R. J. HIMMELRIGHT,
LOCOMOTIVE FIREBOX,
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1,402,162.

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2 SHEETS-SHEET 2.

Witness

Raleigh J. Himmelright

By

Attorneys
To all whom it may concern:

Be it known that I, RALEIGH J. HIMMELRIGHT, of New York, N. Y., residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Locomotive Fire Boxes, of which the following is a specification.

This invention relates to locomotive fire boxes and particularly to that type of fire box provided with a refractory arch or baffle extending from a point adjacent the flue sheet, and beneath the flues, rearwardly and upwardly, a portion of the length of the fire box.

One of the primary objects of this invention consists in providing a novel and simple means whereby this general type of fire box is made more economical in consumption of fuel, and better combustion is obtained with the resultant increase in general efficiency.

Another of the objects of the invention resides in the provision of an improved form of sectional arch in which the sections of bricks constituting the sections are maintained in alignment by means of key members, such members, however, being relieved of the greater part of the weight of the arch.

The foregoing, together with such other objects as may hereinafter appear, or are incident to my invention, I obtain by means of a construction which I have illustrated in preferred form in the accompanying drawings, wherein—

Figure 1 is an irregular horizontal section taken on the line 1--1 of the fire box of Fig. 2 embodying my inventions; Fig. 2 is a vertical section through the fire box shown in Figure 1; Fig. 3 is a section taken on the line III--III of Figure 2; Fig. 4 is an enlarged sectional detail showing the method of supporting the arch from the side sheets and also showing the key members; Fig. 5 is a bottom plan view of one of the key members; Fig. 6 is a bottom plan of one of the bricks constituting the arch; and Figure 7 is a sectional detail showing the manner in which the forward ends of the key members are mounted in the front water leg.

In locomotive fire boxes of the general type to which this invention relates, it has been customary to provide an arch or baffle composed of a plurality of arch bricks arranged in rows and supported on the circulation tubes connecting the front and rear water legs of the fire box, or on similar members mounted in the fire box, such members as a rule supporting the entire load of the arch.

In the first place, I propose to introduce an additional quantity of air into a fire box having this general arrangement of sectional arch to secure advantages herein pointed out, and in the next place to mount the bricks in such a manner that practically the entire weight of the arch is supported from the side sheets, the bricks being maintained in alignment by key members, such key members, if desired, being utilized as the means for introducing the additional quantity of air.

On referring to Figures 1, 2, and 3, it will be seen that the fire box comprises the usual flue sheet 7, side sheets 8, back sheet 9, and crown sheet 10, the flues 11 extending forwardly from the flue sheet 7 through the waist 12. The water legs of the fire box are closed by the usual mud ring 13.

The arch which I have indicated as a whole at A, is composed of a plurality of 80 side rows of arch bricks a, middle rows b, and intermediate rows c, the wing bricks or side rows a being supported at their outer ends on projections 14 on the side sheets, the central rows b and the intermediate rows c being keyed and interlocked into the form of an arch of inverted V-shape, the load of which is transmitted to the side sheets, in a manner to be now set forth.

I mount a plurality of thimbles 15 in the front water leg, the ends of the thimbles being expanded in the flue sheet and throat sheet. The ends of the key members 16, preferably formed of pipes, are adapted to project into the thimbles in the manner indicated in Figure 7. These key members extend rearwardly.

Each of the bricks constituting the side rows a and the intermediate rows c of the arch has a groove 17 formed in the face of each end, but each of the bricks constituting the middle rows b has such a groove formed only in the face of the outer end. At their inner ends the bricks of the central rows have an interlocking tongue and groove as indicated at 18 in Figure 8.

The bricks are assembled as follows. The wing or side bricks are positioned between
the side sheets and their respective key members 16 by slipping the bricks longitudinally of the key member and over the row of projections 14, and the bricks of the intermediate rows and of the central rows are slipped into position lengthwise of the key members 16. When all of the bricks are assembled the resultant arch is of inverted V-shape with its outer ends carried on the projections of the side sheets, and with the upper edges of the bricks contacting with each other. By this arrangement an arch effect is obtained between the various rows of bricks, which is of such character that practically the greater part of the load of the arch is carried on the side sheets, the key members 16 serving merely to keep the bricks of the various rows in alignment with each other and coacting with the bricks in a mutually interdependent relation to prevent collapse of the arch.

I am aware that it has been previously contemplated to support arch bricks from studs or projections on the side sheets. Such constructions have been usually of two kinds. In one type the arch was composed of one brick, usually of arch form, extending entirely across the fire box, or of a plurality of bricks arranged side by side, and each extending entirely across the arch. In the second type, the arch was of the general inverted V-shape type, but the bricks extended half way across the fire box and their ends either bore against each other or were interlocked. By my improved construction, however, I am enabled to divide the arch into more than two transverse sections, and still retain the advantage of supporting the arch from the side sheets, while other additional advantages are obtained, such as for example, as reduction in the size of bricks which simplifies manufacture and makes the bricks easy to assemble and remove as well as obtaining other advantages well known in this art. The side bricks cover up the projections so that the latter will not burn out.

My improved form of arch is peculiarly adapted for the introduction of an additional supply of air over the fire for the purpose of securing more economical consumption of fuel and better combustion of gases with the resultant increase in general efficiency. I secure these results by providing in the under faces of the key members 16, a plurality of jets or holes 19. The suction in the fire box supplemented by the natural draft set up through the thimbles 18, when the locomotive is in motion causes additional air to flow into the hollow members 16 and pass out through the jets 19 over the fire beneath the arch. The key members are thus used for the introduction of additional air. I slightly bevel off the lower portions of the ends of the bricks as indicated at 20 in Figures 1, 3, 4, and 6, so as to permit free escape of air through the jets 19.

If desired the under faces of the bricks may be recessed as at 21 to secure more intimate admixture of the gases and air. It is not necessary that the ends of the key members 16 extend into the thimbles 16, but this is preferred as it makes assembly easier because it provides a temporary means for holding the key members while the first few bricks are put in place, it being observed in this connection that it is desirable to assemble the arch bricks by slipping in the first brick of a side row and then slipping in all of the first bricks of the other rows, completely across the fire box, and then putting in the second brick of each row and so on. When thus assembled, it will be seen that after the first few bricks are in place, the load is transmitted to the side sheets and no weight is carried by the key members and consequently but little strain placed on the thimbles. During installation it is only necessary to support the key members until a transverse row or two of bricks is or are in place, after which the parts will be self-supporting, in the manner above indicated.

Another important advantage of my invention resides in the fact that my improved arch readily accommodates itself to the differences or variations of widths of fire boxes, which is not the case in certain of the prior art arches herein mentioned.

I claim:

1. A side sheet-supported refractory baffle or arch for locomotive fire boxes composed of a plurality of fire bricks arranged in rows longitudinally of the fire box, tubular key members between the rows for preventing collapse of the arch, openings in the key members communicating with the fire box, and a connection between the key members and the atmosphere for admitting air there through to the fire box.

2. The combination with a locomotive fire box, of a refractory arch composed of a plurality of fire bricks, arranged in rows longitudinally of the fire box, the arch being supported at its sides upon the side sheets, independent tubular key members between the rows provided with openings into the fire box, and a connection between the key members and the atmosphere.

3. The combination with a locomotive fire box having a front water leg, of a refractory arch composed of a plurality of bricks arranged in rows longitudinally of the fire box, the arch being supported at its sides, a plurality of thimbles extending through the front water leg and communicating with the atmosphere, a plurality of tubular key members between the rows extending into the thimbles and communicating therewith, and
openings in said members communicating with the fire box.

4. The combination with a locomotive fire box, of a refractory arch composed of a plurality of fire bricks, arranged in rows longitudinally of the fire box, independent hollow key members between the rows provided with openings into the fire box, and connections between the key members and the atmosphere.

5. The combination with a locomotive fire box, of a refractory arch composed of a plurality of rows of fire bricks, hollow key members between the rows provided with openings into the fire box, and connections between the key members and the atmosphere.

6. In a fire box, a sectional arch comprising in combination, spaced arch supporting means, a course of more than two bricks extending between the supporting means and key members between bricks which coact therewith in a mutually interdependent relation to prevent collapse of the arch.

7. In a fire box, a sectional arch comprising in combination, spaced arch supporting means, a plurality of bricks arranged in a transverse course between the supporting means in substantially the form of an inverted V, and key members between the bricks at the sides of the apex of the V which coact therewith in a mutually interdependent relation to prevent collapse of the arch.

8. In a fire box, a sectional arch composed of a plurality of bricks arranged in courses transversely of the box and in more than two rows longitudinally of the box, and key members between rows extending throughout the courses and adapted to coact with the rows in a mutually interdependent relation to prevent collapse of the arch.

9. In a fire box, a sectional arch composed of a plurality of bricks arranged in courses transversely of the box and in more than two rows longitudinally of the box, key members between rows extending throughout the courses and adapted to coact with the rows in a mutually interdependent relation to prevent collapse of the arch, and means in the fire box structure for engaging the ends of the key members.

10. In a fire box having side sheets and a water leg, a sectional arch composed of a plurality of bricks arranged in courses transversely of the box and in more than two rows longitudinally of the box, said arch being supported from the side sheets, a plurality of thimbles in the water leg, and a plurality of key members between rows extending throughout the courses and projecting at one end into said thimbles and adapted to coact with the rows in a mutually interdependent relation to prevent collapse of the arch.

In testimony whereof I have hereunto signed my name.

RALEIGH J. HIMMELRIGHT.