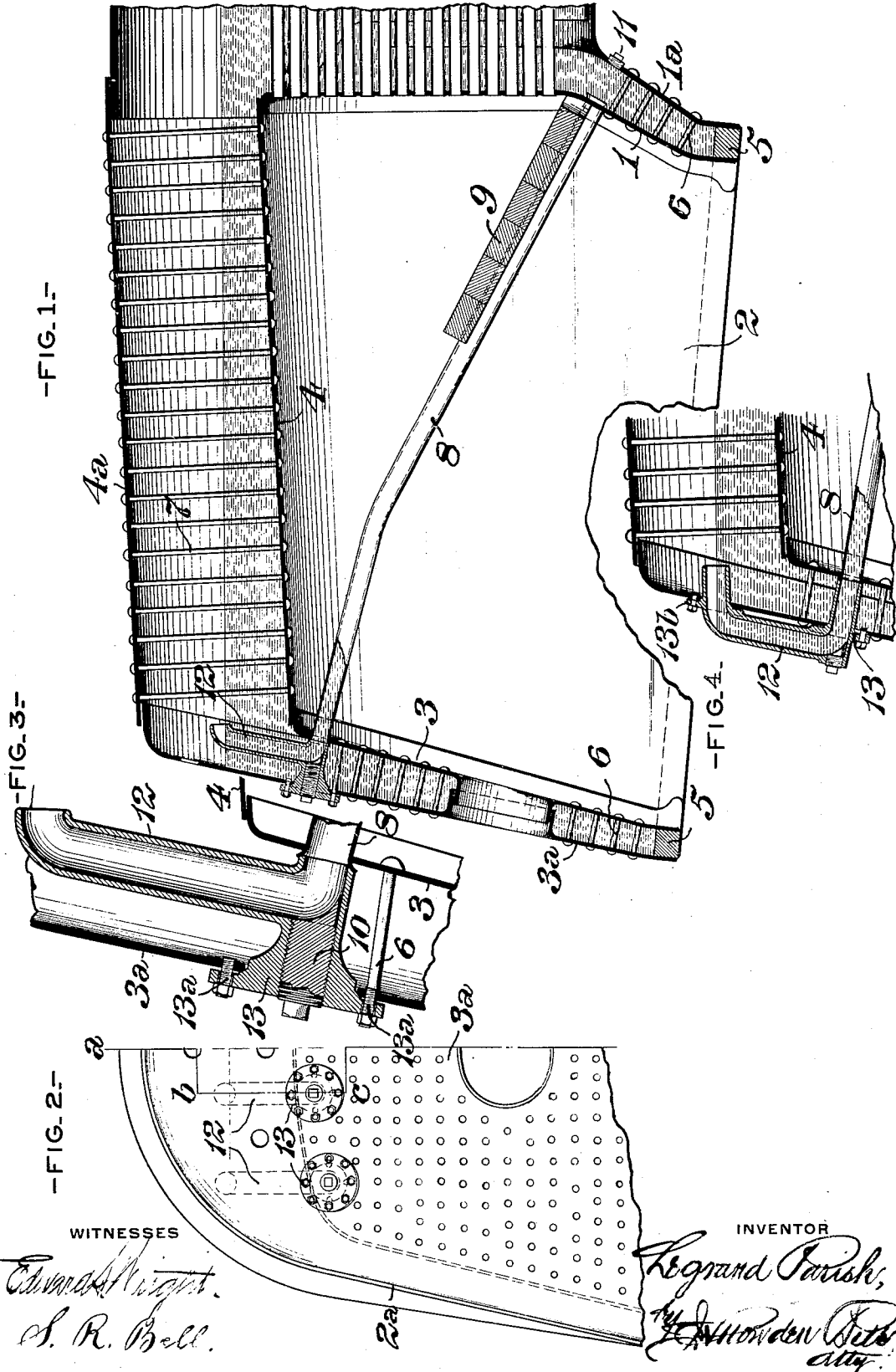


L. PARISH.
CIRCULATING TUBE FOR STEAM BOILERS.
APPLICATION FILED AUG. 24, 1912.

1,049,140.

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UNITED STATES PATENT OFFICE.

LEGRAND PARISH, OF NEW YORK, N. Y.

CIRCULATING-TUBE FOR STEAM-BOILERS.

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Specification of Letters Patent.

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Application filed August 24, 1912. Serial No. 716,798.

To all whom it may concern:

Be it known that I, LEGRAND PARISH, of the borough of Manhattan, in the city, county, and State of New York, have invented a certain new and useful Improvement in Circulating-Tubes for Steam-Boilers, of which improvement the following is a specification.

My invention relates to tubes designed for promoting the circulation of water between different portions of the fireboxes of steam-boilers of the water wall firebox type, as well as for supporting brick arches in such fireboxes, a form of which that has been applied extensively in practice, is illustrated in Letters Patent of the United States No. 40630, granted and issued to John P. Laird, under date of November 17, 1863.

The object of my invention is to provide means, of simple and inexpensive construction and ready application in fireboxes of the present standard types, whereby a more continuous, rapid, and uninterrupted traverse of water through circulating tubes, and consequent circulation between different portions of the firebox, may be effected, than has been found practicable in the use of those of the constructions heretofore applied.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical, longitudinal section through the firebox of a locomotive boiler, illustrating an application of my invention, on the line *a b c d* of Fig. 2; Fig. 2, a view, in elevation, of a portion of the back head of the boiler; Fig. 3, a sectional view, on an enlarged scale, on the line *b c* of Fig. 2; and, Fig. 4, a sectional view of a circulating tube and delivery tube, illustrating a further structural modification.

My invention is herein exemplified as applied in a locomotive boiler firebox, of one of the present approved standard types, comprising an inside firebox, the members of which are a tube sheet, 1, side sheets, 2, a back sheet, 3, and a crown sheet, 4, and an outside firebox, the members of which are a throat sheet, 1^a, side sheets, 2^a, a back sheet, 3^a, and a top or cover sheet, 4^a. The water spaces at the front, rear, and sides of the firebox are closed by a mud ring, 5, and the sheets on opposite sides of said water spaces are connected by stay bolts, 6. The crown sheet, 4, and top sheet, 4^a, are

connected by so-called radial stay bolts, 7. Communication between the front and the rear water spaces is established by a plurality of circulating tubes, 8, in this instance four in number, which are fixed, at their opposite ends, in holes in the tube sheet, 1, and back sheet, 3, respectively, and are inclined upwardly from the former, at a level below the boiler tubes, to the latter, at a level slightly below the crown sheet. The circulating tubes, 8, perform the additional function of supporting a brick arch, 9. Access to the interior of the circulating tubes is, when required, afforded by washout plugs, 10, 11, secured removably in the back sheet, 3^a, and throat sheet, 1^a, respectively, opposite the ends of the circulating tubes.

In the practice of my invention, I attach, removably, to each of the circulating tubes, 8, a delivery tube, 12, which extends upwardly from the upper or delivery end of the circulating tube, into the water and steam space between the crown sheet, 4, and top sheet, 4^a, and is of such length as to terminate therein, by an open end, in or near the plane of the ordinary water level of the boiler. The delivery tubes may be connected to the circulating tubes in any suitable manner which will admit of their ready attachment to and detachment from the latter, and, in this instance, their lower ends are shown as fitting in slightly outwardly turned portions of the upper ends of the circulating tubes, forming sockets which receive them, and as held therein and in normal vertical position, by cover plates, 13, closing openings in the back sheet, 3^a, through which the delivery tubes are introduced and removed as required, and secured to the back sheet by studs, 13^a. The cover plates are shown in the drawings as projecting laterally from the delivery tubes and as being integral therewith, but it will be obvious that, if preferred, they may be made separate from, and abutting against said tubes, and will similarly perform their above described functions. The washout plugs, 10, of the upper ends of the circulating tubes are screwed into the cover plates, and their inner ends are curved so as to form easy bends in the delivery tubes, as clearly shown in Fig. 3.

Fig. 4 illustrates a structural modification, designed to enable the application of the delivery tubes to be made to circulating tubes, the location of which is such that the

insertion and removal of delivery tubes of proper length, in and from a water space into which they are desired to discharge, would not be practicable, as well as to enable the discharge end of the delivery tube to be located either in the same vertical plane as the circulating tube, or otherwise. The delivery tube, 12, is, in this case, extended through the back sheet, 3^a, of the outside firebox, and carried upwardly, outside of the firebox, to the proper discharge level, at which it reenters the firebox, through an opening closed by a cover plate, 13^b. Said upper opening may, of course, be located in any determined vertical plane, as the delivery tube may stand either vertically or be inclined, in accordance with the desired plane of discharge of the delivery tube.

It will be seen that my improvement provides means by which the currents of water and steam which, by the action of the heat in the firebox on the surfaces of the circulating tubes, are caused to traverse upwardly and rearwardly through said tubes from the front to the rear water space, are not discharged into the latter as in prior practice, but are delivered into the space above the crown sheet, at practically the water level. These currents are, therefore, not retarded or obstructed by the weight of the volume of water above the level at which the circulating tubes are connected to the back sheet, as they are in prior practice, and a correspondingly increased effectiveness as to freedom and rapidity of circulation necessarily results. It will also be apparent to

those familiar with the operation of steam boilers, that this advantage is attained without any attendant objection in the particular of interference with the setting, removal, or cleaning of the circulating tubes, these being, by the provision of the cover plates and plugs, rendered as readily and conveniently accessible for the above purposes as in the ordinary constructions.

I claim as my invention and desire to secure by Letters Patent:

1. The combination, with a steam boiler firebox, of a circulating tube extending upwardly from one water space of the firebox to another, a delivery tube fitting the discharge end of the circulating tube, and a cover plate closing an opening in the shell of the discharge water space and detachably connecting the circulating tube and delivery tube.

2. The combination, with a steam boiler firebox, of a circulating tube extending upwardly from one water space of the boiler to another, a delivery tube fitting the discharge end of the circulating tube, a cover plate closing an opening in the shell of the discharge water space and detachably connecting the circulating tube and delivery tube, and a washout plug closing an opening in the cover plate in line with the circulating tube.

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Witnesses:

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