The present invention relates to an alloy casting for a car carrying refractory block which are being fired in a car tunnel kiln.

It is an object of the invention to provide an improved kiln rubbing seal.

It is an object of the invention to protect and increase the life of kiln bearings and cars.

It is an object of the invention to substantially increase the output of refractory block per man hour by the decrease in the number of shut downs for repairs.

It is an object of the invention to provide means to lock brick shapes against undue expansion and eliminate wall abrasion.

It is an object of the invention to provide means whereby fire clay blocks which rapidly deteriorate and cause destruction of the kiln are replaced.

It is an object of the invention to conserve kiln heat.

It is an object of the invention to provide improved means to protect kiln cars from excessive heat.

It is a particular object of the invention to provide heat resistant chrome alloy casting to form the top of a kiln car said casting being so constructed and arranged that it holds a large amount of insulation material where it is most needed and serves as a permanent lock against undue expansion of the kiln insulating material and blocks.

Other objects of the invention will appear as the description proceeds.

In the drawings like figures refer to like parts throughout.

Fig. 1 is a section of a car tunnel kiln with a car equipped with one form of the invention.

Fig. 2 is a perspective view of an alloy casting representing one form of the invention.

Fig. 3 is a perspective view of a fire brick shape which forms the alloy casting.

A car tunnel kiln 10 is a refractory furnace in which fire brick and similar products are baked at a temperature of about 2600 degrees Fahrenheit. Steel frame cars 11 are rolled into kiln 10 on rails 12, laid on the floor of pit 13 the walls 14 of which are closely adjacent the sides of car 11. Walls 14 are each provided with a channel 15 filled with sand 16 held in place by an upstanding angle member 17. A cross frame 18 is provided with depending metal side flanges 19 positioned to extend into the sand 16 in channels 15 so that as car 11 is rolled along rails 12 depending flanges 19 form a draft seal with sand 16 and ride along therein.

A portion of the tunnel wall above pit 13 and just above channels 15 is sloped outwardly at an angle of about forty-five degrees as at 20. Framing 18 carries a casting 21 thereon which extends along the sides of the car 11. Casting 21 may be made in mating parts as shown in Fig. 2, or in a single piece extending across frame 18 as desired. Casting 21 has a base portion 22 which sets into and is carried by cross frame 18. Frame 18 prevents improper movement of casting 21 as it extends upwardly parallel to and closely adjacent wall portion 20. Casting part 23 extends about half way up wall portion 20 and then projects upward substantially vertically, forming a flange 24 along the edge of car 11. Casting 21 is covered with insulation material such as clay sand asbestos or the like 25, leaving flanges 24 projecting. A fire brick shape 26 rests upon insulation material 25 and has a lower outer offset portion 27 which extends over flange 24. Space 28 is allowed for expansion. Fire brick shape 26 has an inner vertical wall 29, an inner upper offset portion 30 and a second inner wall 31. Inner upper offset portion 33 forms a surface 32 on which rest refractory blocks 33 supported by insulation 34 filled in to the level of surfaces 32. Second inner walls 31 about blocks 33 and hold them in position.

In operation a stacked car 11 filled with blocks 33 is rolled into tunnel kiln 10 which is bricked up and fired. Metal side flanging 19 ride through sand 16 and maintain a heat seal so that pit 13 is much cooler than the upper portion of the kiln 10. As blocks 33 heat up they expand and force fire brick shape 26 outward, causing it to slide on insulation material 25. Spaces 28 are ample for this purpose. Casting 21 holds all in place and does not warp crack or burn. There is therefore no abrasion of the furnace wall by cracked insulation or blocks 33 which have become wedged between the kiln wall and the car 11. Production is increased and costs are decreased because the life of a kiln lining is greatly increased eliminating many costly shut downs to reline and the cost of such relining. Car equipment enjoys a much longer life and the number of refractory blocks output per man hour is substantially increased. With previous insulating material, expansion of the heated refractory blocks 33 soon displaced them on cars 11 so that one or more of the blocks 33 frequently fell between the car 11 and the kiln wall and cracked the insulating material on the car causing it together with the fallen block to abrade the kiln wall necessitating frequent replacement. Often cars must be left in
3 the kiln to cool as they become so locked in place that they cannot be moved. The present invention makes a continuous tunnel kiln possible wherein cutouts 11 may be pushed in one end and cut the other as long as a kiln lining lasts. As in the case of a blast furnace continuous operation greatly increases the effective life of a furnace lining as an important factor is the large expansion and contraction to which intermittent operation subjects them which literally works the lining to death. The advantages of the present invention with batch operation are great and make its use well worth while. We claim:

1. In a refractory block firing unit, a tunnel kiln, said kiln having a pit with car rails therein, a kiln car arranged to be moved on said rails and having a framing structure, a heat seal means between the walls of said kiln and said car, a heat resistant alloy casting positioned on top of said framing structure, the walls of said kiln having an outwardly flared portion, said casting having an upwardly and outwardly extending wall portion approximately parallel to and closely adjacent to said flared wall portion, upstanding flanging means on the outer portion of said casting, insulation material covering said framing structure and said casting, said flange extending above said insulation material, a plurality of parallelepiped fire brick shapes having diagonally offset channel portions on their outer lower and inner upper parts, said shapes resting on said insulation material and extending above said upstanding flanging, but inwardly spaced therefrom a sufficient distance to allow for expansion and refractory block on said inner upper offset part of said shape.

2. The combination set forth in claim 1, said parallelepiped shapes being rectangular, said inner upper channel in each said shape providing a supporting base for refractory block and an upstanding portion arranged to engage said block on expansion.

3. In a refractory block firing unit, a tunnel kiln, said kiln having a relatively high temperature portion and a relatively low temperature portion, a movable car in said low temperature portion, a frame for said car, heat conserving means between said movable car and the walls of the kiln tunnel serving to separate said low temperature portion from said high temperature portion, an upstanding heat resistant alloy member mounted on the upper side of said car frame, said heat conserving means comprising a portion of said alloy member approximately parallel to a portion of said kiln wall and in closely adjacent heat conserving relation therewith whereby a permanent heat seal is provided, said approximately parallel portions being arranged to make a substantially vertical wall between the walls of said kiln and said car frame.

4. A fire brick supporting shape for use with a kiln car having an upstanding edge comprising, a parallelepiped base portion arranged to rest within a car, an upwardly and outwardly extending portion arranged to project over the edge of a kiln car, said base portion and said upwardly and outwardly extending portion being joined to form an inner channel means the lower wall of which is formed by an upper surface of said base portion and a side wall of which is formed by an inner wall of said upwardly and outwardly extending portions, parallel end walls helping to maintain said outwardly and upwardly extending portion at an obtuse angle to said base portion, said outwardly extending portion projecting outwardly and upwardly far enough to protect a kiln car frame from high temperature of kiln gases.

5. The combination set forth in claim 5, said outwardly and upwardly extending portion forming an obtuse angle with said base portion of such value that the angularly extending portion closely corresponds to a sloping portion of a kiln normally adjacent a car edge and a central web joining said base portion and said outwardly and upwardly extending portion for maintaining the unit stresses in said shape below the yield point at normal kiln working temperatures.

6. The combination set forth in claim 1, said alloy casting comprising a base plate, a wall at an obtuse angle to said base plate, and a tapered upstanding edge on the upper part of said wall, said base plate having positioning means whereby said casting may be securely positioned on top of a kiln car and receive refractory block for firing.

7. The combination set forth in claim 1, said fire brick shapes comprising, a rectangular parallelepiped having a base portion arranged to rest within a car, an upwardly and outwardly extending portion arranged to project over the edge of a kiln car and providing expansion space between said base portion and said car edge, said base portion and said upwardly and outwardly extending portion being joined to form an inner channel means the lower wall of which is formed by an upper surface of said base portion and a side wall of which is formed by an inner wall of said upwardly and outwardly extending portion whereby said shape base portion may be positioned on a kiln car adjacent to, but spaced from, an edge thereof and receive refractory block to be fired in said channel portion.

BOYD C. MILLER. 
JOHN H. ISENHOUR.

REFERENCES CITED
The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,321,388</td>
<td>Owens</td>
<td>Nov. 11, 1919</td>
</tr>
<tr>
<td>1,439,473</td>
<td>Knox</td>
<td>Dec. 19, 1922</td>
</tr>
<tr>
<td>1,628,373</td>
<td>Richardson</td>
<td>May 10, 1927</td>
</tr>
<tr>
<td>1,636,073</td>
<td>Robertson</td>
<td>July 18, 1927</td>
</tr>
<tr>
<td>1,694,083</td>
<td>Straight</td>
<td>Dec. 4, 1928</td>
</tr>
<tr>
<td>1,739,176</td>
<td>Morse, et al</td>
<td>Dec. 10, 1928</td>
</tr>
<tr>
<td>1,838,672</td>
<td>Hanley, Jr.</td>
<td>Dec. 29, 1931</td>
</tr>
<tr>
<td>1,879,246</td>
<td>Hogue</td>
<td>Sept. 27, 1932</td>
</tr>
<tr>
<td>1,960,572</td>
<td>Butterworth, et al</td>
<td>May 29, 1934</td>
</tr>
</tbody>
</table>