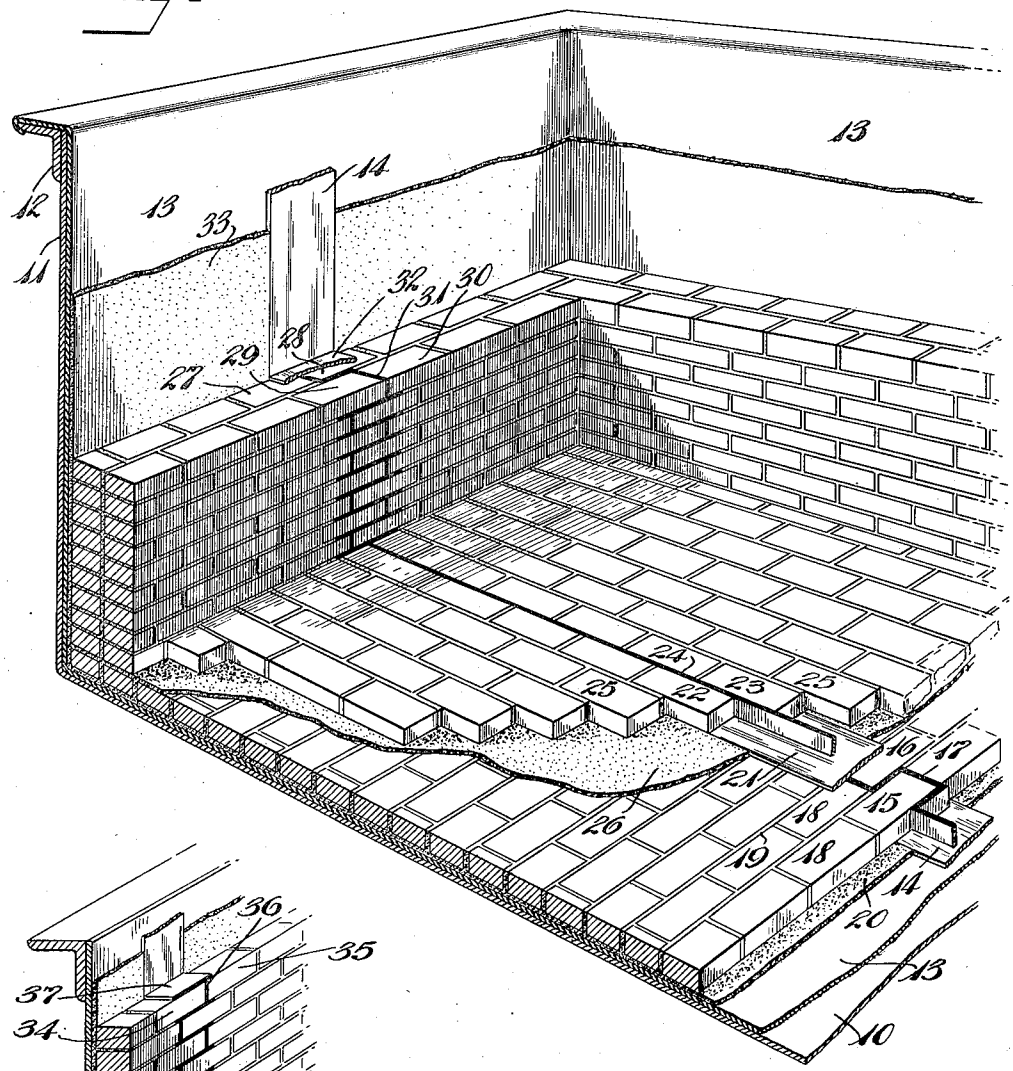
Sept. 24, 1935. E. B. GATES 2,015,470

MASONRY STRUCTURE WITH JOINTS

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Fig-1



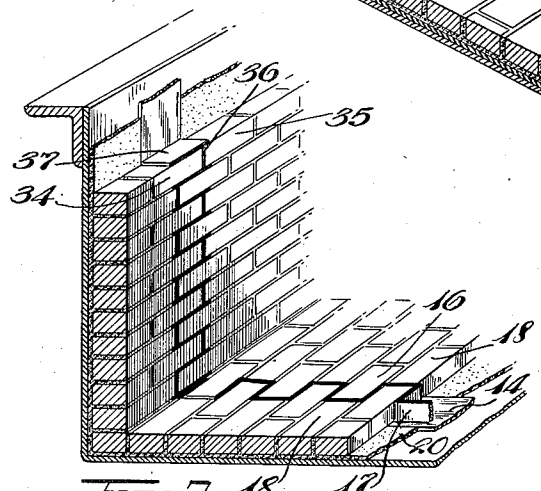


Fig-2

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Fig-3

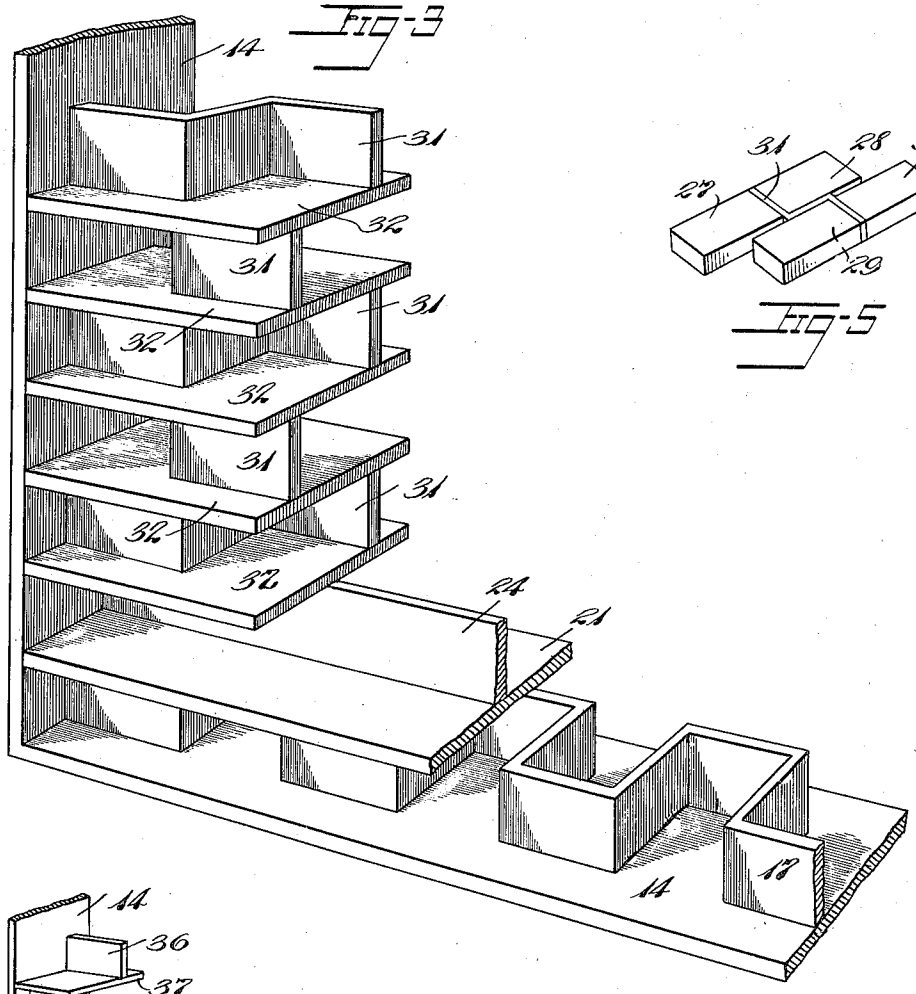


Fig-5

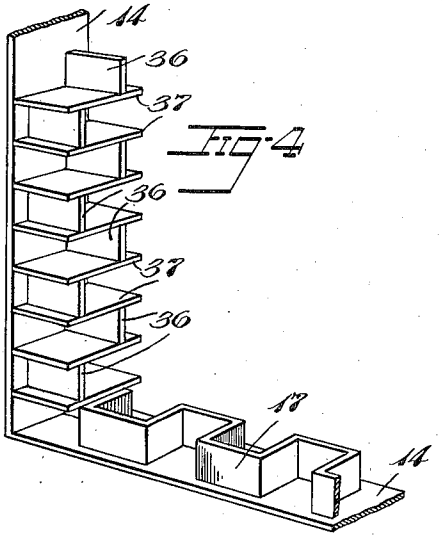


Fig-4

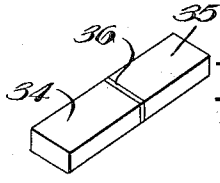


Fig-6

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UNITED STATES PATENT OFFICE

2,015,470

MASONRY STRUCTURE WITH JOINTS

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Application June 9, 1933, Serial No. 675,050

8 Claims. (Cl. 72—14)

This invention relates to masonry structures having expansion joints and to the method of constructing same and it is especially useful in the construction of corrosion-resistant masonry for tank linings, floors and the like.

In the building of pickling tanks, floors, or other structures adapted to resist the corrosive action of acids or other corrosive chemicals it is the practice to lay the corrosion-resistant brick or tile in a fusible relatively inelastic corrosion resistant cement such as a mixture of sulfur and silica sand, with or without softening agents or other ingredients. While by the exercise of careful workmanship a rigid structure may be laid of leak-proof construction, the resulting structure when subjected to temperature changes and hydrostatic pressure is liable to crack or open at the joints. It is therefore highly desirable to provide means for compensating for such changes in temperature or other causes which might cause the structure to develop defects.

The use of linings of corrosion resistant brick within a rubber lined tank structure to protect the rubber lining from mechanical injury and to reduce the temperature of any of the solution contacting with the rubber lining also has been proposed, as in the Fritz Patent No. 1,899,413, and provides an efficient structure. However, while in tanks or other structures of small size, say not exceeding fifteen feet in any dimension, the rubber lining of the tank compensates for expansion differences due to temperature changes, it has been found that in structures of greater dimensions, cracking or separation of the brick may occur from changes in temperature or other causes and that the resilient rubber lining alone does not provide sufficient compensation for expansion differences.

The principal objects of this invention are to provide corrosion resistant expansion means which may be incorporated in such masonry structures whether or not the additional rubber lining is employed, and to provide a method of constructing such structures, to facilitate the building of such structures by providing means for constructing the masonry linings in sections of convenient size, by the division of the lining into sections providing against cracking of the masonry due to settling, expansion, or contraction of the structure, and by the provision of expansion joints of novel character to allow for expansion and other stresses while insuring alignment of the sections adjacent the expansion joint.

Other objects will appear from the following description and the accompanying drawings.

In the drawings:

Fig. 1 is a perspective view showing a corner of a tank partially lined with corrosion resistant brick, the successive courses of material being broken away in stepped relation in order to show the construction, the expansion joint being shown as partly constructed.

Fig. 2 is a perspective view showing a portion of a wall and floor construction of modified form using a single layer of brick, the expansion joint being shown as extending across the floor and up the wall, parts being broken away to show the construction.

Fig. 3 is a perspective view of the assembled rubber expansion member as used in constructing the wall and floor of Fig. 1, the brick being omitted and parts being broken away to show the construction.

Fig. 4 is a similar view showing the assembled rubber expansion member as used in the single course structure illustrated in Fig. 2.

Fig. 5 is a perspective view of one of the assembled brick units used in constructing the double course wall of Fig. 1.

Fig. 6 is a perspective view of one of the assembled brick units used in constructing the single course wall of Fig. 2.

Referring to the drawings:

The tank illustrated in Fig. 1 is constructed of a sheet metal floor 10 and sheet metal wall 11, the wall being reinforced at its upper margin by an angle iron 12. The invention is not limited to such a wall and floor structure, as concrete or other material may be used. A rubber lining 13 is shown as adhesively applied to the inner surfaces of the floor and walls. This lining is desirable but not necessary. Where used it provides an enveloping cushion for the masonry structure and assures against attack of the walls of the tank by any liquid which might seep through the masonry. The rubber lining where used may be of any well known construction.

The expansion joint is best described by reference to the method used in constructing the masonry lining. A strip of adhesive such as a thermoplastic rubber-derivative cement is applied across the floor of the tank and up the walls whereever an expansion joint is to occur. A strip of unvulcanized rubber 14, having a thickness equal to the cement joint between bricks or of mortar-thickness and of width exceeding half the length of a brick is then applied over the cemented strips.

A number of bricks 15, 16, which previously have been prepared by coating at least one end thereof with a priming coat of rubber thermoplastic

cement and drying the coating, are now laid with their coated ends overlying the strip 14 so as to break joints, and simultaneously a resilient material such as an unvulcanized rubber strip 17 of mortar-thickness and having a width equal to the brick thickness, is laid back and forth in a meandering course between the bricks 15, 16 and around their ends. The overhanging ends of the bricks are supported by shims comprising small pieces of acid proof thermoplastic cement of mortar thickness. The bricks are pressed closely into place so that the rubber strip 17 completely fills the voids therebetween.

Where it is desired to provide a greater thickness of rubber between the ends of the bricks a piece of rubber having a width equal to the thickness of the brick and a length equal to the width of the brick may be applied between the strip 17 and the end of each adjoining brick.

When the strip 17 and bricks 15, 16 have been laid entirely across the floor from wall to wall, other uncoated bricks 18 are laid to complete the first layer of brick. These bricks are spaced apart to provide the usual voids therebetween and are spaced from the floor layer 13 by pieces of acid proof thermoplastic of the same thickness as strip 14. Fluid thermoplastic acid proof cement is now poured into all the vertical voids to provide the bond 19 and running under the bricks fuses with the pieces of solid cement to provide a solid layer 20. It will be noted that the strips 14 and 17 provide a fluid tight dam for retaining the cement and this permits construction of the masonry in progressive steps each consisting of the laying of a masonry section between expansion joints.

The second course of brick is preferably laid cross-wise of the first course. A strip 21 of unvulcanized rubber similar to strip 14 is now applied over bricks 15, 16 and the exposed edge of strip 17, and is rolled down into adhesive contact therewith. Two rows of primed bricks 22, 23 are now laid across the tank over the strip 21 with a strip 24 of unvulcanized rubber of width equal to the thickness of the brick and width at least of mortar thickness therebetween, spaces being left between the ends of the bricks. Bricks 25 are then laid to cover the remainder of the floor being supported on pieces of thermoplastic acid proof cement. The voids are filled with fluid cement which flows between the first and second courses of brick to provide a layer 26. This completes the floor structure.

If a wall is to be built as in Fig. 1, this conveniently is constructed, with the expansion joint continued therethrough, by preforming a series of units such as are illustrated in Fig. 5. These comprise four bricks 27, 28, 29, 30, arranged to be laid in a plurality of rows of the same course and which have been primed with thermoplastic rubber cement, and a strip 31 of unvulcanized rubber or other resilient material of at least mortar thickness extending therebetween. The rubber and bricks are assembled and pressed to unite them in a unit. A number of pieces of unvulcanized rubber 32 are also provided. The first piece of rubber 32 is laid across the strip 24 in the floor and covers the adjoining floor bricks. A unit such as shown in Fig. 5 is then laid thereon. A second piece 32 is laid thereover and then another four brick unit reversed so as to break joints. The remaining bricks in the wall courses are laid either to the same height as at the joint or to a less extent with pieces of thermoplastic cement therebetween to properly space the brick, it being usually more convenient to keep the wall at the expansion joint in advance of the remainder of the wall structure. After a number of courses, preferably five, have been laid up at the joint in this manner, the inside face of the wall is sealed against leakage by a form of boards, a layer of waxed paper being laid between the boards and the wall. Thermoplastic corrosion-resistant cement in fluid condition is then poured between the back of the brick and the tank wall to fill the voids between the bricks and to form a layer 33 of cement. The wall may then be continued in the same manner.

In Fig. 2 I have shown a lining comprising a single floor layer and a single wall layer, omitting the rubber lining. The floor is laid in the same manner as described in laying the first layer of floor in the construction shown in Fig. 1. The rubber strips 14 and 17 comprise the expansion strip separating the bricks 16 and 18. Such a floor may be used alone as in dairies or battery rooms. In laying the wall, however, the preformed units shown in Fig. 6 are used, each comprising a pair of bricks 34, 35 attached end to end by a strip 36 of unvulcanized rubber of mortar thickness, the ends of the bricks being primed with thermoplastic rubber cement.

A piece of rubber 37 is laid under the first wall course and over the strip 17, then a unit comprising bricks 34, 35 is laid thereon. This construction is continued throughout the wall, the strips 36 being staggered so as to break joints.

In both the double and single wall constructions the resilient expansion joint provided by the rubber strips extends continuously across the floor and up the wall so as completely to fill the voids between the intercalated bricks projecting from the facing margins of the adjoining rigid masonry sections. The assembling of the brick and rubber while the rubber is in an unvulcanized state permits the weight of the brick to cause the rubber to flow and completely fill the voids between sections, resiliently cushioning each projecting brick.

The heat absorbed by the brick when pouring the thermoplastic cement assists first in softening the unvulcanized rubber and then in partially vulcanizing the same. Vulcanization may be prolonged by covering the previously poured joints with a bed of sand to prevent escape of heat. Where complete vulcanization of the rubber is not accomplished by the heat absorbed by the bricks, it may be completed by filling the finished tank with water and heating the water by introduction of steam.

Where an additional rubber lining is employed outside the brick, as shown in Fig. 1, the rubber strips comprising the expansion joint become integrally united to the rubber lining and provide webs of rubber extending from the rubber lining between the adjoining sections of brickwork. As the vulcanization of rubber depends upon the presence of sulfur in the rubber compound or adjacent thereto, the thermoplastic cement used in uniting the rigid sections of brick structure is composed principally of sulfur, the rigid thermoplastic and resilient rubber bonding portions adhere to each other when heated. The presence of the priming coat of rubber-derivative cement on the bricks does not interfere with the adhesion of the thermoplastic sulfur cement to the bricks but has been found to increase the strength of the bond.

I claim:

1. The combination of two rigid sections of

brickwork, each comprising a floor portion and a wall portion, said sections having bricks extending from mating margins thereof in such intercalated relation as to lock the sections against movement in a plurality of directions, said mating margins having voids between them to permit of relative bodily movement between said sections, and a body of resilient material completely filling the voids between the sections.

2. A corrosion-resistant structure comprising a rigid base having an extensive area, a corrosion-resistant layer of resilient material adhesively united thereto, a plurality of rigid protective sections laid thereover each comprising ceramic units united by a rigid bonding material, said sections having a void between them, and a body of resilient material bonded to the first-named layer and filling the void between the sections.

3. A tank lining comprising a strip of resilient material of mortar-thickness extending across the floor of the tank, a plurality of bricks, each having substantially half its length over the strip and alternately extending beyond opposite margins of the strip, a second strip of resilient material attached to the first-named strip in perpendicular relation thereto and extending in a meandering arrangement around the material supported ends of each brick to provide a resilient bond therebetween, and rigid brick and cement sections of floor rigidly bonded to the exposed ends of the material-bonded bricks to provide a continuous floor having a resilient expansion joint.

4. The method of constructing a corrosion resistant brick structure provided with a resilient expansion joint, said method comprising laying a strip of resilient material along the zone to be provided with the expansion joint, priming a plurality of bricks with adhesive cement, laying the bricks across the resilient material strip in intercalated relation while laying a narrow strip of resilient material on edge therebetween with one of its edges joined to the first named strip to provide a resilient material dam between sections, and laying other brick to complete the sections flanking the joint.

5. The method of constructing a corrosion resistant brick structure provided with an expansion joint, said method comprising laying a strip of resilient material along the floor of the structure, priming a plurality of bricks with adhesive cement, covering said strip with said bricks and simultaneously laying resilient strip material to fill the voids therebetween and provide a continuous resilient material dam extending through the structure, laying sections of brick work on each side of the joint so formed and interlocking with the brick of the joint, and filling the voids in the respective sections with a rigid setting cement.

6. The method of constructing a corrosion resistant brick structure, which structure comprises building units of a plurality of bricks primed with adhesive cement and separated by resilient strips of resilient material, assembling a plurality of said units and separating strips of resilient material to provide an expansion joint extending through the structure, and completing the structure from bricks set in rigid cement.

7. The method of constructing a corrosion resistant, brick structure provided with an expansion joint, said method comprising priming a plurality of bricks with a rubber like adhesive, assembling said bricks with resilient unvulcanized rubber strips therebetween, laying unprimed bricks adjacent to the primed bricks, filling the voids between the bricks with molten heated cement, and vulcanizing the rubber strips by contact with the heated brick structure.

8. A structure comprising a pair of rigid floor and wall sections of brick work, said sections having bricks extending from mating margins thereof in such intercalated relation as to lock the sections against movement relative to each other and having voids therebetween, the mating margins of the floor and wall sections extending across the floor and up the wall, and a body of resilient material filling the voids between said mating margins.

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