Sept. 29, 1931. G. D. MORRIS 1,824,917

KILN CAR CONSTRUCTION

Filed Sept. 30, 1929

Fig. 1,

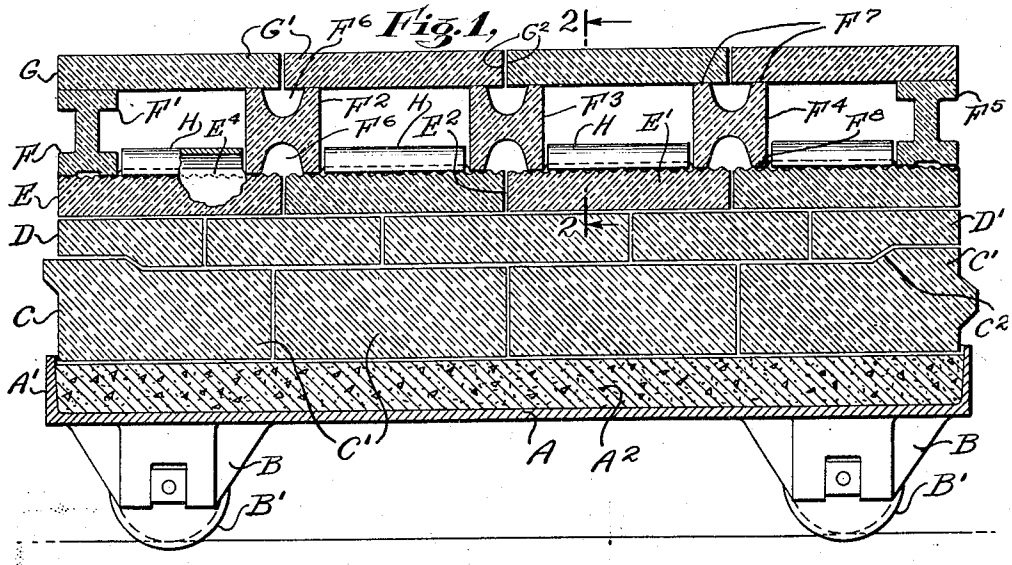


Fig. 2,

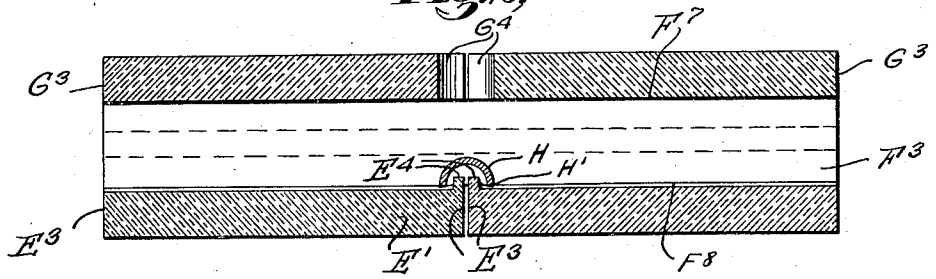
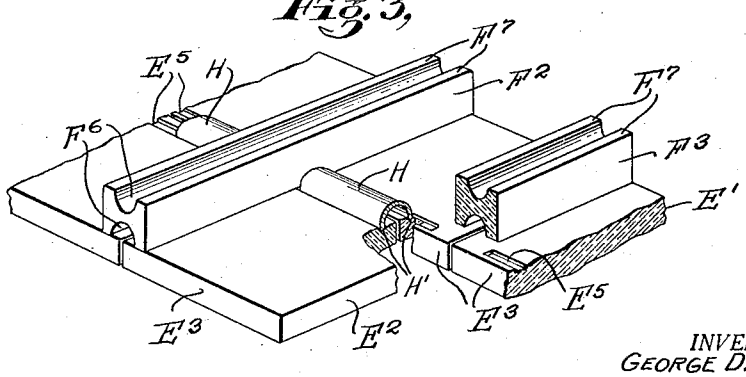


Fig. 3,



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UNITED STATES PATENT OFFICE

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KILN CAR CONSTRUCTION

Application filed September 30, 1929. Serial No. 396,114.

The present invention relates to improvements in the construction of kiln cars or trucks used for carrying goods to be heat treated through a continuous tunnel kiln. The superstructure of such cars is usually formed by a plurality of superposed horizontally extending courses of refractory members mounted on a wheeled metallic frame. The three upper courses of the superstructure generally comprise a middle course having a plurality of spaced apart girder tiles extending transversely of the car and positioned between vertically spaced courses of flat rectangular slabs, the slabs of each course being arranged with their adjacent side edge surfaces substantially in contact. The goods to be heat treated are positioned on the upper slab course. The individual slabs of the lower course, on which the girder tiles are directly supported, usually extend the entire width of the car and because of the linear proportions of the slabs and the heavy loads and high temperatures to which they are subjected, are frequently broken in use. The individual goods supporting slabs usually extend transversely only a part of the width of the car.

In heat treating certain classes of goods it is necessary to provide a bed of sand on the goods supporting slabs and in which the goods are placed. Inasmuch as the refractory blocks and slabs in the superstructure are not rigidly connected because of the expansion spaces required, precautions must be taken to prevent the sand on the uppermost slabs from filtering down into the joints in the lower courses of the superstructure. Sand collecting in these joints prevents the normal expansion of the refractory members and rapidly effects the destruction of the car superstructure.

Arrangements have been heretofore proposed to intercept and store sand filtering down between some of the joints between the upper goods supporting slabs as is disclosed in my prior Patent No. 1,755,701, granted April 22, 1930. The general object of my present invention is to provide an improved kiln car superstructure construction in which sand infiltration is practically eliminated. A further object of my invention is to provide an improved arrangement and construction of the slabs on which the girder tiles are directly supported characterized by a decrease in the transverse dimensions of the slabs and novel provisions for preventing the entrance of sand into the slab joints.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described preferred embodiments of the invention.

Of the drawings:

Fig. 1 is a sectional elevation partly broken away of a kiln car embodying my invention;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is a perspective view with parts broken away of a modified construction.

In the drawings and particularly in the construction illustrated in Figs. 1 and 2, a tunnel kiln car is illustrated having a metallic frame member A with a vertical marginal flange A′. Bearings B are secured to the frame for supporting the usual flanged wheels B′.

The frame member A is arranged to support the truck superstructure which in the construction illustrated consists in a plurality of superposed horizontally extending courses C, D, E, F and G of refractory members of various shapes mounted on a bed of concrete A^2 within but not completely filling the rectangular frame A. The course C of the superstructure consists of a plurality of massive refractory blocks C′ arranged at and within the marginal portions of the frame member flange A′. The center portion of the course is filled with superposed fire clay blocks. The course D of the superstructure also comprises refractory blocks D′ along the marginal portions of the car and central fire clay blocks, the blocks of the

course D being of smaller dimensions than the blocks in the course C. The marginal blocks C′ and D′ are preferably formed with their adjacent surfaces interlocking as shown at C^2 to limit the outward movement of the upper blocks on the lower blocks.

On the built-up structure formed by the courses C and D is arranged the third course E consisting of a plurality of flat rectangular slabs E′, each of which is rectangular in form and extends transversely half the width of the car. In a car embodying the present invention eight of these slabs were used in this course. The upper surface of each slab may be corrugated as shown to minimize movement of the upper courses of the superstructure thereon. The slabs E′ are preferably arranged on the blocks of the course D so that the joints between the blocks D′ are covered by the slabs.

In the present construction I provide means for covering the longitudinally and horizontally extending vertical joints formed by the adjacent side and end surfaces E^2 and E^3, respectively, of the slabs E′. For this purpose the girders or rails which form the course F of the superstructure are positioned over the transversely extending joints of the slabs E′. Each girder extends the full width of the car and is preferably a one-piece block of refractory material. As shown, five of these girders F′ F^2, F^3, F^4 and F^5 are used, the girders F′ and F^5 being located along the front and rear edges of the car respectively. Inasmuch as the girders F′ and F^5 have no slab joint protecting function, they may be made of the usual I-beam cross section. The girders F^2, F^3 and F^4 are of the preferred cross sectional shape and construction illustrated in my said prior application. Each of these girders has a general rectangular cross section modified by a deep recess or groove F^6 formed in the upper and lower surfaces thereof and extending throughout the length of the girder. The upper and lower surfaces F^7 and F^8, respectively of each girder adjacent the grooves F^6 are flat and arranged to support a goods supporting platform course G.

The goods supporting platform, as shown in Figs. 1 and 2, is composed of a plurality of slabs G′ having substantially the same dimensions and shape as the slabs E′. The slabs G′ are arranged on the supporting girders so that the transversely extending vertical joints between the front and rear end surfaces G^2 of each pair of adjacent slabs is positioned directly over the top groove F^6 of the corresponding supporting girder. With this construction any sand on the goods supporting platform which works down between the transversely extending joints thereof, will fall into the grooves F^6 directly therebelow. The grooves are of sufficient size to store a substantial amount of sand, which may be removed after the car is withdrawn from the kiln by a suitable tool or vacuum pipe. The double groove arrangement permits inversion and increases the period of use of the girders.

With the arrangement heretofore described any sand which works down into the longitudinally extending joints formed by the side surfaces G^3 of adjacent slabs G′ will fall directly onto the slabs E′ and unless the latter are made in one piece extending the width of the car with consequent liability to breakage, will work down into the longitudinally extending joints therein. Since the smaller size slabs are decidedly preferable, the longitudinal joints between the slabs E′ are each covered by a series of convexly curved shallow plates H, each of which extends between and is held against longitudinal movement by the vertical sides of the adjacent girders.

Movement of the plates H transversely of the car is prevented by the formation of upstanding flanges E^4 at the inner sides of the slabs E. The individual slab flanges only extend part of the length of the corresponding slab because of the space thereon required for supporting the transverse girders. The flanges thus aid in arranging the girders in position.

In some cases each slab E′ may be preferably formed with a shallow groove E^5, as shown in Fig. 3, in lieu of the flange E^4 heretofore described. When so constructed the cover plate is positioned with its lower edges H′ in the grooves E^5. This arrangement decreases the effective height of the cover plates and thereby improves the transverse circulation of the kiln atmosphere through the passages between the girders and also through the circulation openings formed by the cut out portions G^4 in the slabs G′. It is also advantageous in that similar grooves may be formed in the lower surface or at the opposite side of the slabs whereby if warping of the slab should occur, the slab may be inverted or reversed and its effective life thereby increased.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is:

1. A tunnel kiln car having a superstruc-

ture comprising a plurality of refractory slabs having adjacent edge surfaces forming longitudinally and transversely extending joints, a plurality of supporting girders extending transversely of said car and positioned over said transversely extending slab joints, and cover plates mounted on said slabs between said transverse girders and extending over said longitudinally extending slab joints.

2. A tunnel kiln car having a superstructure comprising a plurality of rectangular refractory slabs having their adjacent side and end surfaces arranged to form a plurality of longitudinally and transversely extending joints, a plurality of refractory girders extending transversely of said car, a goods supporting platform mounted on said girders, said girders being positioned on said slabs over said transversely extending joints, and refractory cover plates positioned between said girders and extending over said longitudinally extending slab joints.

3. A tunnel kiln car having a superstructure comprising a pair of rectangular refractory slabs having their adjacent side edge surfaces in contact and forming a joint extending longitudinally of said car, and a cover plate mounted on said slabs and extending over said longitudinally extending joint.

4. A tunnel kiln car having a superstructure comprising a plurality of refractory slabs having adjacent edge surfaces forming longitudinally and transversely extending joints, a plurality of supporting girders extending transversely of said car and positioned over said transversely extending slab joints, cover plates mounted on said slabs between said transverse girders and extending over said longitudinally extending slab joints, and means on each of said slabs for maintaining the corresponding cover plate in position.

5. A tunnel kiln car having a superstructure comprising a plurality of rectangular refractory slabs having their adjacent side and end surfaces arranged to form a plurality of longitudinally and transversely extending joints, a plurality of girders extending transversely of said car, a goods supporting platform mounted on said girders, said girders being positioned on said slabs over said transversely extending joints, refractory cover plates positioned between said girders and extending over said longitudinally extending joints, and means adjacent the edge portion of each of said slabs for maintaining the corresponding cover plate in position.

6. In a tunnel kiln car superstructure having a plurality of superposed courses of refractory blocks and slabs, an intermediate course comprising a plurality of rectangular refractory slabs, each of said slabs having its side and end edge surfaces in contact with the side and edge surfaces of adjacent slabs, thereby forming a plurality of longitudinally and transversely extending joints, and means for preventing the entrance of sand into said joints.

7. In a tunnel kiln car having a superstructure consisting of a plurality of superposed courses of refractory members, an intermediate course comprising a plurality of rectangular refractory slabs having their adjacent edge portions forming longitudinally and transversely extending joints, a plurality of girders mounted on said slabs and positioned over said transversely extending joints, a goods supporting platform mounted on said girders and comprising a plurality of rectangular refractory slabs having their adjacent edge portions forming longitudinally and transversely extending joints above and in alignment with said first mentioned joints, a sand receiving groove in the supporting surface of said girders below said last mentioned transversely extending joints, and cover plates positioned on said first mentioned slabs between said girders and extending over said first mentioned longitudinally extending joints and below said last mentioned longitudinally extending joints.

8. A tunnel kiln car superstructure comprising a pair of rectangular refractory slabs having their adjacent side edge surfaces forming a joint extending longitudinally of said superstructure, a longitudinally extending groove in each of said slabs adjacent said joint, and a cover plate positioned in said grooves and extending over said joint.

Signed at New Castle, in the county of Lawrence and State of Pennsylvania, this 24th day of September, A. D. 1929.

GEORGE D. MORRIS.