No. 675,623. Patented June 4, 1901.

J. COUR.

FIRE BOX.

(Application filed Feb. 18, 1901.)

(No Model.)

FIG. 1.

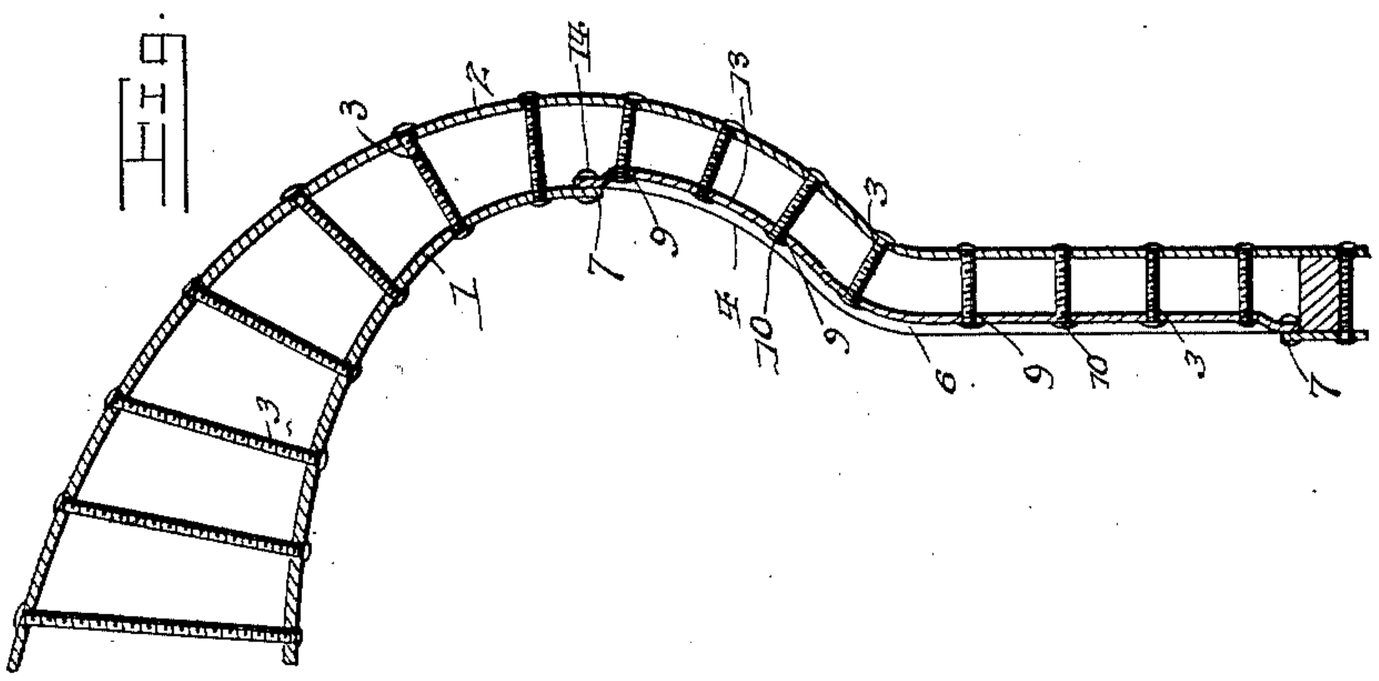


FIG. 2.

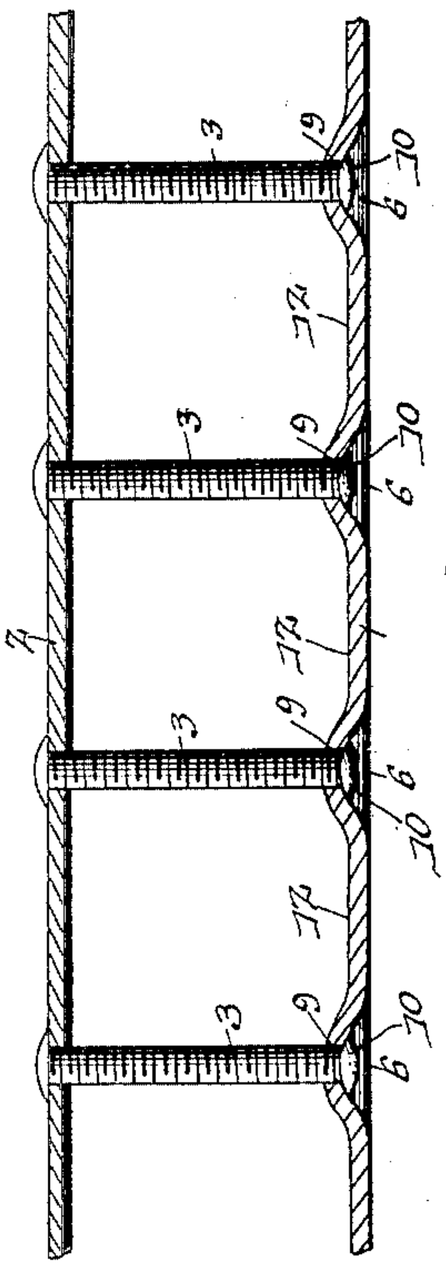
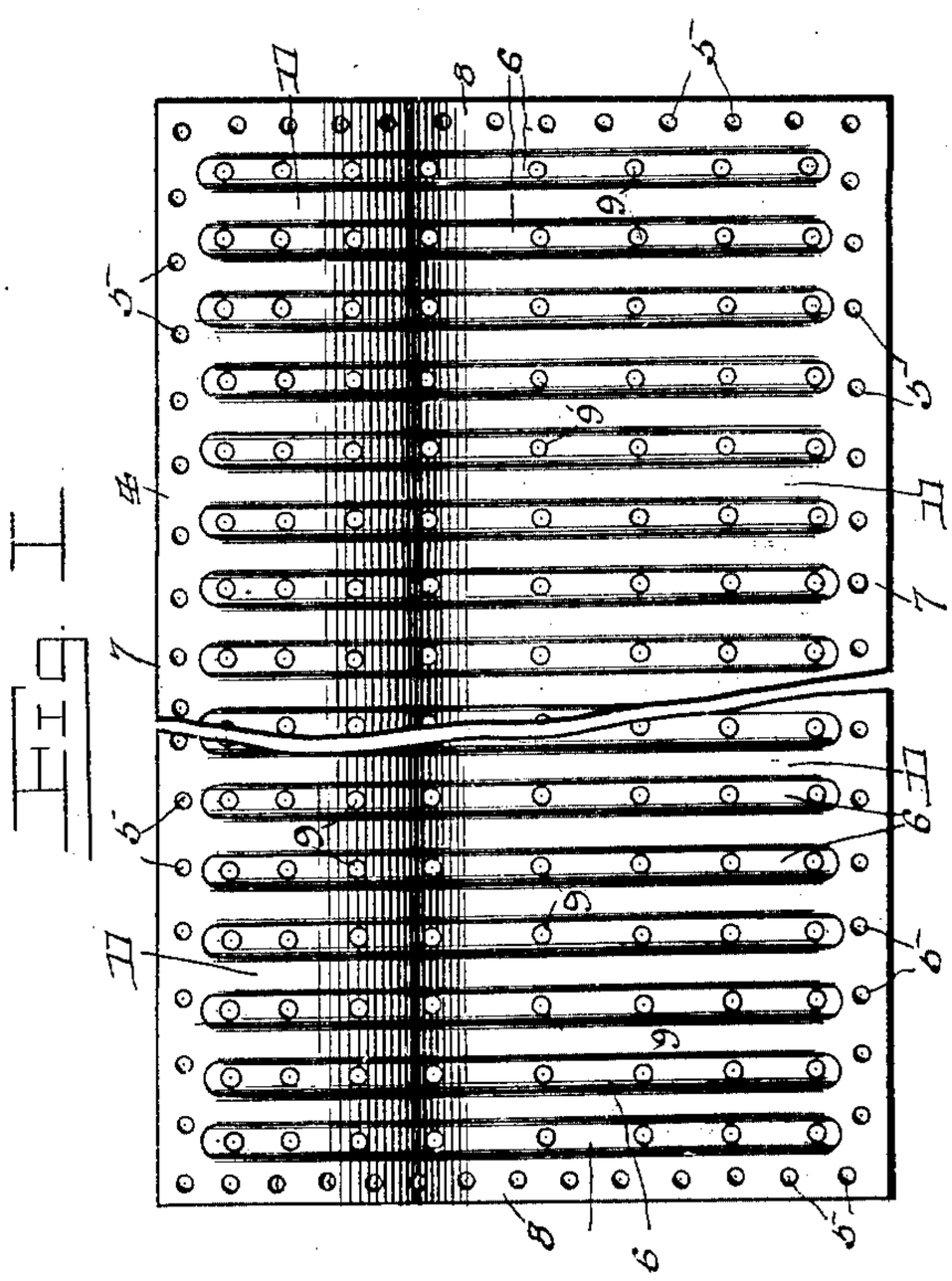


FIG. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

JOSEPH COUR, OF CHICAGO, ILLINOIS.

FIRE-BOX.

SPECIFICATION forming part of Letters Patent No. 675,623, dated June 4, 1901.

Application filed February 18, 1901. Serial No. 47,836. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH COUR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Fire-Box, of which the following is a specification.

This invention relates to fire-boxes for steam-boiler furnaces, and particularly for locomotives, and has for its object to provide improved means for preventing cracking of the inner wall or shell, which is exposed directly to the heat of the fire within the fire-box. It is furthermore designed to prevent the accumulation of sediment upon the anterior side of the inner shell and to form the latter so as to promote the circulation of the water in the water-space surrounding the fire-box.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is an elevation of one of the improved plates for the inner side or shell of a fire-box. Fig. 2 is a vertical sectional view taken through one side of a fire-box embodying the present invention. Fig. 3 is an enlarged detail sectional view taken horizontally through one side of the fire-box.

Like characters of reference designate corresponding parts in all of the figures of the drawings.

It is a well-known fact that the inner wall or shell of a fire-box cracks vertically in the lines of the respective series of bolt-openings, as these lines are in the weakest portions of the shell or plate. This cracking takes place in the flat portions between vertically-adjacent bolt-openings, thereby weakening the plate and causing a leak at the edges of the bolt-openings. Various methods of preventing such cracking have been heretofore employed, such as forming circular depressions and corrugations in the plate, so as to compensate for contraction and expansion; but the bolt-openings have been formed in the flat or unchanged portions of the plate in straight vertical lines between the cupped or corrugated portions, whereby the weakest portions of the plate remain and the same cracking takes place just the same as in an ordinary flat plate.

The object of the present invention is to form the plate so that it will freely contract and expand under the change of temperature in the fire-box and to locate the bolt-openings in such relation as to obviate the weak places therebetween and permit of an expansion and contraction of the portions of the plate between the bolt-openings, thereby to prevent cracking of the heretofore weak places.

In order that the present invention may be fully understood, I have illustrated in Fig. 2 of the drawings a vertical section of one side of a fire-box having the usual inner and outer shells 1 and 2, respectively, which are connected by the usual bolts 3 and spaced at a suitable interval to form a water-space around the fire-box. It is the lower portion of the side wall that is exposed to the greatest degree of heat, and therefore I have employed an upper crown sheet or plate 1 of the usual flat metal and a separate bottom or lower plate 4, which is constructed in accordance with the present invention to protect the same against cracking.

In carrying out the invention I employ a metal sheet of the desired shape, usually rectangular, and provide the same with a marginal series of bolt-openings 5, extending entirely around the sheet or plate. Also the plate is corrugated vertically, so as to form a series of vertical sockets or recesses 6 in the outer face or the face which is exposed to the heat in the fire-box, the sockets being arranged at regular intervals throughout the length of the plate and terminating at opposite ends adjacent to the top and bottom edges thereof, so as to provide a top and bottom flat marginal flange 7 for the formation of the marginal series of bolt-openings 5. The opposite end corrugations or sockets are located at suitable distances from the end edges of the plate, so as to form the respective end flanges 8, corresponding to the top and bottom flanges. The top and bottom ends of

the respective sockets or corrugations merge gradually into the respective top and bottom flanges, so as to obviate an abrupt end wall for the accumulation of sediment upon the back of the plate. It will thus be apparent that the plate is corrugated or provided with a series of vertical sockets in its front face, the length of the sockets being nearly equal to the height of the plate and the series extending for nearly the length of the plate, there being a narrow flat marginal flange in the plane of the front of the plate extending entirely around the latter and having a series of bolt-openings.

The openings 9 for the reception of the intermediate bolts, that connect the inner and outer shells of the fire-box, are formed in the corrugations or backs of the sockets and arranged at suitable intervals throughout the lengths of the sockets, whereby the inner upset heads 10 of the bolts, as best shown in Fig. 2, are seated within the sockets and back of the front face of the plate, so that they are somewhat protected from the heat. By placing the intermediate bolt-openings in the bowed backs of the corrugations or sockets the intervals between the said openings are in the parts of the plate which are adapted to expand and contract, whereby said intervals are located in the strongest portions of the plate and are prevented from cracking by the expansion and contraction of the backs of the sockets.

It will be observed that the vertical flat panels or portions 11 of the plate, between adjacent sockets or corrugations, are continuous throughout the height of the plate and are not broken by bolt-openings or perforations of any character, so that these portions of the plate may be as strong as possible in view of their slight ability for expansion and contraction. In other words, the relatively flat portions of the plate are unbroken by perforations, and the essential bolt-openings are formed in the parts of the plate which are formed for expansion and contraction, so that what are ordinarily the weakest portions of the plate are now rendered strong and durable to withstand cracking. Moreover, the backs of the corrugations are mutually unconnected and are therefore free for contraction and expansion in opposite directions and at substantially right angles with respect to the direction of the corrugations.

By having the sockets or corrugations, or rather the backs thereof, projected at the back of the plate the intervals between adjacent corrugations form vertical open-ended grooves 12 upon the back of the plate, which tend to increase the circulation of water in the water-space and do not form sockets for the collection of sediment. However, should any sediment collect upon the back of the plate the expansion and contraction of the several corrugations will crack and break such collection of sediment, thereby preventing any amount of such collection and rendering the back of the plate comparatively clean.

It is preferable to have the corrugations or sockets extend a suitable distance above the laterally-outward bend of the side wall of the fire-box, and for this reason the upper portion of the plate is bowed outwardly, as indicated at 13 in Fig. 2 of the drawings, so as to conform to the shape of the fire-box, the sockets or corrugations being extended into this bowed top portion of the plate. The meeting edges of the crown-plate 1 and the bottom corrugated plate are overlapped and connected by the rivets or fastenings 14, also shown in Fig. 2.

From the foregoing description it is apparent that the present invention consists in combining the intermediate bolt-openings with sockets or corrugations, which are arranged to obviate the weak places usually occurring between adjacent bolt-openings, by adapting the metallic plate to contract and expand in the intervals between the openings in direct contrast to prior devices, which are not capable of expansion and contraction in the intervals between the openings of each series.

In the ordinary flat plate the heads of the stay-bolts project beyond the adjacent face of the plate, whereby they become more highly heated than the plate and an unequal expansion and contraction takes place between the head portion of the bolt and the plate, thereby causing leaks around the heads of the bolts. This objectionable feature is entirely obviated in the present invention, as the plate and the heads of the stay-bolts are uniformly heated and the contraction and expansion is also uniform, whereby the bolts remain tight and unaffected.

What is claimed is—

1. A fire-box, having inner and outer shells, the inner shell having depressions or sockets projected inwardly or toward the outer shell, and stay-bolts connecting the two shells and piercing the backs of the depressed or socketed portions only of the inner shell, said backs being mutually free and capable of expansion and contraction in opposite directions from the bolts, and the intermediate portions of the shell between the sockets or depressions being imperforate.

2. A fire-box, having inner and outer shells, the inner shell having substantially parallel vertical corrugations formed therein, and stay-bolts connecting the opposite shells and piercing the backs of the corrugations only, the intermediate portions of the shell between the corrugations being imperforate, and the backs of the corrugations being mutually free and capable of expansion and contraction horizontally in opposite directions.

3. An inner shell for a fire-box, consisting of a flat plate having a series of substantially parallel corrugations formed therein with bolt-openings provided in the backs of the corrugations, the flat intervals between the corrugations being imperforate, lying in the

same plane and forming the front of the plate, and the backs of the perforate corrugations being mutually free and capable of expansion and contraction in opposite directions at substantially right angles with respect to the corrugations.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOSEPH COUR.

Witnesses:
A. M. CASTLE,
ADAM REICHWEIN.