(No Model.)

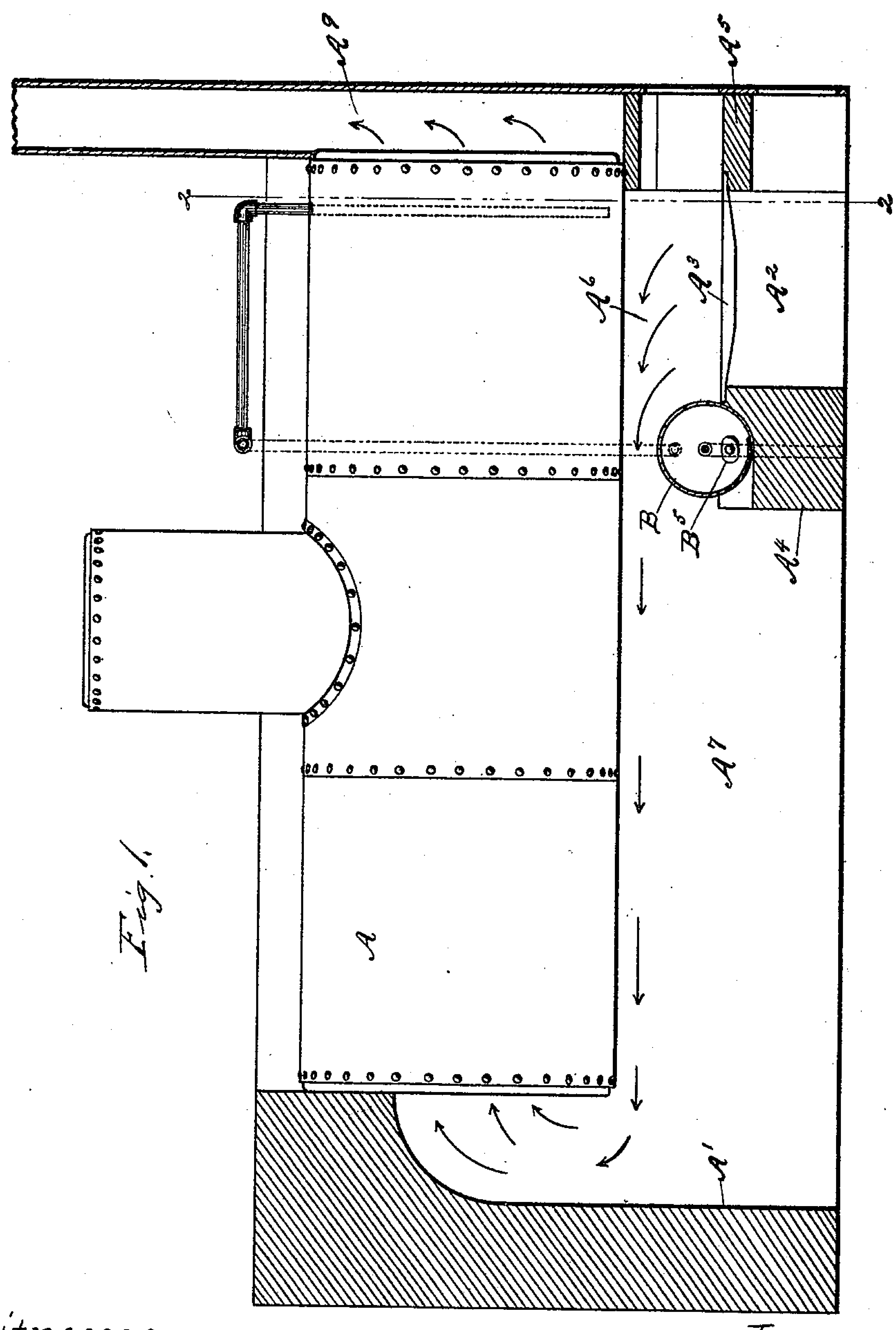
2 Sheets—Sheet 1.

J. R. WALSH.

TUBULAR BRIDGE WALL.

No. 450,268.

Patented Apr. 14, 1891.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

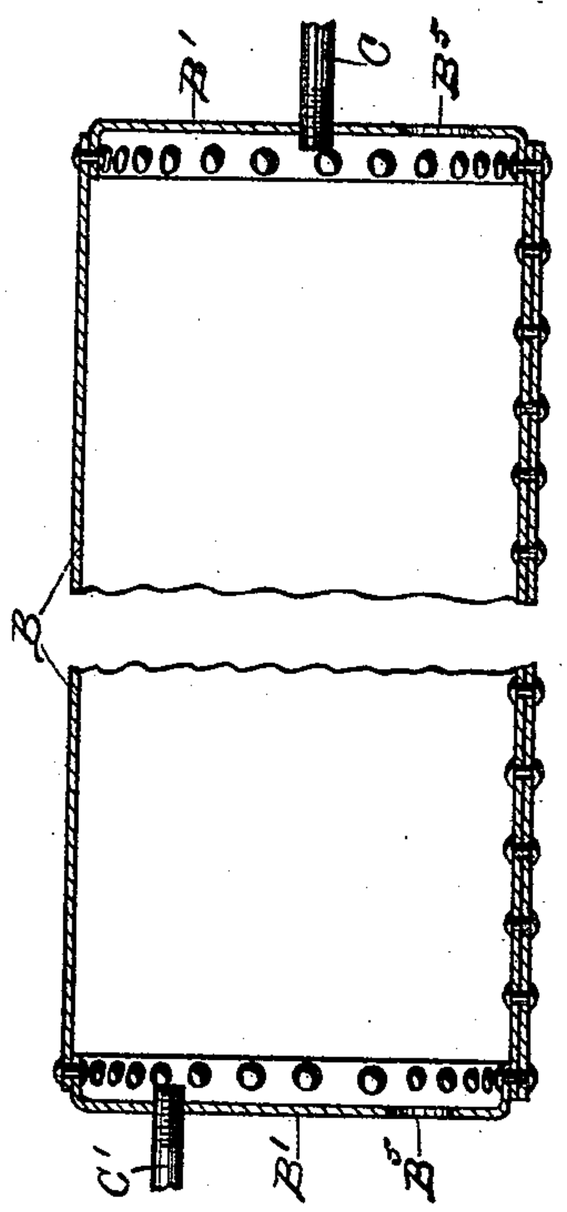
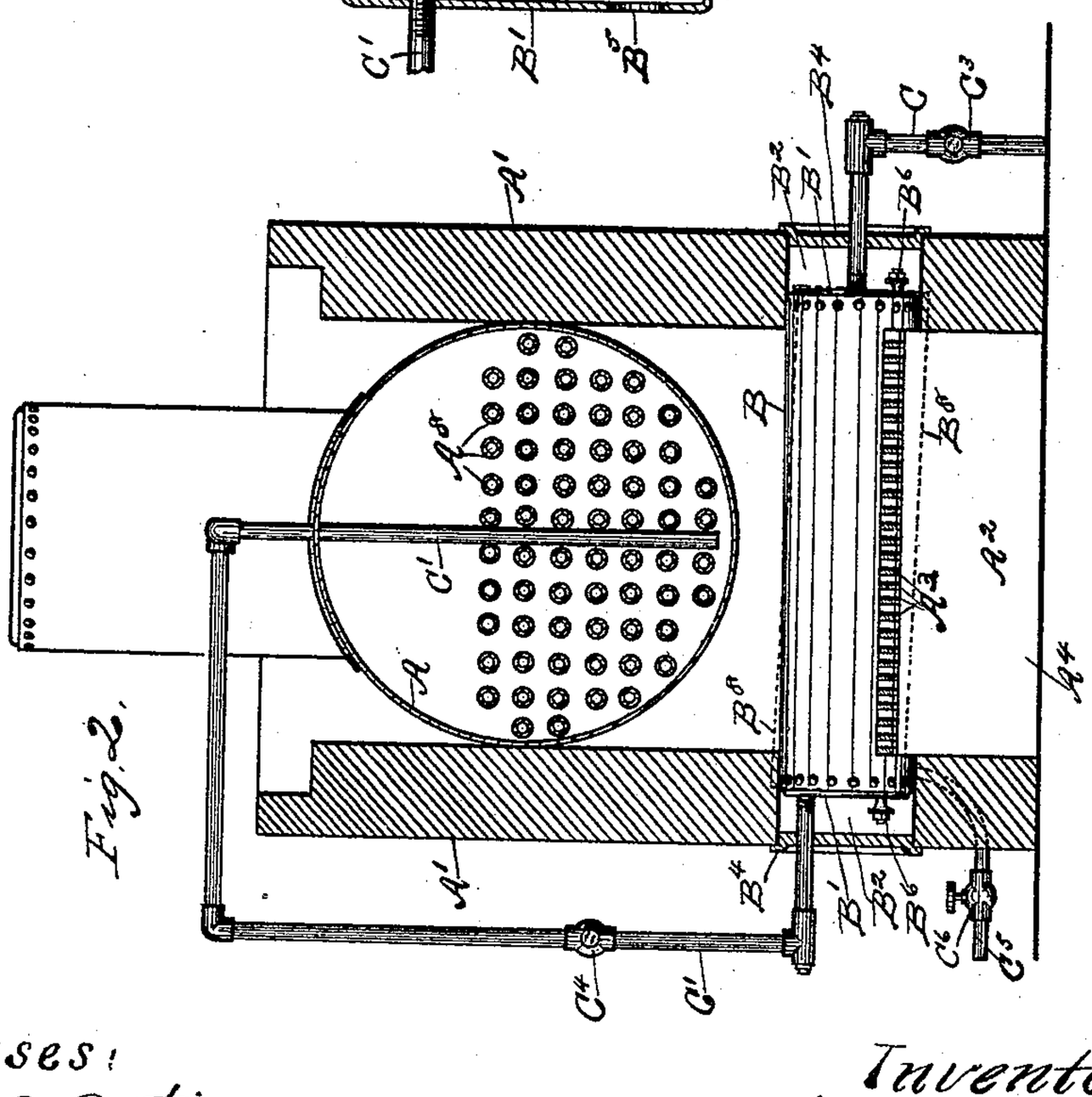


Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES R. WALSH, OF TROY, NEW YORK.

TUBULAR BRIDGE-WALL.

SPECIFICATION forming part of Letters Patent No. 450,268, dated April 14, 1891.

Application filed July 10, 1890. Serial No. 358,271. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. WALSH, a citizen of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Tubular Bridge-Walls, of which the following is a specification.

My invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures therein.

Figure 1 is a central vertical longitudinal section of a boiler-furnace, showing the boiler in side elevation and the tubular bridge-wall in cross-section. Fig. 2 is a vertical cross-section taken on the broken line 2 2 in Fig. 1. Fig. 3 is a central longitudinal section of the bridge-wall detached.

The boiler A is set in the furnace-walls A′ in the usual manner.

A^2 represents the ash-pit, located beneath the grate A^3, which is supported by the walls A^4 and A^5. The space A^6 between the grate and the boiler is known as the "fire-box," and the space A^7 beneath the rear part of the boiler as the "combustion-chamber."

The combustion-chamber is separated from the fire-box and ash-pit by what is known as the "bridge-wall."

In operating the furnace the products of combustion pass from the fire-box between the bridge-wall and boiler, through the combustion-chamber, through the boiler-flues A^8, and the escape-flue A^9 to the chimney, (not shown,) as indicated by the arrows in Figs. 1. As ordinarily constructed, the bridge-wall consists of a brick wall A^4, which extends upward to a point near the bottom of the boiler.

In my improved device a wall of masonry A^4 is built up part way only to the required height of the bridge-wall and surmounted by a cylindrical tank or reservoir B, which is preferably made of a single plate of boiler-iron bent into the form of a cylinder, having its edges riveted together to form a hollow cylinder and closed at the ends by separate head-plates B′, riveted on in the usual manner employed in the construction of steam-boilers. This cylindrical tank extends transversely of the furnace, and is made of such a length that its ends each enter an aperture or chamber B^2 in each of the side walls of the furnace adapted to receive and fit such ends. The feed-water pipe C, which supplies the boiler with water, enters the tank, which forms a tubular bridge-wall through the lower part of one head, and a pipe C′ leads from the tank through the upper part of the other head exteriorly of the furnace to the upper part of the boiler, and through the boiler-shell to the lower part of the interior of the boiler, as shown in Figs. 1 and 2. As the feed-water passes through the tubular bridge-wall it takes up and utilizes much of the heat which would otherwise be absorbed by a bridge-wall of masonry and wasted.

I am well aware that tubular bridge-walls have been heretofore employed to heat the feed-water on its way to the boiler; but their construction was such that the internal heat of the furnace soon rendered them worthless.

An open tank or tube made of thin metallic plates and filled with water can be subjected to a high degree of heat without injury to the plate, because the heat is quickly conducted through the plate to the water and carried away in steam; but if the tank or tube contains seams or joints formed by lapping the edges of the metallic plates and riveting or otherwise securing them together the thickness of the metal is doubled at that point, and the space between the lapped portions tends to retard the conduction of the heat, so that such parts soon deteriorate and become worthless. If sediment, scale, or other matter is allowed to accumulate upon the inner side of the shell of the tank or tube, the heat conduction is retarded and the shell is soon "burned out" if subjected to the furnace-flames. It is therefore necessary to provide for clearing out the deposits if a tubular bridge-wall is employed.

Because small connecting-pipes, connected with a tubular bridge-wall within the furnace, are subjected to intense heat and cannot be easily cleaned, they soon burn out.

On account of the probabilities of rapid deterioration of boiler connections the insur-

ance underwriters will not permit such connections to be concealed or hidden from easy and ready access and inspection.

In my improved tubular bridge-wall the cylindrical portion is composed of a single plate of boiler-iron of a single uniform thickness, which contains only one seam or joint, which runs longitudinally of the tube and is wholly covered by the masonry of the bridge-wall, which protects it from the heat of the furnace. The seams which join the cylindrical portion with its heads are located within the chambers B′ and B² in the furnace-walls, wholly removed from the destructive force of the heat. The pipe connections with the tubular bridge-wall are all made within these chambers. The chambers open exteriorly of the furnace, affording an unobstructed view from without and a ready access at all times. The chambers may be provided with doors B⁴ when desired, which serve to protect the projecting ends of the tube from air-currents. When drafts of air are permitted to strike a hot-water or steam reservoir subject to high internal pressure, the unequal contraction of the parts adjacent to seams and connections is likely to produce a leak in such seams or connections. By covering the ends of the tubes they are not only protected from air-currents, but the loss of heat by radiation is greatly diminished. The length of the tubes and size of the chambers may be varied as desired. The heads are provided with oppositely-located hand-holes B⁵, provided with the usual well-known covers, partly shown at B⁶. After removing the covers a rod can be inserted and the tank or tube thoroughly cleaned as often as desired.

By connecting pipe C with the top of the boiler it is nowhere subjected to the direct action of the furnace heat and is easily accessible for inspection or repairs, and by extending the pipe to a point near the bottom of the boiler, as shown, the feed-water is delivered upon or near the crown-sheet of the boiler.

The pipes C and C′ may each be provided with a stop-cock, as C³ and C⁴, and the tank with a blow-off pipe C⁵, having a stop-cock C⁶. By closing cock C³ and opening cocks C⁴ and C⁵ the water and loose sediment can be blown out of the tank by the boiler-pressure.

When desired, the tube B may be slightly inclined, as indicated by the dotted lines B⁸ in Fig. 2.

The whole boiler is no stronger than the weakest point, and the tubular bridge-wall could about as safely have all its connections within the furnace as one of them. I therefore keep the exposed portion of the tube, which is located within the furnace, integral and unbroken.

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

1. In a boiler-furnace, a tubular bridge-wall having its ends, end connections, and seams covered, whereby they are protected from the furnace heat and outside air-currents, substantially as described.

2. In a boiler-furnace, the combination, with two oppositely-located furnace-walls provided with chambers opening interiorly and exteriorly of the furnace, of an integral cylindrical tube extending across the furnace from the interior of one chamber to the interior of the other, tube-closing heads resting in such chambers, and feed-water connections at the ends of the tube, substantially as described.

3. In a boiler-furnace, the combination, with the side walls of the furnace having oppositely-located chambers, of a cylindrical tube extending from the interior of one chamber to the interior of the other, formed from a single plate of metal by securing the edges with a longitudinal lapping joint or seam, a tube-supporting wall of masonry covering such seam, tube-closing heads resting in such chambers, an inlet feed-water pipe connected with one end, and an outlet feed-water pipe connecting the other end exteriorly of the furnace with the upper part of the boiler, substantially as described.

4. In a boiler-furnace, the combination, with two oppositely-located furnace-walls provided with chambers opening interiorly and exteriorly of the furnace, of a tubular bridge-wall extending from one chamber to the other, tube-closing heads within such chambers, feed-water connections at the ends, and a hand-hole in each head, substantially as described.

5. In a boiler-furnace, a tubular bridge-wall having the exposed portion of the tube within the furnace composed of an integral unbroken shell, its ends and all its connections and seams being covered by the furnace-walls, substantially as described.

In testimony whereof I have hereunto set my hand this 9th day of June, 1890.

JAMES R. WALSH.

Witnesses.
FRANK C. CURTIS,
GEO. M. PAYFER.