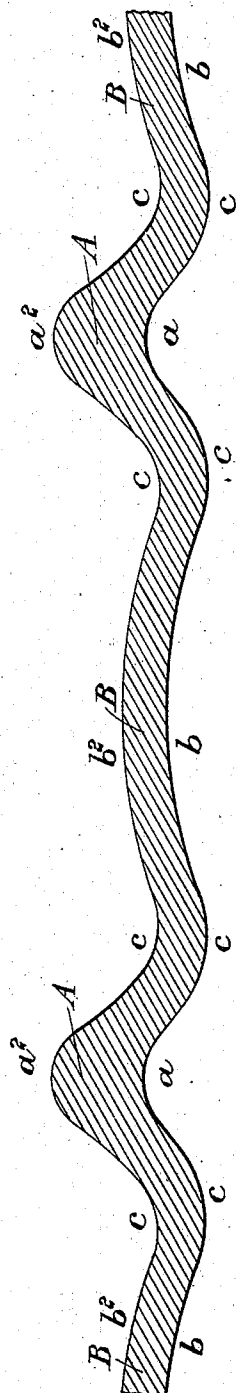


(No Model.)

J. NODDER.
STEAM BOILER FURNACE AND FLUE.

No. 574,107.

Patented Dec. 29, 1896.



Attest:

Robert Lewis
J. T. Cameron

Inventor:
Joseph Nodder
by *Geofford Mauro*
his attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH NODDER, OF SHEFFIELD, ENGLAND, ASSIGNOR TO THE JOHN BROWN & COMPANY, LIMITED, OF SAME PLACE.

STEAM-BOILER FURNACE AND FLUE.

SPECIFICATION forming part of Letters Patent No. 574,107, dated December 29, 1896.

Application filed August 20, 1896. Serial No. 603,400. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH NODDER, a subject of the Queen of Great Britain and Ireland, residing at Atlas Works, Sheffield, in the county of York, England, have invented certain Improvements in Steam-Boiler Furnaces and Flues, of which the following is a specification.

This invention has for its object to provide boiler furnaces and flues which have a high degree of resistance against collapse and an efficient elasticity of movement when in work. The plates of which the said boiler furnaces or flues are made are of unequal thickness, the thicker portions being constituted by hollow ribs arranged transversely to the axis of the furnace or flue, the concavity being on the fire side of the furnace or flue and the convexity on the water side, the tops of the said ribs being thicker than the other portions of the plate. Between the ribs thus formed arched parts or portions are made with a sweeping curve, the convexity thereof being on the water side and the concavity on the fire side, these curved parts preferably joining the ribs aforesaid by reversely-curved portions.

The accompanying drawing represents in longitudinal section a portion of a boiler furnace or flue sufficient to illustrate this invention.

A are the aforesaid thickened hollow ribs arranged transversely to the axis of the furnace or flue. These have a concavity on the fire side at *a*, the top or convexity *a*² being on the water side of the furnace or flue.

B are the arched parts or portions between the ribs A, these said arched parts or portions being made with a sweeping curve, with the concavity *b* on the fire side and the convexity *b*² on the water side of the furnace or flue, the said parts B joining the ribs A by reversely-curved portions, as at *c*.

It has been practically demonstrated that furnace-flues having no provision for longitudinal movement caused by expansion and contraction during work are particularly liable to circumferential splits at the base of the rib, while flues of the corrugated and suspension arch type elongate too easily, and when

compelled to contract by the cooling of the boiler do not retain their circularity, but are forced inward and partially collapsed.

With the form of flue constituting the present invention the circularity of the flue is maintained by the thickened ribs or bands, while the arches and curved parts at the end of the arched parts provide sufficient flexibility for contraction and elongation, so that even with increased strength against collapse I avoid the longitudinal rigidity of flues having no provision for longitudinal movement caused by expansion and contraction during work and the longitudinal weakness of the corrugated and suspension arch flues without further encroachment on the water-space of the boiler, the space inclosed between two parallel lines from fire to water being less than in any other furnace-flue of this class known to me.

My furnace-flue has been demonstrated to be stronger than those heretofore in use, while possessing the necessary flexibility or elasticity without encroachment upon the water-space.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A boiler furnace or flue having thickened hollow ribs, and arched portions between the ribs, the convexities of said parts being on the water side of the flue and the concavities thereof on the fire side of the flue, substantially as described.

2. A boiler furnace or flue having thickened hollow ribs, arched portions between the ribs, the convexities of said parts being on the water side of the flue and the concavities thereof on the fire side of the flue, curved portions intermediate of and connecting the arched portions to the ribs, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH NODDER.

Witnesses:

CHAS. MAXEY,

J. E. TOWNSEND.