J. P. Evans,

Steam-Boiler Fire-Box.

No. 34,823. Patented Apr. 1, 1862.

Fig. 2

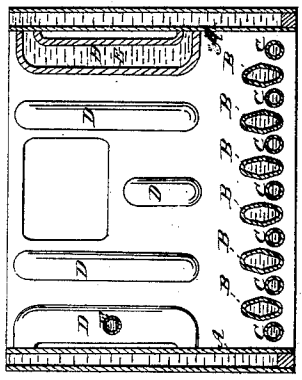


Fig. 4.

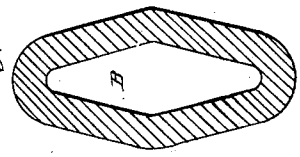


Fig. 1.

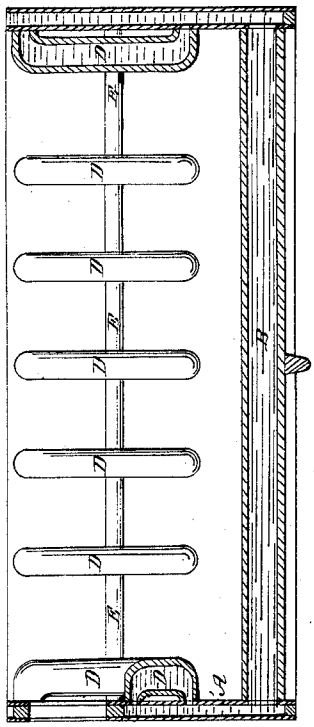
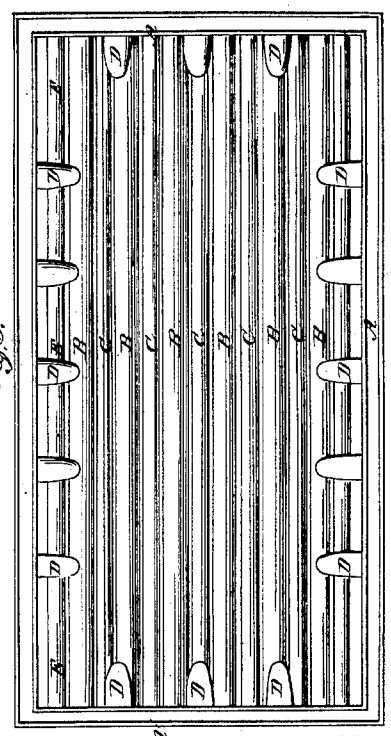


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOSEPH P. EVANS, OF HAZLETON, PENNSYLVANIA.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **34,823**, dated April 1, 1862.

To all whom it may concern:

Be it known that I, JOSEPH P. EVANS, of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of a locomotive fire-box with my invention applied. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a plan of the interior of the same. Fig. 4 is a transverse section of one of the elliptical bars.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in the combination for the grate of a boiler-furnace of a series of tubular bars of elliptical or substantially similar form in their transverse section and a series of alternately-interposed tubular or solid bars of round form, the elliptical bars being so much deeper than the round ones as to expose a great portion of their surface to lateral contact with the incandescent fuel upon the grate and cause the rapid generation of steam from the water, which circulates through them between the water-spaces at opposite ends of the fire-box.

It also consists in the arrangement within and at the sides and ends of the fire-box of bent pipes having an elliptical or flattened transverse section connected each at one end with the upper part of the water-space surrounding the fire-box and at the other end with a lower portion of said water-space, such pipes being exposed to the intense radiant heat of the fire and to the contact of the heated and inflamed gases of combustion, and having induced through them a material circulation of water which is rapidly converted into steam.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the fire-box.

B B are the elliptical tubular grate-bars, and C C the interposed round bars, also represented of tubular construction, all of said bars communicating with the water-spaces at the front and back of the fire-box.

The elliptical bars B B are set up edgewise—that is to say, with their greater diameter in a vertical direction, and this diameter is so much greater than that of the interposed round bars C C that, though all are arranged with their bottoms about on the same level, the said bars B B stand high above C C, with the greater, or a very considerable, portion of their surfaces in contact with the fuel, which enters the spaces between them and above C C, and by the use of this system of elliptical and interposed round bars a greater area of surface is exposed in lateral contact with the fire than is done by the zigzag arrangement of round bars lately introduced.

D D are the bent pipes arranged at the sides and ends of the fire-box. These pipes are straight for the greater portion of their length, but have elbows at top and bottom to enable them to be connected with the water-space surrounding the fire-box. Their transverse section is of elliptical or flattened form, and they are arranged with the portion between the elbows either upright or inclined in such a way as to keep the lower parts nearer than the upper parts to the sides and ends of the fire-box. The said pipes, being exposed to the radiant heat of the incandescent fuel on the grate and to the contact of the flame and heated gases evolved from the fuel, are subjected to a very great heat, and the water in them is rapidly converted into steam; but at the same time so rapid an upward circulation of water is induced within them as to prevent them from being overheated.

E E are horizontal pipes arranged parallel with the sides of the fire-box and connecting the pipes D with each other and with the water-space at the ends of the fire-box. These pipes also serve as heating-surfaces, in contact with which a rapid generation of steam takes place, and at the same time they aid the circulation in D D. Similar pipes to E E may be employed to connect the pipes D D at the ends of the fire-box with each other and with the water-spaces at the sides of the fire-box.

I do not claim, broadly, the invention of

tubular fire-grates, nor do I claim the use of water-tubes within the fire-box connecting the upper and lower parts of the boiler; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Having the fire-grate made with an alternate arrangement of large elliptical tubes and small cylindrical tubes or bars, in the manner and for the purpose herein shown and described.

2. The arrangement of the elliptical pipes D and connecting-pipes E with each other and with the boiler A, as herein shown and described.

JOSEPH P. EVANS.

Witnesses:
THOMAS EVANS,
WILLIAM GETTRING.