2 Sheets--Sheet 1.

J. De BUTT.

Water Fire-Box.

No. 160,652. Patented March 9, 1875.

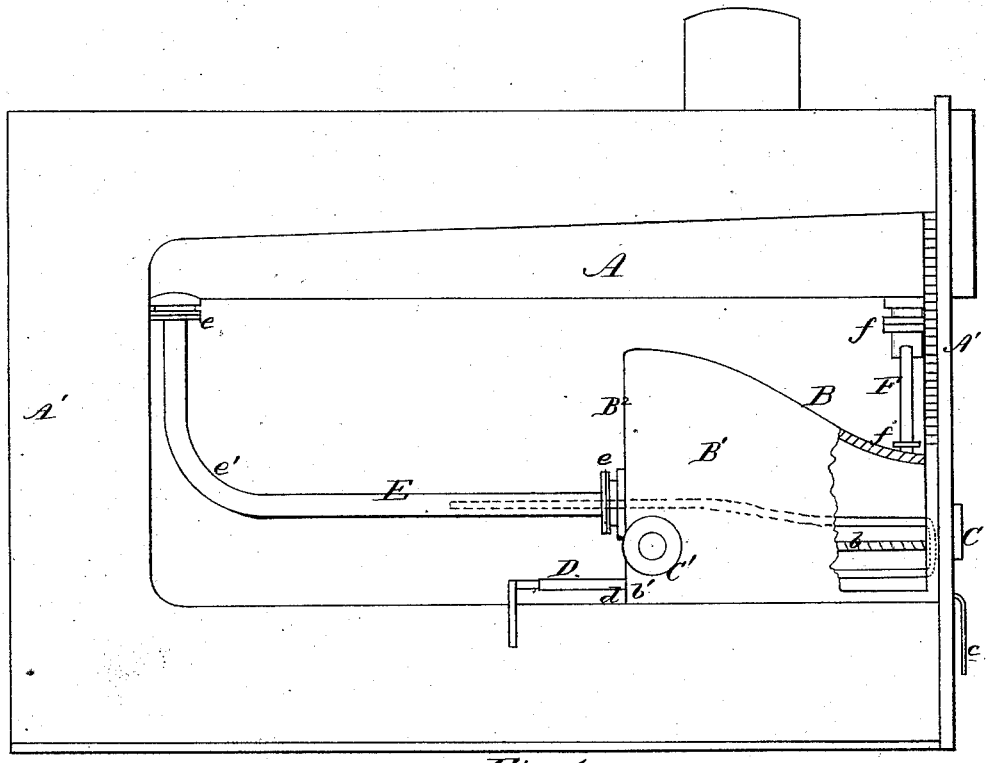

Fig. 1

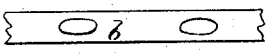

Fig. 2.

Witnesses
L. Frank Hartman
J. P. Connolly

Inventor
John De Butt
By Connolly Bros., Attorneys

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

2 Sheets--Sheet 2.

J. De BUTT.

Water Fire-Box.

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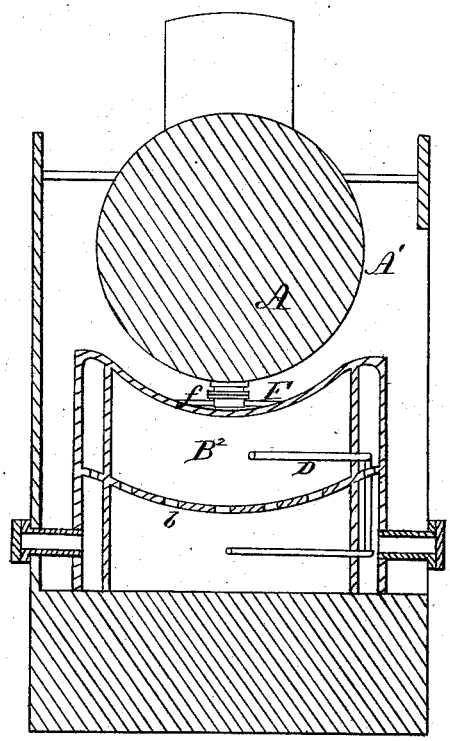

Fig 3

Witnesses

L. Frank Hartman

J. B. Connolly

By

Inventor

John De Butt

Connolly Bros

Attorneys

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JOHN DE BUTT, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN WATER FIRE-BOXES.

Specification forming part of Letters Patent No. **160,652**, dated March 9, 1875; application filed November 7, 1874.

To all whom it may concern:

Be it known that I, JOHN DE BUTT, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Combined Fire-Box and Feed-Water Heater for Stationary Boilers; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a side elevation of my invention. Fig. 2 is a detail view, and Fig. 3 is a vertical transverse section.

The object of my invention is to provide a portable fire-box for the various styles or kinds of boilers in which a fire-wall is employed, and to make this fire-box of metal, for the two-fold purpose of preventing the adherence of clinkers, which inevitably occurs where fire-brick is used, and of providing a receptacle or chest, in which the feed-water may be heated up to the boiling-point before being admitted to the boiler.

My invention accordingly consists of a portable fire-box of cast-iron, suitable for adaptation to various boilers, and serving as a water-holder and heater, as hereinafter fully described.

Referring to the accompanying drawing, A represents a boiler of any ordinary construction, as cylinder, tubular, or flue, supported in the usual manner upon walls A′ A′. B represents my improved form of fire-box, consisting of the three sides B^1, B^1, and B^2, the latter being the bridge-wall. Each of these sides consists of a hollow wall or section, having one or more webs, *b*, serving the purpose of stay-bolting, said webs being open to permit a free circulation of water, as hereafter more fully set forth. The sides B^1 B^1 project through the front wall A′, and are each furnished with hand-holes C and blow-off pipe *c*. From the wall A′ the sides B^1 B^1, on their upper line, rise gradually to correspond with the usual elevation of the flame until they meet the side or bridge wall B^2, whose upper edge is sunk or rounded out in concave form, so as to be concentric with the boiler above, and give room for a free draft.

The web *b* already described follows the line of the upper edges of the sides, as shown in dotted lines, so as to always retain as nearly as possible a position midway between the top and bottom of the fire-box. C′ represents hand-holes, by which access may be had to the rear of the sides B^1 B^1 and to the bridge-wall B^2.

The foregoing construction may be slightly modified, according to the construction of the boiler, to which the fire-box is applied—as, for instance, the bridge-wall may have a straight instead of a curved upper surface where straight sections instead of a cylindrical generator are employed.

I shall now proceed to describe the method and means by which a circulation of water is had between the boiler and fire-box, and how the water is heated in the latter before being fed to the former: D represents a water-pipe of, say, one inch diameter, made of copper or iron, entering the bridge-wall at *d* below the web *b;* passing thence around the corner *b′* to the front of the fire-box, turning upwardly, then passing above the web *b;* thence along to the corner *b′* around the same, and then out the bridge-wall and into a pipe, E, of, say, three inches diameter, which connects the fire-box and boiler. There are two, three, or more of the pipes E, connected as shown, to the fire-box and boiler, respectively, by flanged socket-joints *e e*, and having a curve or quarter-turn at *e′*, the elasticity of which will prevent any injury from the strain due to the expansion resulting from heat. F is a pipe, having a central connection, by flat or socket flanged joint, with the boiler at *f*, and with the two sides of the fire-box at *f′ f′*.

The feeding operation and circulation, therefore, are as follows: The water first passes through the pipe D and fire-box until it enters the pipe E, by which it is taken into the boiler. From the boiler it passes through the pipe F into the fire-box, and thence again through the pipes E E to the boiler, a constant circulation being thus maintained.

The water fed through the pipe D, it will be observed, passes through the water which has

descended from the boiler into the fire-box, and is heated by the latter before passing into the pipe E and thence into the boiler.

The fire-box being made of iron, clinkers will not adhere to it as they do to fire-brick, and said box having hollow walls serves as a holder and heater for water, thus utilizing heat that would otherwise be, at least partially, wasted.

The fire-box, as already remarked, may be readily applied to any boiler now in use employing a bridge-wall, and may be easily removed when desired. It is not to be confounded with a sectional boiler having water-legs extending down as far as the grate, for although it is of cast-iron and serves the purpose of heating the water, it is a fire-box that may be applied to and is intended principally for application to wrought-iron boilers.

G represents the grate, designed to be supported on walls H H, on which the fire-box rests.

What I claim is—

1. The water fire-box, cast in one piece, with open front and hollow, stay-bolted or webbed side and bridge walls, and made independent of the boiler, substantially as and for the purpose set forth.

2. In combination with the water fire-box, having hollow walls for the reception of water from the boiler, the feed-pipe D passing through the water-space, so as to have its contents heated from the surrounding water, substantially as described.

3. The combination of the fire-box B, having a pipe, E, proceeding from its bridge-wall or hottest part, and communicating with the boiler, and a boiler, A, having a pipe, F, proceeding from its forward end or coolest part, and connecting with a fire-box beneath, whereby a constant circulation of water, when the parts are in operation, is maintained between said fire-box and boiler.

In testimony that I claim the foregoing I have hereunto set my hand this 21st day of October, 1874.

JOHN DE BUTT.

Witnesses:

JNO. A. BELL,

M. DANL. CONNOLLY.