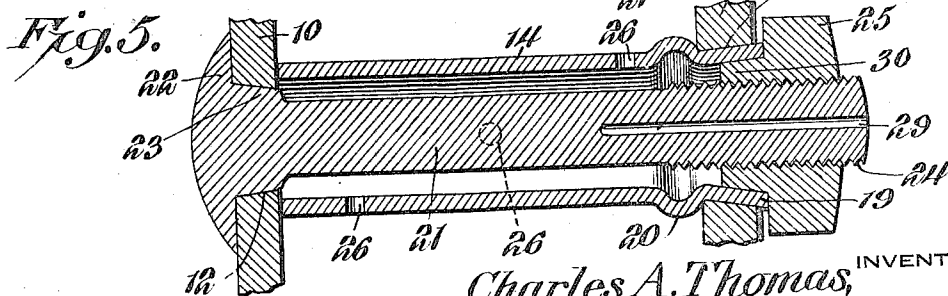
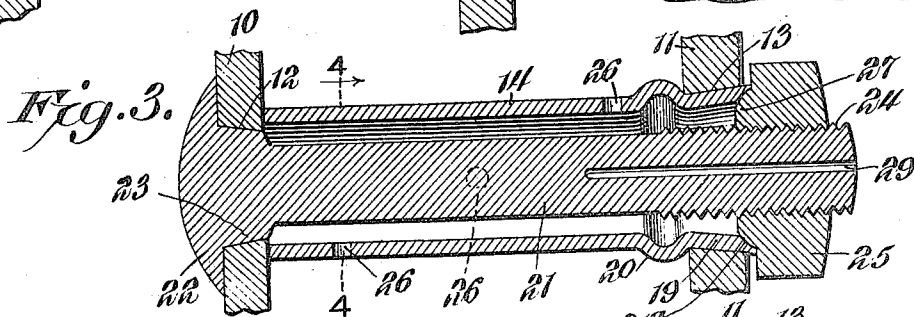
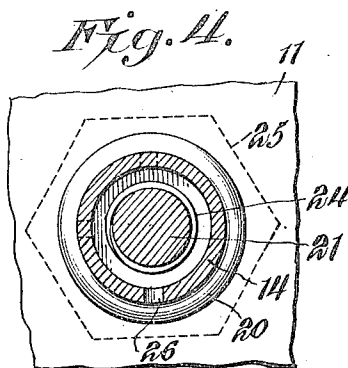
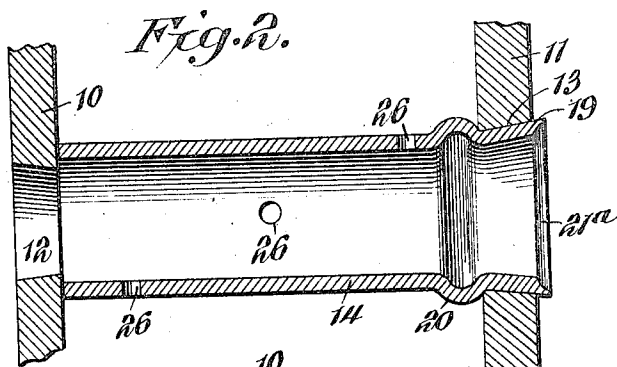
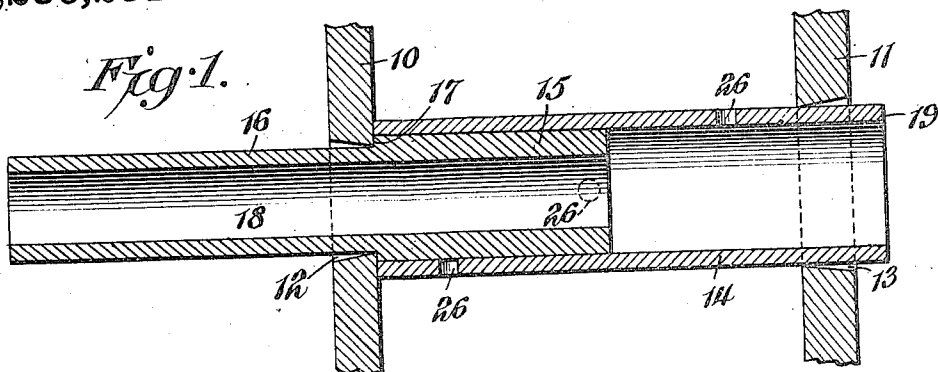


Patented Aug. 7, 1917.

1,236,231.



WITNESSES

M. C. Hanrahan,
Howard D. Orr.

Charles A. Thomas, INVENTOR,

BY

E. G. Figgers.

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES A. THOMAS, OF BIRMINGHAM, ALABAMA, ASSIGNOR OF ONE-HALF TO FRANK A. MAYER, OF WASHINGTON, DISTRICT OF COLUMBIA.

BOILER-STAY.

1,236,231.

Specification of Letters Patent.

Patented Aug. 7, 1917.

Application filed September 27, 1916. Serial No. 122,449.

To all whom it may concern:

Be it known that I, CHARLES A. THOMAS, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented a new and useful Boiler-Stay, of which the following is a specification.

This invention relates to improvements in boiler stays for securing the fire-box and outer sheets of a steam boiler in their respective positions.

The object is to provide a boiler stay, which, after proper installation, will permit of greater flexibility by providing for the maximum amount of expansion or contraction which is unevenly distributed throughout the fire-box sheet of a steam generating boiler, without the customary resultant distortion of the outer sheet, and to reduce to a minimum the breakage of the bolts due to the great strain to which they are subjected when in such use, and the consequent leakage and danger of boiler explosions.

Another object is to provide a boiler stay, which is capable of being quickly and easily applied, consisting of few parts, simply constructed, and obviating the necessity of threading the openings in the inner and outer sheets of the fire-box, thus prolonging the life of the stay to a material degree, the stay having means for permitting the free circulation of water thereabout so as to protect it from the intense heat of the fire-box.

A full and complete understanding of the invention may be obtained from a consideration of the following detailed description, taken in connection with the accompanying drawing forming a part of this specification, it being understood that while the drawing shows a practical form of the invention, the latter is not confined to strict conformity therewith, but may be changed or modified, so long as such changes or modifications mark no material departure from the salient features of the invention, as specifically pointed out in the claims appended hereto.

In the drawing in which like reference characters designate similar parts throughout the several figures:—

Figure 1 is a sectional view through the plates of a steam boiler and the sleeve of the invention, showing the manner of applying and adjusting the sleeve to the boiler sheets.

Fig. 2 is a similar view, showing the sleeve after being secured in position.

Fig. 3 is a similar view, showing the complete stay in position.

Fig. 4 is a transverse sectional view, taken on the line 4—4 of Fig. 3, and looking in the direction of the arrow.

Fig. 5 is a longitudinal sectional view of a slightly modified form of construction.

Referring to the drawing, 10 designates the inner or fire-box sheet of a steam boiler, and 11 the outer sheet thereof. The inner sheet 10 has an inwardly flaring opening 12 provided therein, while the outer sheet 11 has an outwardly flaring opening 13, which is in axial alinement with the opening 12 and is of somewhat larger diameter than the same. A cylindrical sleeve 14 extends inwardly through the opening 13 in the outer sheet and abuts at its inner end against the fire-box sheet 10, in concentric relation to the opening 12.

In applying the stay, a mandrel 15 is fitted in the sleeve 14, as illustrated in Fig. 1, said mandrel having a reduced shank 16 upon its inner end of a diameter to freely pass through the contracted portion of the opening 12 in the fire-box sheet 10. The shank 16 provides an annular shoulder 17 at the inner end of the mandrel 15, which, after the same is introduced into the tube 14 and through the opening 12, abuts against the outer side of the fire-box sheet 10 and arrests the further inward movement of the mandrel 15 and serves, in conjunction with the shank 16, to center the inner end of the sleeve 14 about the opening 12 and to maintain the same in such position.

While the sleeve 14 is held in this position by the mandrel 15, as shown in Fig. 1, a suitable expanding tool is inserted in the outer end of the sleeve 14, and is centered in the sleeve by engagement of the spindle, or other like part of the expanding tool in the center bore 18 of the mandrel. The expanding tool is adapted to roll or expand the outer end 19 of the sleeve against the flaring wall of the tapered opening 13, and if desired, a prosser may be inserted in the outer end of the sleeve 14 and operated to raise an annular projection or pross 20 upon the outer cylindrical surface of the sleeve, immediately behind the outer sheet 11, as shown in Fig. 2.

When the pross 20 is formed in the sleeve 14, it is found that the sleeve is not materially shortened, and that when the bolt 21 is

tightened, the inner end of the sleeve terminates sufficiently close to the inner fire-box sheet 10 for the purposes of this invention.

The press 20, may, of course, be omitted, as the expanded end 19 of the sleeve retains the latter tightly in the outer boiler sheet 11. The annular projection 20 and the flared end 19 of the sleeve 14 holds the sleeve from longitudinal movement from the outer boiler plate 11 in either direction.

As shown in Fig. 2, after the end of the sleeve 14 has been expanded to fit the opening 13 and the press 20 formed therein immediately behind the outer sheet 11, the end 19 of the said sleeve projects slightly beyond the outer face of the outer sheet 11 and is there provided with an annular depression or seat 21^a, which is preferably formed by rounding the wall thereof in a convex manner. The stay bolt 21 passes through the opening 12 and into the sleeve 14, and is provided with an enlarged head 22 fitting snugly against the inner wall of the boiler sheet 10 and having a conical enlargement 23 provided at the inner side of the head 22, thus forming a supplemental head for the bolt 21 and being so tapered as to bind tightly within the inwardly tapering walls of the opening 12 throughout the thickness of the inner fire-box sheet 10.

Should the head 22 be burned or broken off, or should the bolt 21 become broken, the enlargement 23, binding tightly in the opening 12, will act as a plug and prevent the bolt, or the inner fragment thereof, from being blown either into the fire-box, or outwardly from the boiler sheets, and furthermore, in the event of the bolt breaking, water can not leak into the fire box, and but a slight tell-tale leak can occur through the outer end of the sleeve 14 or outer sheet 11.

The outer end 24 of the bolt 21 is threaded throughout a considerable distance and extends beyond the outer end of the sleeve 14. A binding nut 25 is mounted for longitudinal adjustment upon the threaded end 24, and is provided with a concentrically disposed convex extension 27, arranged on its inner face and adapted to fit within the convex seat 21^a formed in the projecting end of the sleeve 14 and tends to force the flaring wall of said sleeve into tight binding relation with the opening 12 in the outer sheet 11, the extension 27 being of such length as to project into the sleeve 14 beyond the plane of the outer face of the boiler plate 11.

The intermediate or body portion of the stay bolt 21 is of reduced diameter, or of a diameter equal substantially to the bottom of the threaded portion 24, and this reducing of the bolt 21 provides a relatively large space about the bolt and within the sleeve 14, the latter being provided with openings 26 disposed at different points in the wall thereof, for the purpose of admitting water

from the space between the plates 10 and 11, in order to freely circulate through the sleeve and about the bolt 21 to prevent excessive heating of the stay.

A tell-tale opening or bore 29 is formed in the outer end of the bolt 21 to admit the escape of water and steam, should the bolt 21 become broken at a point adjacent the outer boiler plate 11, where, as a matter of fact, the majority of breaks occur in boiler stays.

The flaring end 19 of the sleeve admits of the adjustment of the stay to boiler sheets of different spaced relation, and the convex extension 27 of the adjustable nut 25 binds in the concaved seat 21^a of the outer end of the sleeve 14 and clamps the flared end 19 thereof within the opening 13 of the outer sheet 11 after the desired adjustment of the clamping nut 25. The extension 27 within its seat 21^a acts as a ball and socket joint and freely permits of the buckling of the inner fire-box sheet 10 due to expansion and contraction.

In other words; a flexibly mounted bolt is provided which compensates for the expansion of the fire-box sheet.

The slightly modified form illustrated in Fig. 5 consists in eliminating the concaved seat 21^a, heretofore described, and providing the clamping nut 25 with a tapering extension 30 formed on the inner face thereof and consisting of a conical concentric sleeve having its circumferential wall tapered at an angle to fit snugly within the flared end 19 of the heretofore described sleeve 14. It will be seen that the extension 30 also acts to press outwardly on the inner face of the flared end 19 of the sleeve to clamp the same within the opening 12 in the outer sheet 11, and thus bind the sleeve thereto in the same manner as in the form previously described.

It will be noted that in both forms of the invention the nut is provided with an annular extension on its inner side which acts as a wedge to force the flared wall of the sleeve into tight engagement with the opening of the outer sheet.

This application is a continuation of my former application, Number 87,811 in so far as the construction shown in Fig. 5 of the drawing is concerned.

What is claimed is:—

1. In a boiler stay, the combination with spaced apart inner and outer boiler sheets having axially alined oppositely tapered or flared openings therethrough, the opening in the outer sheet being larger than the opening in the inner sheet, a sleeve projecting through the opening in the outer sheet and abutting against the inner sheet about the opening thereof, said sleeve having an expanded outer end seated against the tapered wall of the opening of the outer sheet, a bolt passed through the opening in the inner sheet into

said sleeve and having a head seated flat against the inner side of the inner sheet, with an annular tapered enlargement binding in the opening of said sheet, and against the tapered wall thereof to hold the bolt rigidly in the inner sheet, said bolt having a threaded outer end projecting through and beyond the outer end of the sleeve, and a binding nut threaded upon the outer end of the bolt beyond the sleeve and having an annular wedging extension on its inner side which fits within the expanded outer end of the sleeve and extends inwardly beyond the outer face of the outer sheet.

2. In a boiler stay, the combination with spaced apart inner and outer boiler sheets having axially alined oppositely tapered or flared openings therethrough, the opening in the outer sheet being larger than the opening in the inner sheet, a sleeve projecting through the opening in the outer sheet and abutting against the inner sheet about the openings thereof, said sleeve having an expanded outer end seated against the tapered wall of the opening of the outer sheet,

per wall of the opening of the outer sheet, a bolt passed through the opening in the inner sheet into said sleeve and having a head seated flat against the inner side of the inner sheet, with an annular tapered enlargement binding in the opening of said sheet and against the tapered wall thereof to hold the bolt rigidly in the inner sheet, said bolt having a threaded outer end projecting through and beyond the outer end of the sleeve, and a binding nut threaded upon the outer end of the bolt beyond the sleeve and having a tapered extension projecting into the expanded outer end of the sleeve to hold said expanded end against the tapered wall of the opening of the outer sheet.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES A. THOMAS.

Witnesses:

Mrs. E. H. McBEE,
C. M. WEISSINGER.

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