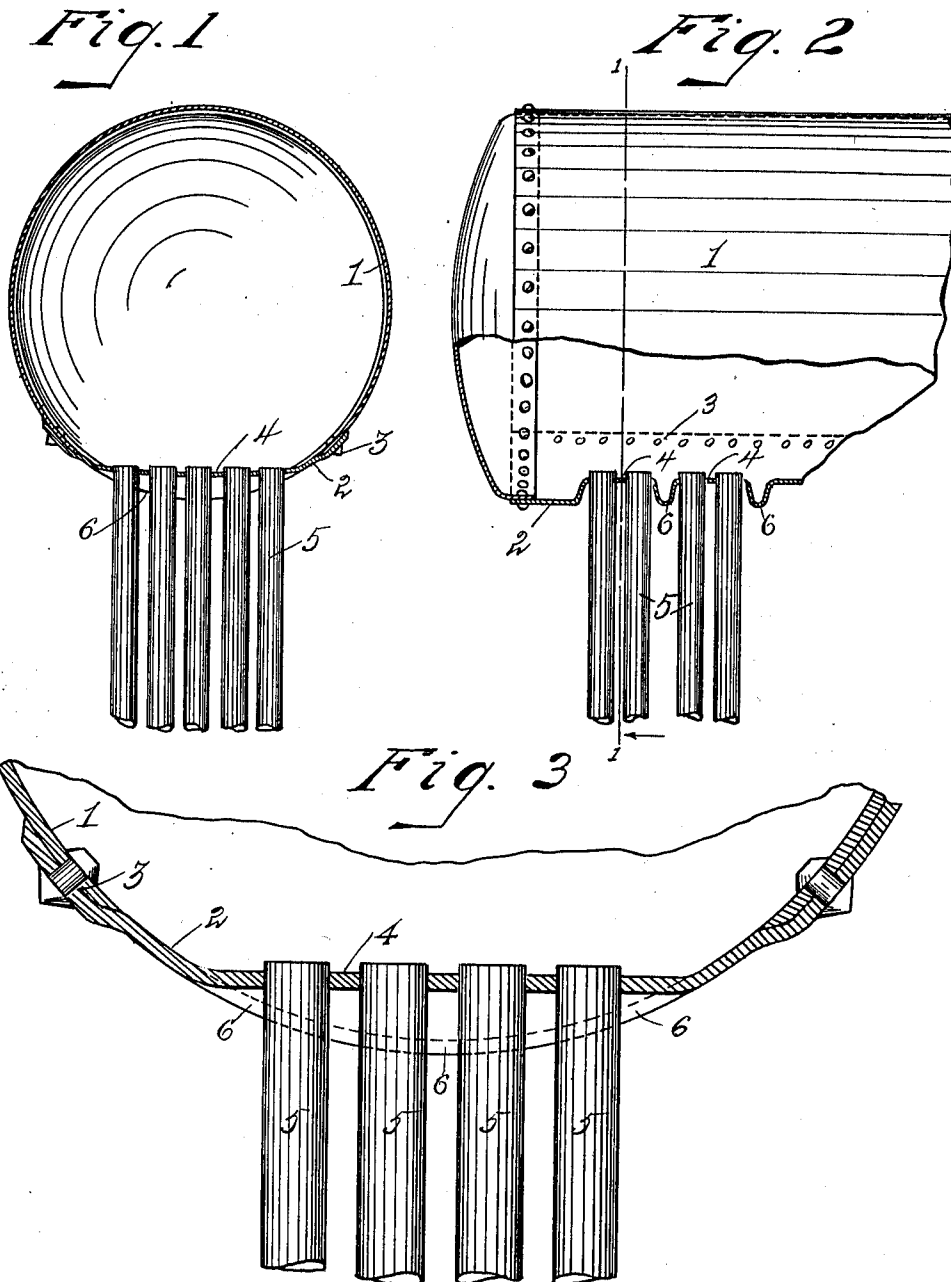


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 MEANS FOR ATTACHING WATER TUBES TO WATER TUBE BOILER AND OTHER DRUMS.
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1,021,204.

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MEANS FOR ATTACHING WATER-TUBES TO WATER-TUBE BOILER AND OTHER DRUMS.

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Specification of Letters Patent.

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Application filed July 31, 1911. Serial No. 641,615.

To all whom it may concern:

Be it known that I, WILLIAM D. McNAULL, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Means for Attaching Water-Tubes to Water-Tube Boiler and other Drums; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

In the construction and use of water-tube boilers the difficulty of securing and maintaining the ends of the water-tubes in the curved walls of the various drums is well understood. Where a group of water-tubes is connected with the cylindrical wall of a drum, not only is it difficult to form a perfect joint between the ends of the tubes and the holes in the wall of the drum, but since it is necessary in such case to employ tubes of different lengths, irregular contraction and expansion takes place among the several tubes, with familiar disastrous results. To overcome this objection, the tube-sheet, or that portion of the drum which receives the ends of the water-tubes, are, by some manufacturers, made flat so that the water-tubes are all of the same length and so that their ends enter perfectly circular holes. But when this is done, the cylindrical contour of the drum in cross-section is sacrificed, thus greatly reducing the capacity of the drum to withstand internal strains, there now being a tendency of the tube-sheet to bend and curve outwardly.

My invention is designed to overcome the difficulties and objections here indicated, and, more particularly, to provide the drum or drums of a water-tube boiler with flat surfaces to be pierced for the reception of the ends of the water-tubes, but in so doing to greatly strengthen, reinforce and brace the tube-sheet without sacrificing the advantages of the cross-sectional curvilinear form. I attain these objects by means of the devices, construction and arrangement of parts hereinafter described, and shown and illustrated in the accompanying drawings, in which,—

Figure 1 is a vertical cross-sectional ele-

vation of an upper water and steam drum of a water-tube boiler, constructed according to my invention and having connected therewith the upper ends of a group of water-tubes, the section being taken on line 1—1, Fig. 2; Fig. 2, a side-elevation of one end of said drum with a portion broken away to show a central longitudinal vertical section of a portion of the tube-sheet, and Fig. 3, an enlarged view of the lower part of Fig. 1.

Like numerals of reference indicate like parts throughout the drawings.

In the drawings, 1 is a steam and water drum of the usual or any preferred construction. While the present description is of an upper drum, it is manifest that the same description,—when inverted,—will apply to a lower or "mud" drum.

2 is a tube-sheet which may be formed integral with, but is preferably riveted, as at 3, at its side-margins, to the drum to form the under side of the drum. At intervals along its length the tube-sheet between its marginal flanges is flattened, as at 4. These flattened portions are provided with holes which may be staggered or arranged in one, two or more transverse rows for the reception of the ends of the water-tubes 5. Between the adjacent flattened portions of the tube-sheet and the neighboring groups of water-tubes, the tube-sheet is crimped transversely, as at 6, the crimps being deepest midway of their length and curved from end to end to form substantially an arc of the circle of the drum. These cross-crimps 6 are formed preferably by swaging the sheets between dies in a suitable die-press.

It will be seen that the transverse crimps 6, by reason of their longitudinally arched form and their U-shape form in cross-section, are of immense strength; that they preserve substantially the cylindrical contour of the drum, and that they form rigid and unyielding braces and supports for the flattened portions of the tube-sheets which receive the ends of the water-tubes.

Having described my invention, what I claim and desire to secure by Letters Patent is,—

1. In a device of the described character, a drum having, at intervals, along one side, flattened portions having holes for the reception of the ends of tubular members, the wall of the drum being transversely crimped between the neighboring flattened portions,

said crimps being U-shaped in transverse section and arched longitudinally in an arc—substantially—of the transverse outline of the drum.

- 5 2. In a device of the described character, a drum having, at intervals along one side, transverse flattened portions in which are groups of holes, said drum being outwardly and transversely crimped between the neigh-

boring flattened portions in substantially an arc of the transverse outline of the drum, and tubes connected with said holes.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM D. McNAULL.

Witnesses:

LEOWE KIBURTZ,
C. S. ROWLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."