

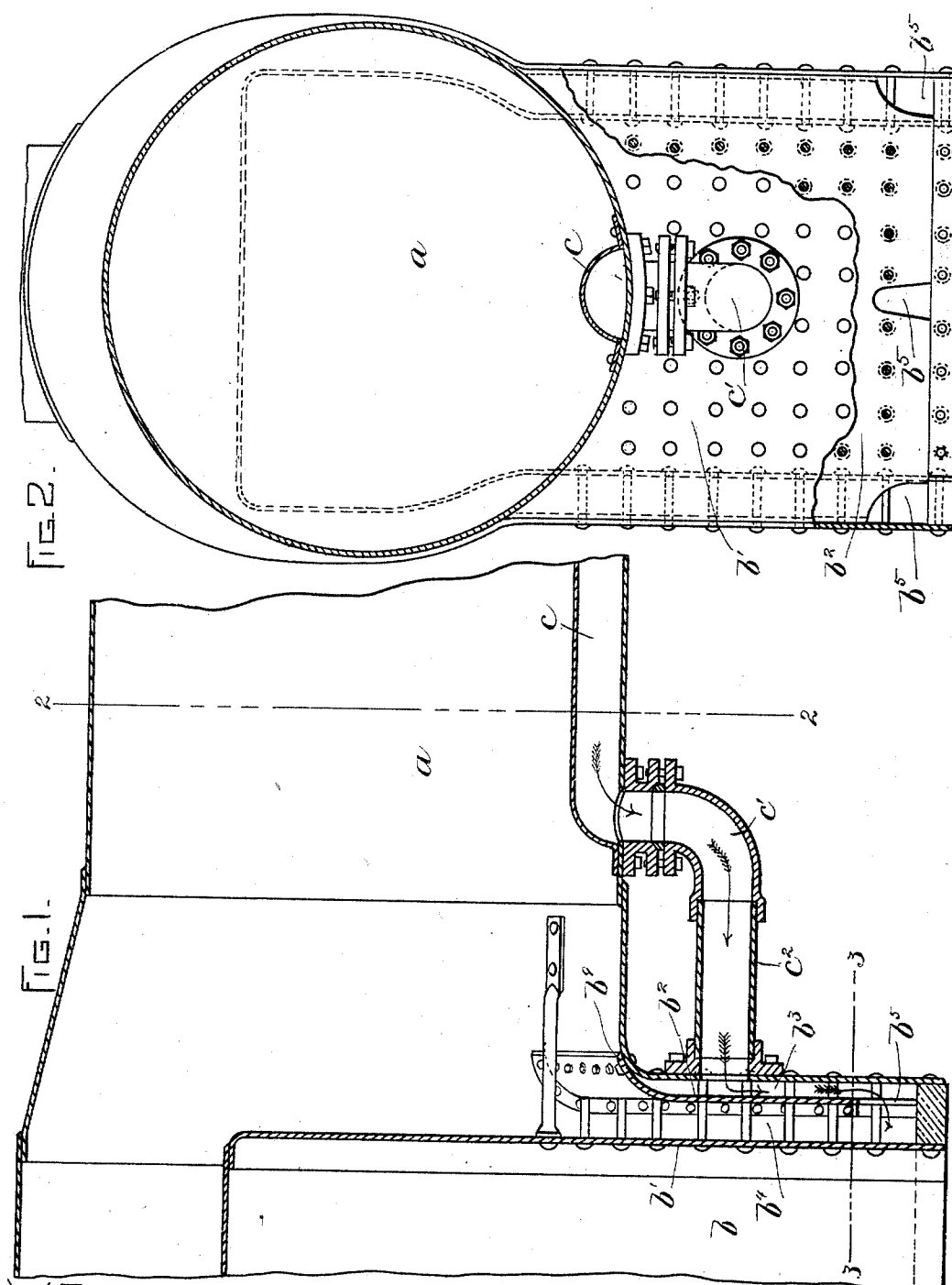
(No Model.)

2 Sheets—Sheet 1.

W. B. MACK.
LOCOMOTIVE BOILER.

No. 503,287.

Patented Aug. 15, 1893.



WITNESSES:

A. S. Hanson.
M. W. Jackson

INVENTOR:

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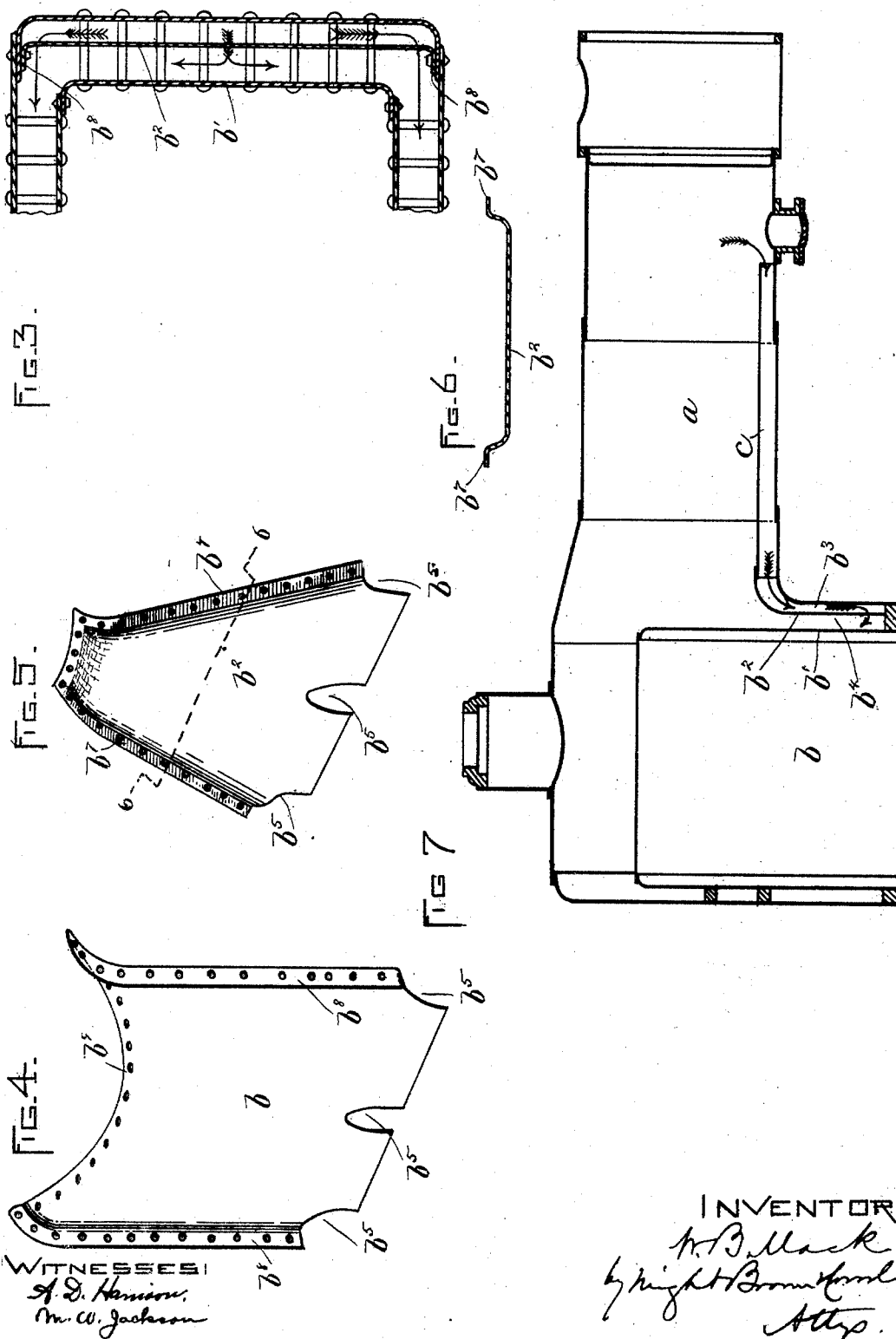
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UNITED STATES PATENT OFFICE.

WILLIAM B. MACK, OF BOSTON, MASSACHUSETTS.

LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 503,287, dated August 15, 1893.

Application filed December 10, 1892. Serial No. 454,702. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MACK, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Locomotive-Boilers, of which the following is a specification.

This invention is an improvement upon the invention shown in Letters Patent of the United States No. 487,535, granted to me December 6, 1892. In said patent, I show a conduit or passage leading from the lower portion and forward end of the boiler along the boiler and to the lower portion of the water-leg of the fire-box, said conduit consisting in part of a plate, riveted to the exterior of the water-leg and to the under side of the boiler, said plate being struck up so as to form a passage connecting an orifice in the under side of the boiler with a series of orifices in the front side of the water-leg.

The present invention has for its object to enable the external plate or frame heretofore applied to the water-leg to be dispensed with, and to provide such a construction of the interior of the water-leg as to cause the desired circulation of water through all parts of the water-leg, and to these ends the invention consists in the improvements which I will now proceed to describe.

In the accompanying drawings, forming part of this specification, Figure 1 represents a longitudinal section of a portion of a locomotive boiler, including the wall of the water-leg at the rear of the fire-box, the same being provided with my improvement. Fig. 2 represents a section on line 2 2, Fig. 1, looking toward the left, and showing a portion of the outer wall of the water-leg broken away. Fig. 3 represents a section on line 3 3, Fig. 1. Fig. 4 represents a perspective view, showing the partition which subdivides the water-leg. Fig. 5 represents a perspective view, showing a modified form of said partition. Fig. 6 represents a section on line 6 6, Fig. 5. Fig. 7 represents a longitudinal section of the boiler and fire-box, having the partition constructed as shown in Figs. 5 and 6.

The same letters of reference indicate the same parts in all the figures.

In the drawings: *a* represents the boiler, and *b* the fire-box of a locomotive. The fire-box is or may be of the usual construction,

and is surrounded by the usual water-leg. The front side *b'* of the water-leg of the side opposite the doors of the fire-box, is preferably made wider than usual, and is provided with a vertical partition *b²*, which subdivides the widened portion of the water-leg into an outer vertical compartment *b³*, and an inner vertical compartment *b⁴*. Said compartments have no communication with each other, excepting at the lower portion of the water-leg, where they are connected by openings *b⁵* in the partition, so that water can flow from the lower portion of the compartment *b³* into the lower portion of the compartment *b⁴*. The upper portion of the compartment *b⁴* communicates directly with the boiler, as shown in Figs. 1 and 7.

By reference to Figs. 2, 4 and 5, it will be seen that two of the openings *b⁵* are at the opposite edges of the partition, and that they are all located at the lower portion of the partition. This arrangement of the openings causes the outer compartment *b³* to distribute the water flowing downwardly through it as hereinafter described, the outer openings *b⁵* coinciding with the side portions of the water leg and causing the water passing through them to pass through the said side portions, while the central opening *b⁵* causes a portion of the water to flow along the central portion of the inner compartment *b⁴*. By thus distributing the water and insuring its passage through the side portions of the water leg, I avoid liability of forming steam in said side portions and thus burning out the walls of the water leg.

c represents a passage or conduit, extending lengthwise of the boiler along the lower portion thereof, its forward end communicating with the forward lower portion of the boiler, while its rear end communicates with the upper portion of the outer compartment *b³*. The connection between the rear portion of the passage *c* and the compartment *b³* is shown in Figs. 1 and 2 as outside of the boiler, said connection being composed of pipe sections *c' c²*, suitably secured to the boiler and to the outer wall of the water-leg. In Fig. 7, I show the rear end of the passage *c* connected directly with the upper portion of the compartment *b³*, no external connection being employed. In this case the passage *c* is

extended nearly to the point where the water-leg joins the boiler, and the internal partition which subdivides the water-leg is formed as shown in Figs. 5 and 6, and has offset flanges $b^7 b^7$, which are riveted to the outer wall of the water-leg. The partition, when constructed as shown in Figs. 1, 2, 3 and 4, is formed to extend entirely across the water-leg, and has at its ends backwardly-bent flanges $b^8 b^8$, which are riveted to the end portions of the water-leg, as shown in Fig. 3. The upper edge of the partition is made concave to fit the bottom curvature of the boiler, and is curved in vertical section, as shown at b^9 (Fig. 1), so as to rest upon the boiler, the curved portion b^9 being riveted to the boiler, as shown in Fig. 1.

It will be seen that, by the employment of the water-leg internally subdivided at its front side, I dispense with the external casing which was required in the construction shown in my former patent, the construction here shown being less expensive and more durable than that formerly employed, there being no such necessity for tight joints where the partition b^2 is secured to the walls of the water-leg as existed in the construction heretofore employed.

I am aware that it has been proposed to partially subdivide the front side of the water-leg of a locomotive boiler by a partition extending from the top only partway to the bottom of the water-leg, the lower edge of said partition being entirely separated from the bottom of the water-leg by a space through which the water passes from the forward lower portion of the boiler through a conduit connecting said portion of the boiler with the outer compartment of the water-leg. Under such an arrangement, there is a tendency of the water to flow directly upward along the inner compartment of the front side of the water-leg, this being the most direct course, so that there is liability of the water failing to properly fill the side portions of the water-leg. Hence there is liability of steam being generated in said side portions, so that there is danger of burning the inner walls of the side portions of the water-leg along the fire-box. It will be observed that the partition b , which subdivides the front portion of the water-leg in my improved construction, extends to the bottom of the water-leg, so that no water can pass from the outer to the in-

ner compartment excepting through the openings b^5 , two of which are provided at the opposite edges of the partition, and another at the central portion. The water is thus distributed and caused to pass in two streams through the side openings into the side portions of the water-leg, and in a third stream through the central opening into the inner compartment of the front portion of the water-leg. The force given to said streams by the necessary contraction caused by the extension of the partition and the limited area of the openings, insures a sufficient entrance of the water into the side portions of the water-leg to obviate the danger of the formation of steam therein, there being always sufficient pressure of water in the side portions of the water-leg to keep the same filled with water.

I claim—

A locomotive boiler, the forward portion of the water-leg of which is subdivided into an outer and an inner vertical compartment by a vertical partition, extending to the bottom of the water-leg, and having openings $b^5 b^5$ at its opposite edges and another opening b^5 at its central portion, all arranged to distribute the water flowing through the outer compartment, the outer openings causing two streams of said water to enter the lower portion of the inner compartment at points coinciding with the side portions of the water-leg, while the central opening causes another stream to enter the lower portion of the inner compartment at its center; combined with a passage or conduit, extending along the bottom of the boiler, and communicating at one end with the forward lower portion of the boiler, and at its other end with the outer compartment, said outer compartment constituting a water distributing continuation of the conduit, whereby water conducted backwardly by the conduit is distributed at the bottom of the water-leg and caused to flow through the side portions as well as through the forward portion of the water-leg; as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 5th day of December, A. D. 1892.

WILLIAM B. MACK.

Witnesses:

R. H. MACK,

A. D. HARRISON.