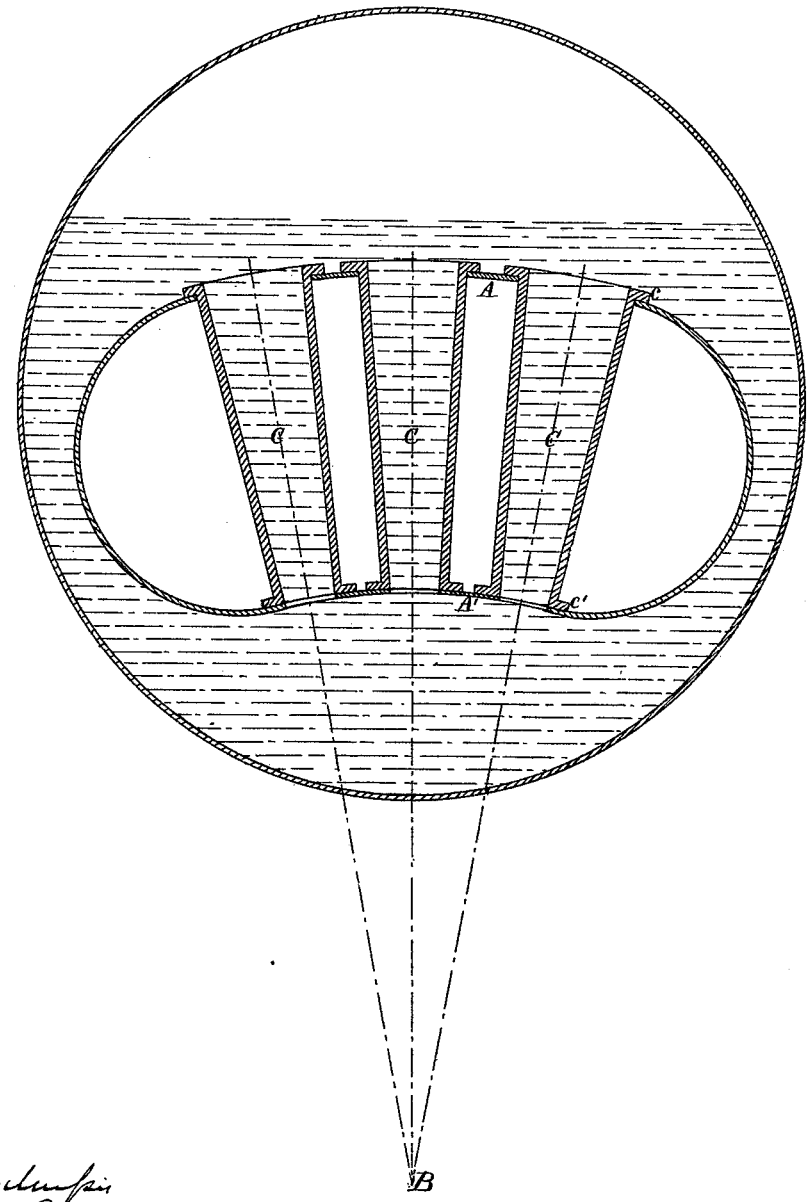
C. J. GALLOWAY & C. H. HOLT.

STEAM-BOILERS.

No. 180,863. Patented Aug. 8, 1876.



Witnesses
Elmore Martin.
R. S. Bostwick

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C. H. Holt by
C. S. Whitman
atty

UNITED STATES PATENT OFFICE.

CHARLES J. GALLOWAY AND CHARLES H. HOLT, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **180,863**, dated August 8, 1876; application filed February 8, 1876.

To all whom it may concern:

Be it known that we, CHARLES JOHN GALLOWAY, of Knott Mill Iron-Works, Manchester, in the county of Lancaster, England, engineer, and CHARLES HERBERT HOLT, of Manchester aforesaid, engineer, have invented an Improvement in Steam-Boilers; and do hereby declare that the following description, taken in connection with the accompanying sheet of drawings, hereinafter referred to, forms a full and exact specification of the same, wherein we have set forth the nature and principles of our said improvements, by which our invention may be distinguished from others of a similar class, together with such parts as we claim and desire to secure by Letters Patent—that is to say:

This invention relates to internal-flued or Cornish steam-boilers having water-tubes fixed transversely inside the internal flues. In such boilers it is usual to construct the flues of an elliptic form in transverse section, and to fix the tubes therein in a vertical or parallel position. By this arrangement the water-tubes necessarily vary in length and configuration as regards the flanged ends, when flanged tubes are employed, according to the position they occupy in the elliptic flue, and consequently the cost of manufacture of such boilers is rendered much greater than would be the case if the tubes could all be made identical in form, so that they could be manufactured on a large scale, and consequently at a comparatively cheap rate, by special machinery. Now, according to our present invention, we attain this object by constructing the internal flue of the boiler with its upper and lower sides curved to a center external to the flue, and by fixing therein water-tubes radiating from the same or nearly the same center from which the curved sides are struck.

The accompanying drawings shows a transverse section of a steam-boiler constructed according to this invention—namely, with the concave upper side A and the convex lower side A′ both struck from one and the same center, B, and with transverse water-tubes C C, all radiating from the same or nearly the same center, B, from which the curved sides are struck. Thus it will be seen that all the tubes C will be identical in form, and interchangeable, the top and bottom flanges *c c′* being all square to the center line of the tube, so that, in addition to the advantage above mentioned of being able to manufacture them on a large scale, the labor and care required in fitting the tubes in their places in the flue will be greatly reduced, resulting in a still greater cheapening of the cost of manufacture; also, in the case of conical or "Galloway" tubes, such as are shown in the drawing, the further advantage is gained that, as the flanges of the lower ends of the tubes can be brought as close together as those of the upper ends, the bottom plates of the flues need not be made of increased strength, as was necessary with the vertical arrangement of conical tubes used heretofore, on account of the extent of unsupported plate that necessarily occurred between the flanges of the lower small ends when those of the upper ends were close together.

Although this improved system of construction offers special advantages in the case of flanged tubes, whether of conical or cylindrical shape, yet it may also be employed with advantage where tubes of small diameter without flanges, such as locomotive-tubes, are employed, the tubes being fixed in the plates of the flue in any well-known manner, as in this case the advantage of having the tubes all identical as regards their length, and consequently interchangeable, would still be attained.

Having thus described the nature of our invention, and the best means we know of carrying it out in practice, we claim—

An internal-flued or Cornish boiler, having the upper and lower sides of its flue curved to one and the same center, external to the flue, in combination with transverse water-tubes radiating from the same center from which the curved upper and lower sides are struck.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses this 5th day of November, 1876.

CHARLES JOHN GALLOWAY.
CHARLES HERBERT HOLT.

Witnesses:
JOHN BROWN PAYNE,
HENRY GALLOWAY.