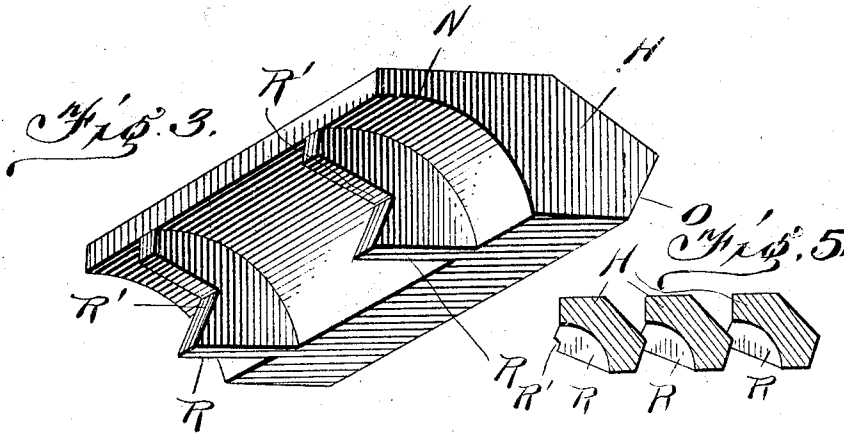
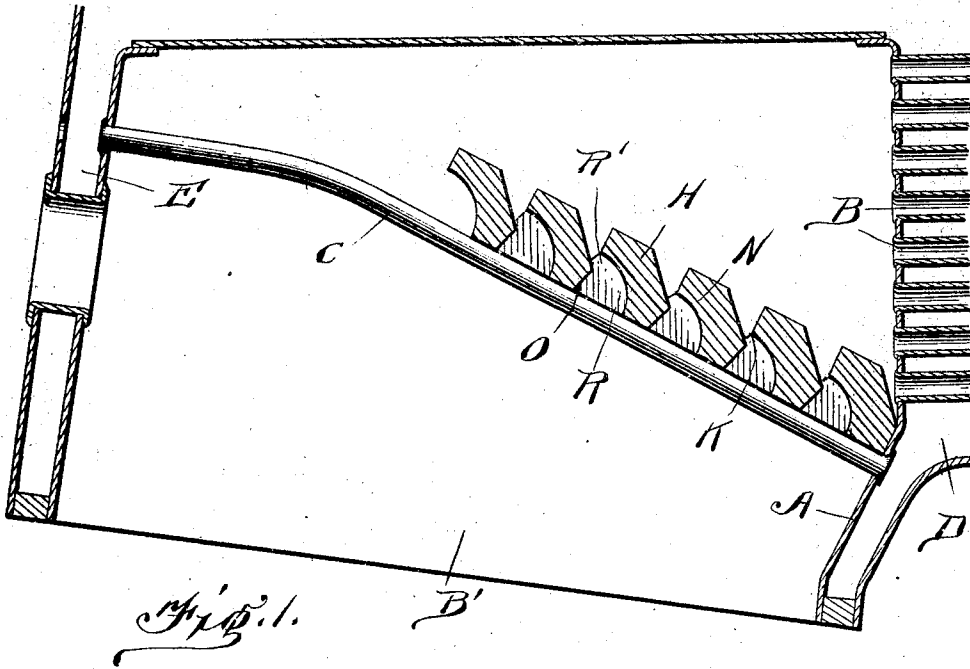


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 ARCH FOR FIRE BOXES OF LOCOMOTIVES, &c.
 APPLICATION FILED MAY 10, 1909.

942,575.

Patented Dec. 7, 1909.
 2 SHEETS—SHEET 1.



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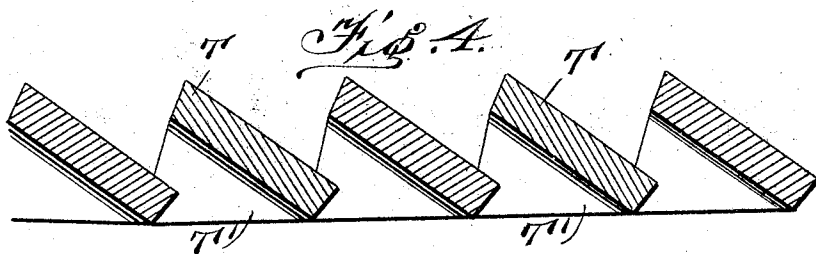
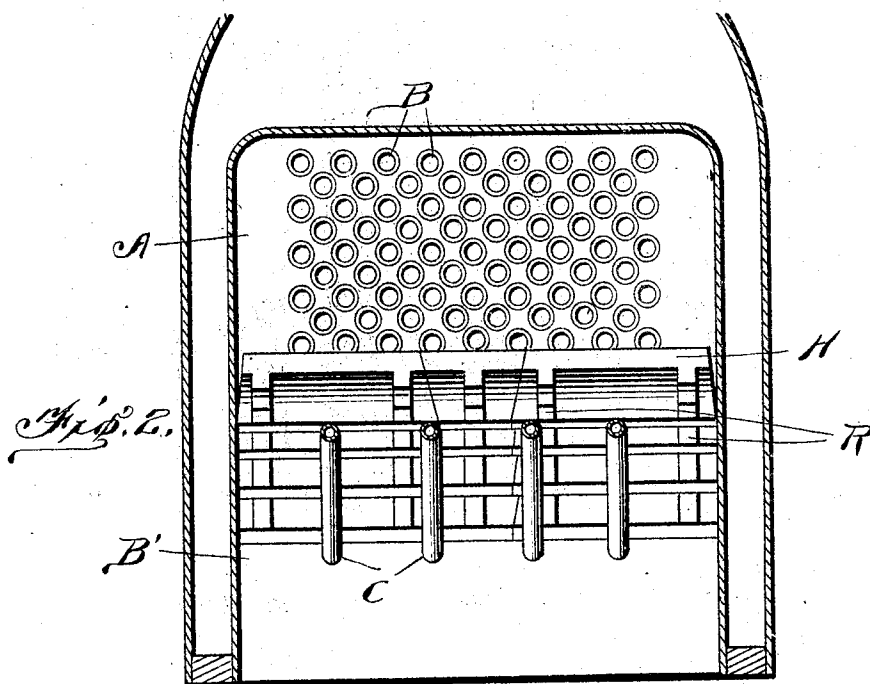
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UNITED STATES PATENT OFFICE.

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ARCH FOR FIRE-BOXES OF LOCOMOTIVES, &c.

942,575.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN LOFTUS, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Arches for Fire-Boxes of Locomotives, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in arches for boxes of locomotive engines, &c., and comprises means whereby the draft from the fire box leading to the flues of a boiler may be uniformly distributed through openings between the bricks of the arch, thereby effecting an appreciable saving of fuel and also preventing the lodgment of cinders and particles of coal in the flues of the boiler and also obviating the expanding of the flues incident to the excessive heat which passes up through the usual opening between the first brick and the flue sheet, in engine furnaces as commonly constructed.

Heretofore it has been the practice in constructing engine furnaces to make the arch to the fire box solid with an opening adjacent to the flue sheet for preventing the lodgment of cinders upon the top of the arch adjacent to the flue sheet. By this construction a strong draft or current or other gases for combustion, including flame and cinders, incident to the exhaust passing into the smoke stack, is created and which, when the fire is clean and in good condition, causes an intense heat to pass through the opening in the arch adjacent to the flue sheet and cause an undue expansion of the lower flues and, when dirty coal for fuel is burned, ashes and cinders will accumulate on the front grates and, as the fire becomes foul, the heat passing up through the opening will be greatly reduced in temperature, thus acting upon the lower flues and causing the same to contact and become deranged and leaky. By dispensing with this opening, as I propose in the present invention, and placing the first line of bricks at the inner end of the arch tight against the flue sheet and forming openings, preferably of

graduated width, intermediate the rows of brick, I find that the draft or current of heat will be more uniformly distributed in approaching the flue sheet. By my improved construction of arch, any tendency to lift the coal from the bed of the fire is avoided and the gases of combustion and particles of coal which might be elevated by the draft will be thrown back upon the surface of the fire.

Another advantage of the present invention consists in preventing the lodgment of sulfur and iron upon the flues, due to the excessive heat as it comes in contact with the flue sheet. By my improved arch and the manner of distributing the heat, I have found from experiment that the melted sulfur and iron instead of being deposited in the flues and causing the same to be clogged will be deposited upon the upper surfaces of the bricks of the arch and thus tending to cement the same securely together.

My invention comprises other and important features which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, in which:—

Figure 1 is a vertical longitudinal section through a fire box and arch made in accordance with my invention. Fig. 2 is a cross sectional view through the arch. Fig. 3 is a detail view of one of the preferred forms of brick employed in the construction of an arch embodying the features of my invention. Fig. 4 is a detail view showing a modified form of fire brick which may be utilized in the construction of the arch, and Fig. 5 is a detailed sectional view showing a slightly modified manner of constructing the brick and in which the notched flanges do not rest upon the water bars.

Reference now being had to the details of the drawings by letter, A designates the flue sheet of a boiler and B the flues leading through the same. Positioned, preferably at inclinations, within the fire box B' are the hollow arch-supporting water bars C which communicate between the boiler D and the water front E. Supported upon said water bars is a series of fire brick H, which bricks are formed in rows spaced apart, leaving openings K intermediate the same and preferably the width of the openings vary, graduating in size from the innermost opening toward the upper or rear row and for the

purpose of more evenly distributing and making uniform the draft through the flues. Each of said brick forming the rows of the arch is preferably recessed away upon its under surface, as at N, and the upper wall of each recess is either curved, as shown in Fig. 1 of the drawings, or inclined, as illustrated in the modified form, and said curved or inclined surface is preferably so formed as to deflect cinders or particles of coal which may come in contact therewith rearward, and the inner edge O of which brick is also beveled slightly for the purpose of causing any particles of coal or cinders coming in contact therewith and which are raised by the strong draft to be deflected back upon the surface of the fire. Each of said brick is provided with a plurality of flanges, designated by letter R, each of which is notched as at R' and in which an angled edge of the adjacent brick is adapted to bear and certain of said flanges are adapted to rest upon the hollow water bars, as shown.

In Fig. 4, I have shown a slight modification of the construction of the brick in which they are made of general rectangular outlined shape and without recesses and each of said brick, as illustrated in Fig. 4, designated by letter T, is provided with notched flanges T' upon its under face, the edges of said flanges being inclined and adapted to rest upon the hollow water bar and each flange adapted to receive the angled edge of an adjacent brick, thus leaving a sufficient space intermediate the brick for the purpose of making the draft uniform.

In Fig. 5 I have shown a slight modification of my invention in which the notches in the flanges of the fire brick engage an edge of an adjacent brick and give material support one to another in the event of either one breaking and in said modification the flanges are not supported upon the water bars.

In operation, by the provision of the first or inner row of bricks being tight against the flue sheet, a defective feature in the arches as now constructed is avoided, dispensing with the opening which usually intervenes between the first row of brick and the flue sheet and which allows a very intense heat to come in contact with the flues, causing expansion of the same. By the provision of the series of openings between the rows of fire brick in my improved arch, the strong draft caused by the suction incident to the exhaust in the smoke stack will be made uniform by causing the draft to be separated through the various openings, the innermost of the series of openings being narrowest where the draft has a tendency to be the strongest and gradually increasing in dimension toward the outer and upper end of the arch where the openings are larger and where the draft is lighter. Any particles of coal or cinders which may be raised by the

strong current or draft and which come in contact with the beveled edges of the brick will be deflected back upon the surface of the fire and any cinders or particles of coal which come in contact with the vaulted, curved or inclined faces of the bricks will be deflected rearward toward the upper edge of the arch and, owing to the force with which said cinders or particles may be deflected, they will pass over the upper end of the arch and fall back upon the surface of the fire, the current being thus reduced allowing the cinders or particles of coal to be thus deposited and reburned. This is an essential advantage obtained from my apparatus over the ordinary construction in which, when there is a solid arch, the draft is so strong over the free edge of the arch that large cinders and small particles of coal will be raised by the draft over the arch and into the flues where they are likely to be lodged and thus choke the flues and impair the efficiency of the engine. By thus uniformly distributing the draft and heat, the objection frequently met with in boiler furnaces as now constructed, in which the intense heat will cause sulfur and iron to melt and accumulate upon the flues incident to the intense heat, will be avoided and choking of the flues by cinders and particles of coal will be largely obviated.

With the construction shown and set forth forming the substance of my invention, I have found that the sulfur and melted iron will be deposited to a considerable depth upon the upper surfaces of the fire brick and over the joints intermediate the same, thus serving as means to securely cement the brick together and thus greatly increasing the service of the arch.

What I claim to be new is:—

1. In combination with a fire box and boiler flues of a locomotive, an arch made up of rows of brick spaced apart and positioned within the fire box and having their opposite faces inclined with respect to the horizon and away from said flues, flanges projecting from the under faces of the brick and having their lower edges inclined and in alinement with one another and against which flanges the adjacent rows of brick are adapted to bear.

2. In combination with a fire box and boiler flues of a locomotive, an arch made up of rows of brick spaced apart and positioned within the fire box and having their opposite faces inclined with respect to the horizon and away from said flues, flanges projecting from the under faces of the brick and having their lower edges inclined and in alinement with one another and against which flanges the adjacent rows of brick are adapted to bear, the upright edge of each flange having a notch adapted to receive an angled portion of a brick in adja-

cent row with spaces intervening between the rows.

3. In combination with a fire box and boiler flues of a locomotive, an arch made
5 up of rows of brick spaced apart and positioned within the fire box and having their opposite faces inclined with respect to the horizon and away from said flues, the under
10 surface of each brick being concaved, each brick having an integral flange projecting from its concaved face, the under edges of the flanges being in alinement and disposed at inclinations.

4. In combination with a fire box and
15 boiler flues of a locomotive, an arch made up of rows of brick positioned within the fire box and having their opposite faces inclined with respect to the horizon and away from said flues, said rows being spaced
20 apart with increasing distances from the lower to the upper row and provided with flanges upon their upper faces, the lower marginal edges of which flanges are in alinement and at inclinations, the forward

edge of each row being in alinement with 25 the rearmost portion of each adjacent row of brick.

5. In combination with a firebox and boiler flues of a locomotive, an arch made up of rows of brick positioned within the fire
30 box and having their opposite faces inclined with respect to the horizon and away from said flues, said rows being spaced apart with increasing distances from the lower to the upper row and provided with flanges upon
35 their upper faces, the lower marginal edges of which flanges are in alinement and at inclinations, the forward edge of each flange being notched and the rear edge of each row having an angled portion engaging said
40 notches.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

JOHN LOFTUS.

Witnesses:

CHARLES H. HOPKINS,
JOHN W. SNYDER.