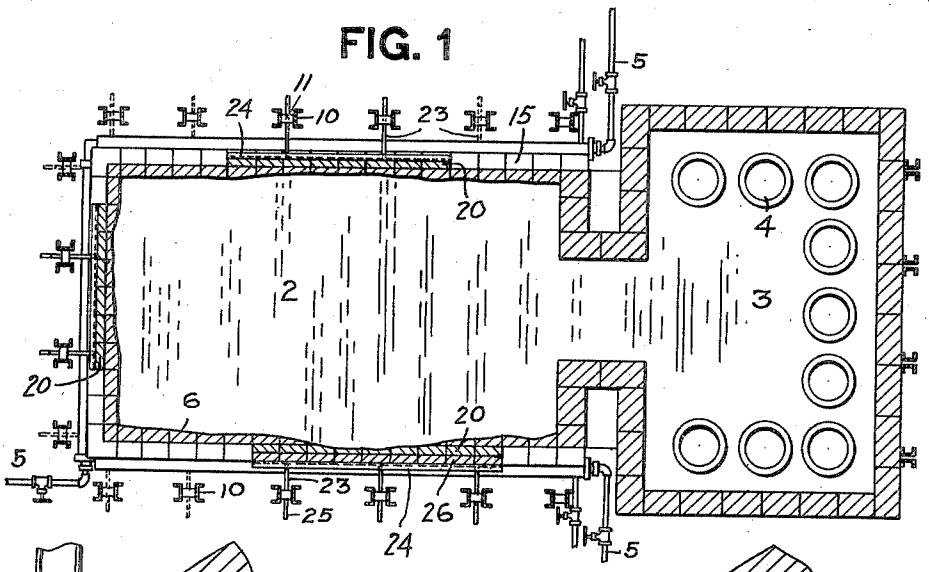


FIG. 2

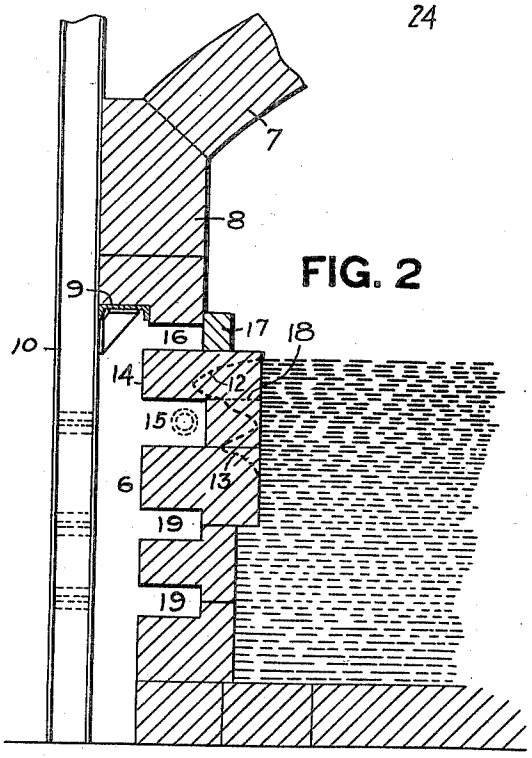


FIG. 3

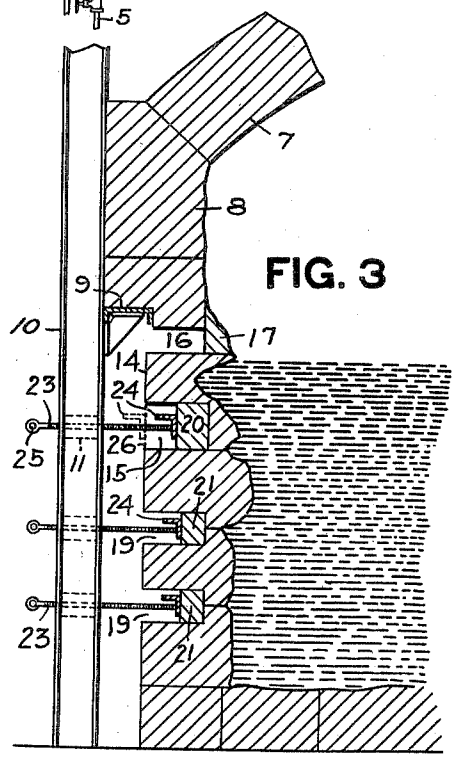
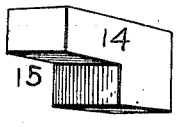


FIG. 4



WITNESSES.

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REFRACTORY WALL FOR GLASS-TANKS.

No. 811,223. Specification of Letters Patent. Patented Jan. 30, 1906.

Application filed August 7, 1905. Serial No. 273,162.

To all whom it may concern:

Be it known that I, LEON J. HOUZE, a resident of Port Marion, in the county of Fayette and State of Pennsylvania, have invented a new and useful Improvement in Refractory Walls for Glass-Tanks; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to tanks or furnaces for the melting of glass, and especially to the construction of the refractory blocks comprising the walls thereof.

The walls of glass-tanks are usually built up of blocks of suitable refractory material, and in the operation of such furnaces the molten glass attacks these refractory blocks and causes them to crumble or wear away. Said blocks crumble and wear away most rapidly at or adjacent to the top of the molten glass, where the action of the flux causes disintegration, and also quite rapidly at the joints between the blocks. The walls are liable to become so worn at places during the fire that it is necessary to restore the blocks in places, which necessitates the shutting down of the furnace or withdrawing the glass below the level of the worn portion, so that new blocks may be inserted. The fire usually lasts about eight months of the year, and it is very desirable to continue the operation of melting and withdrawing the glass without cessation during this period; but this has been practically impossible heretofore in tanks of this character.

The object of my invention is to provide blocks for the walls of the tank so constructed that said blocks will be air-cooled, and thus increase their life, and if worn away so constructed as to permit of the reinforcing of the wall at such weak spots in order to prolong its life until the end of the fire at least.

To these ends my invention comprises, generally stated, a glass-tank whose walls are formed of refractory blocks so formed as to provide air-recesses in their outer faces, whereby the wall is cooled so as to prevent its rapid disintegration and also in auxiliary blocks adapted to be placed and held in said recesses for the purpose of reinforcing the walls at the desired point.

In the accompanying drawings, Figure 1 is a sectional plan view of a glass-tank embodying my invention. Fig. 2 is an enlarged vertical section of a portion of the walls of the tank, showing the walls intact. Fig. 3 is a like view showing the wall practically worn away with reinforcing-blocks in position, and Fig. 4 is a perspective view of one of the blocks.

The numeral 2 designates the melting-compartment of a suitable glass-tank, and 3 the drawing-out compartment. I have employed this simple form of glass-tank to illustrate my invention, although it will be apparent that it may be applied to tanks of any other desired form. Within the drawing-out compartments are the ordinary rings 4.

The melting-compartment 2 is supplied with gas from a system of pipes 5, by means of which the gas is conveyed to suitable combustion-flues, all of which forms no part of my invention and is not illustrated in detail.

The walls 6 are built up of blocks of refractory material, and the arch 7 is supported upon the wall-section 8, which is independent of the portion 6. This wall portion 8 is supported upon a suitable shelf 9, which is carried by the buckstays composed of channel-beams 10, arranged at suitable intervals apart and forming supporting-columns. These channel-beams 10 are arranged in pairs back to back and carry the brackets 11.

Heretofore the walls 6 have been built up of solid blocks of regular shape. Said blocks wear away quite rapidly, due to the chemicals in the glass and the very high heat at which the furnaces must be run. They wear away especially at the level of the glass, due to the action of the flux which is at the surface of the glass. This wears away the upper tier of blocks somewhat in the shape indicated by the dotted line 12, Fig. 2. The blocks also wear away quite rapidly at the joints, the hot glass entering the joint and cutting the blocks away somewhat in the shape shown by the dotted line 13, Fig. 2. This wearing away is so rapid that the top blocks must be renewed several times at each fire. Even the second tier of blocks becomes so worn that they no longer present a sufficient horizontal seat to hold the top blocks in place, so that the second tier must also be frequently renewed. The renewal of these blocks not only entails a considerable expense for material and labor, but it is also necessary to lower the level of the glass in the tank, frequently resulting in bad glass, and also necessitates lowering the heat and stopping the making of glass, so that at least a week is lost at each renewal.

The high heat to which the blocks are subject is the prime cause of the rapid wearing

away of the blocks. Heretofore these blocks have been solid shapes of considerable length, so that the air on the outer face of the walls has practically no effect in reducing the temperature at the inner ends of the blocks.

My invention aims to so construct the blocks, and especially those for the upper row or tier, that the air on the outer face of the wall will materially reduce the temperature at the inner ends of the blocks, thus preventing their rapid disintegration and greatly increasing the life thereof. This may be accomplished in several ways, the drawings showing what I consider the best manner of securing this result.

The upper row of blocks 14 of the wall 6 are L-shaped in form, so that when placed in position they form an air-recess 15 on their under faces. Above the blocks 14 are the openings 16, which are closed by small blocks 17 on the inside of the wall-section 8. As a consequence a large portion of the bodies of the blocks 14 are exposed to the air on their upper, lower, and outer faces. This results in keeping these blocks comparatively cool at their inner ends, so that they do not wear away as rapidly as the old form of blocks. While I have illustrated the blocks 14 as formed in one piece, it is apparent that they may be formed in two pieces, being divided on the dotted line 18, Fig. 2.

As stated, the greatest wear is on the upper tier of blocks 14, and the object of my invention is attained by shaping these blocks in the manner described. If desired, the same principle can be applied to the lower blocks, and especially at the joints, although this is not necessary, since such blocks usually last out a fire as now constructed. By my improvement they can be made to last several fires. As shown, these blocks are cut away on their upper and lower faces, so as to form recesses 19 on their outer faces at the joints, which recesses extend around the furnace and cool the blocks at the joints, so that the glass will not wear them away as rapidly as with the old form of blocks.

With my new form of blocks the inner faces naturally become worn or crumbled, but less rapidly than with the old form of blocks. Furthermore, the flux and glass do not cut in as deeply, but the inner faces of the blocks will assume somewhat the shape shown in Fig. 3. Where the walls of the furnace wear, so that from the exterior of the tank red spots appear, which indicate that the wall is becoming thin, reinforcing-blocks 20 are inserted into the recess 15, as indicated in Fig. 3, which blocks reinforce the worn blocks and extend the life of the wall until the end of the fire. Similar blocks 21 are placed in the recesses 19. There is always present a solid horizontal seat or surface on which these reinforcing-blocks rest, so that they will always be in proper position. In order to secure these reinforcing-blocks in place, I employ the threaded rods or bolts 23, which pass through the threaded holes in the brackets 11 on the buckstays 10, with inner ends bearing against angle-bars 24, in contact with the reinforcing-blocks themselves. In this way the reinforcing-blocks are securely held in place against the outward pressure of the molten glass in the tank. These rods are provided at their outer ends with rings 25, or other suitable means, by which they may be readily turned to position. It may be found necessary to employ the reinforcing-blocks for the entire circumference of the surface, or only for portions thereof, wherever the appearance from the outside indicates that the wall is getting thin. I have indicated in Fig. 1 these reinforcing-blocks arranged for some distance along the walls of the furnace. Furthermore, if the first set of reinforcing-blocks do not last through the fire another set of reinforcing-blocks may still be inserted in the recess 15, as indicated in dotted lines 26, Fig. 3, and even a third or fourth set may be inserted, if necessary. In this manner by the insertion of the reinforcing-blocks as may be found necessary the life of the wall of the furnace may be extended without lowering the level of the glass in the furnace or interfering in any way with the continuous operation of the furnace, so that no time is lost in letting the furnace cool down for repairs to the wall. Since the recesses 15 are located below the level of the glass, they, together with the reinforcing-blocks 20, offer a ready means for renewing the walls below the level of the glass and without the necessity of lowering the same. The reinforcing-blocks are readily inserted in position and held securely therein, so that there is no liability of the furnace breaking out at any of the points of reinforcement.

It will be found that the recesses 15 and 19 will act to retard the wearing away of the blocks and may of themselves act to prevent the wearing away of the wall during the fire; but in case this action is not of itself sufficient the reinforcing-blocks may be readily inserted in said recesses, which are always ready to receive them.

What I claim is—

1. A glass-tank having a vertical wall of refractory material, a portion of said wall being formed of blocks so shaped and laid that their outer end and a horizontal face for at least one-third the length of the blocks are exposed to the atmosphere.

2. A glass-tank having a vertical wall of refractory material, provided on its outer face with an air-recess which extends inwardly for at least one-third the thickness of the wall and is open to the atmosphere.

3. A glass-tank having a vertical wall formed of refractory material, a portion of said wall being formed of L-shaped blocks forming a recess on the outer face of the wall

and exposing the outer end and horizontal face of the block to the atmosphere.

4. A glass-tank having a vertical wall formed of refractory material, a portion thereof being formed of blocks so shaped and laid as to provide a recess on their outer faces at the joints between the blocks, thereby exposing the outer ends and a portion of the horizontal faces of said blocks to the atmosphere.

5. A glass-tank having a vertical wall of refractory material provided on its outer face with an air-recess extending inwardly for at least one-third of the thickness of the wall, and being open to the atmosphere, and adapted to receive reinforcing-blocks.

6. A glass-tank having a vertical wall formed of refractory material, a portion thereof being formed of L-shaped blocks so laid as to form an air-recess on the outer face of the wall, and exposing the outer ends and a portion of the horizontal face of said block to the atmosphere, said recess being adapted to receive reinforcing-blocks.

7. A glass-tank having a wall provided with a recess therein, reinforcing-blocks in said recess, and means for holding said blocks in position.

8. A glass-tank having a recess formed in the outer face of its wall adjacent to the level of the molten glass, reinforcing-blocks in said recess, and means for holding said blocks in position.

9. A glass-tank having a vertical wall formed of refractory material, the upper portion of said wall being formed of blocks so shaped and laid as to provide a recess on the outer face of the wall located below the level of the glass, and exposing the outer ends and a portion of the horizontal faces of said blocks to the atmosphere.

10. A glass-tank having a vertical wall formed of refractory material provided on its outer face below the level of the glass in the tank with a recess open to the atmosphere and adapted to receive reinforcing-blocks.

11. A glass-tank having a wall formed of refractory material, and means for applying reinforcing-blocks to the outer face thereof below the level of the glass in the tank.

12. A glass-tank having a wall formed of refractory material provided on its outer face with a recess below the level of the glass in the tank, said recess being adapted to receive refractory reinforcing material.

In testimony whereof I, the said LEON J. HOUZE, have hereunto set my hand.

LEON J. HOUZE.

Witnesses:
J. J. LEMLEY,
W. A. MCCAHON.