

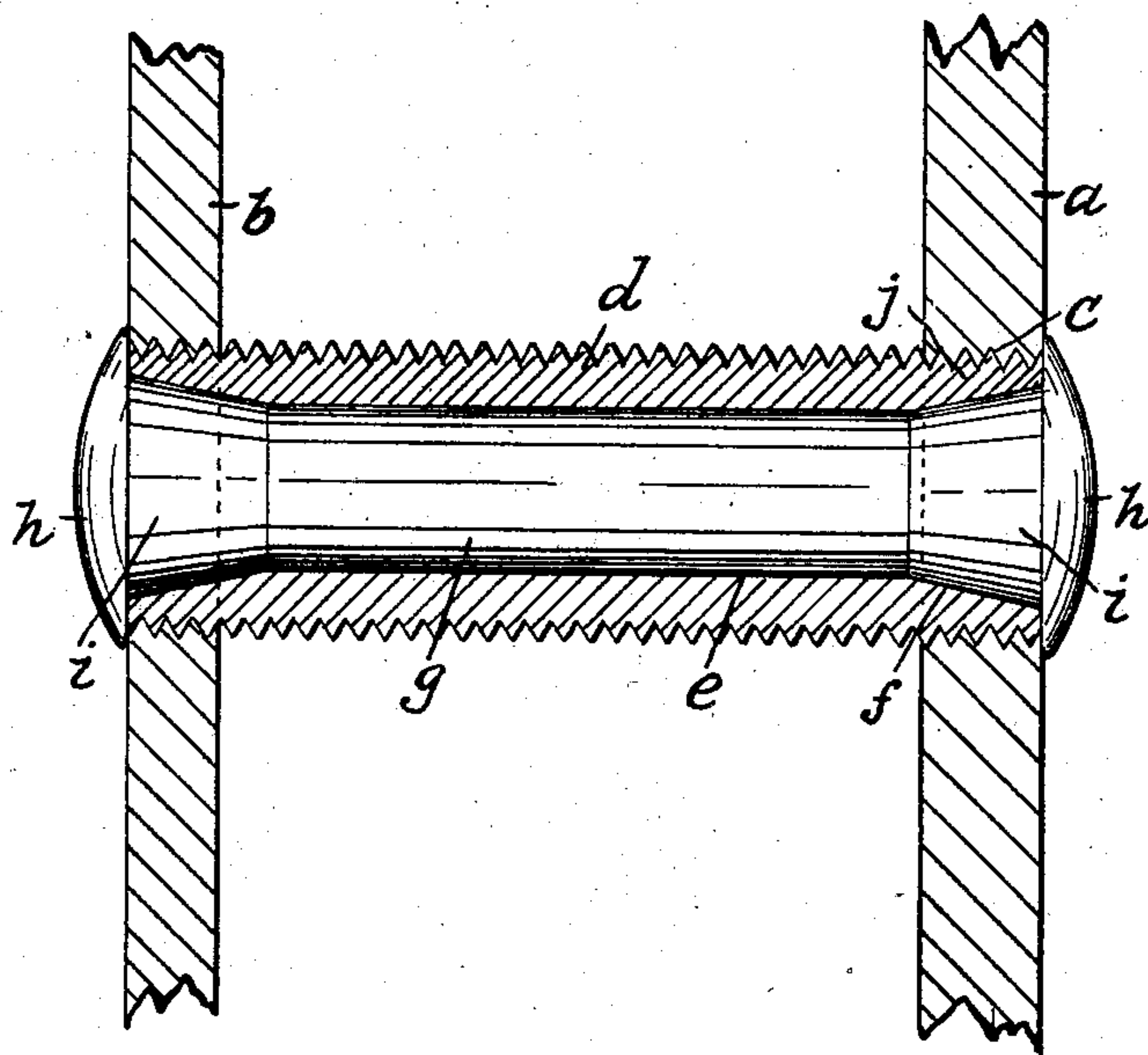
No. 721,869.

PATENTED MAR. 3, 1903.

S. H. DUNNING.  
STAY BOLT.

APPLICATION FILED JULY 7, 1902.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

SAMUEL H. DUNNING, OF PATERSON, NEW JERSEY.

## STAY-BOLT.

SPECIFICATION forming part of Letters Patent No. 721,869, dated March 3, 1903.

Application filed July 7, 1902. Serial No. 114,555. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL H. DUNNING, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Stay-Bolts; and I do hereby 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 drawing, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to the manufacture of stay-bolts. Stay-bolts commonly in use have either of two exterior forms—i. e., wherein the bolt is reduced at both ends where it is received by the hole in the plate of either of the parts it connects or wherein the bolt is surrounded by a screw-threading, so as to be capable of being screwed into place from the outside of either plate. The latter is an improvement on the former designed to facilitate the fitting of the bolt into position. Both of these forms are subject to breakage between the plates, for which reason they are commonly made tubular, at least in their end portions, so that by the oozing out of water through the passage thus produced the breakage may be detected, and, moreover, it is almost impossible to prevent leakage where the stay-bolt passes through the plates. Even in the threaded form of stay-bolt this leakage is likely to occur, for simply the wear which the thread of the bolt is subject to in fitting it in place is sufficient to produce quite a perceptible leak-outlet under the high pressure in the boiler.

My invention therefore has for its object and consists in an improvement in the method of securing together certain parts, such as the sheets forming contiguous portions of a boiler and fire-box, designed to overcome these and other objections. It also consists in the product of such improved method.

My invention will be found sufficiently illustrated in the single figure of the accompanying drawing.

In said drawing, *a* designates the outside or boiler sheet, and *b* the inside or fire-box sheet, these being provided, as usual, with aligned openings *c*, adapted to receive the

stay-bolt. I prefer to have these holes threaded, but do not wish to be correspondingly limited. Into these holes is snugly fitted the body member *d* of my improved stay-bolt. If in accordance with the preferred construction the holes *c* are threaded, the said member *d* should also be externally threaded, so as to be capable of being screwed into place in the holes. The member *d* is tubular, and the channel *e* through the same is near the ends of the latter preferably gradually widened or made divergent, as at *f*. Through the body member *d* is then passed another member *g*, having a somewhat greater length than the member *d* and preferably closely fitting its channel *e*. In carrying out my invention according to the preferred form thereof after said member is in place the metal of its protruding ends is riveted or otherwise displaced in such manner that it not only forms rounded heads *h*, giving a good exterior appearance, but made to expand, as at *i*, so as to force all portions of the surrounding part of the member *d*, as at *j*, outwardly, thus closing all possible interstices between the member *d* and the plate *a*, (or *b*.) If the end portions of the channel *e* are divergent, the effect will be to cause the metal of the ends of the member *g* to fill said channel at these points and then expand the member *d* at *i*. I have conceived that it is not absolutely essential that both heads be riveted, for it is obvious that the part *g* may be already formed at one end just as it appears in the drawing when introduced into the member *d*, and if the part *i* of the end portion in question is made a little larger in diameter than the receiving portion thereof of the part *d* and the member *g* thereupon driven into place the expanding of the portion *j* of said member *d* may be effected quite well, after which the riveting of the other end of the member *g* may be accomplished, and this leads me also to state that my invention is not necessarily limited to extending a part, such as *g*, clear through the tubular member *d*, for my invention is broad enough to comprehend simply the steps involved in, first, fitting to the sheet or plate a body member having the plate-receiving portion thereof substantially tubular; second, introducing therein another member designed to remain therein permanently, and to



effect the expanding of said tubular portion and then displacing the metal of the expanding or latter member which is in said tubular portion in any manner, so as to effect the  
 5 expanding of said tubular portion. In fitting the member *g* in place according to the preferred method it is heated to the usual degree suitable for conveniently manipulating the metal in the operation of riveting the  
 10 same, and on account of the fact that by the time the riveting is complete the portions *i* have a wedge-like shape as the metal cools the tendency is for the member *g* to contract longitudinally, with the consequence that the  
 15 portions *i* act supplementally to augment the expanding of the portions *j* of the member *d*. This illustrates that the aforementioned displacement of metal at *i* is not necessarily a displacement affecting the relative arrangement of the molecules of the metal, but may  
 20 be the displacement bodily of the whole of that portion of the metal received by the part of the member *d* to be expanded.

It is to be observed that should the body  
 25 member *d* become fractured, even all the way around, the member *g* will remain to hold the plates properly in position, nor will the possibility of leakage where the member *d* passes through the plates be in the least increased.

30 Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In the art of structurally combining a fire-box and boiler-sheets or the like, the  
 35 method of securing to one sheet a member having a tubular portion and adapted to project from the other sheet which consists in first providing an opening in said first-named sheet, introducing the tubular portion of said  
 40 member into said opening, then introducing into that part of the tubular portion of said member which is in the plane of said first-named sheet another member, and then displacing the material of said last-named member  
 45 against the surrounding portion of said first-named member so as to expand the same, substantially as described.

2. In the art of structurally combining a fire-box and boiler-sheets or the like, the  
 50 method of securing to one sheet a member adapted to project from the other sheet which consists in first forming said member substantially tubular in its end portion, providing an opening in said first-named sheet, introducing  
 55 the tubular end of said member into said opening, then introducing into that part of the tubular end of said member which is in the plane of said first-named sheet another member, and then displacing the material of  
 60 said last-named member against the surrounding portion of said first-named member so as to expand the same, substantially as described.

3. In the art of structurally combining a  
 65 fire-box and boiler-sheets or the like, the method of securing to one sheet a member adapted to project from the other sheet which

consists in first forming said member substantially tubular in its end portion, providing an opening in said first-named sheet, introducing  
 70 the tubular end of said member into said opening, then introducing into that part of the tubular end of said member which is in the plane of said first-named sheet another member, and then displacing the material of  
 75 said last-named member by expanding the same laterally so as to force it against the surrounding portion of said first-named member to thus expand the same, substantially as described.  
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4. In the art of structurally combining a fire-box and boiler-sheets or the like, the method of securing to one sheet a member adapted to project from the other sheet which  
 85 consists in first forming said member substantially tubular in its end portion, providing an opening in said first-named sheet, introducing the tubular end of said member into said opening, then introducing into that  
 80 part of the tubular end of said member which is in the plane of said first-named sheet another member having a wedge-shape form, and then forcing said last-named member into said tubular portion of the other member so  
 95 as to expand said tubular portion, substantially as described.

5. In the art of structurally combining a fire-box and boiler-sheets or the like, the method of securing said sheets together which  
 100 consists in first providing alined openings in said sheets, introducing into said openings a body member of substantially tubular form, then introducing into said body member another member, and then displacing the material of said last-named member in the planes  
 105 of said sheets and against the surrounding portions of said first-named member so as to expand the same against said sheets, substantially as described.

6. In the art of structurally combining a  
 110 fire-box and boiler-sheets or the like, the method of securing said sheets together which consists in first providing alined openings in said sheets, introducing into said openings a body member of substantially tubular form,  
 115 then introducing into said body member another member, and then displacing the material of said last-named member in the planes of said sheets by expanding the same so as to force it against the surrounding portions of  
 120 said first-named member to thus expand the same against said sheets, substantially as described.

7. In the art of structurally combining a fire-box and boiler-sheets or the like, the  
 125 method of securing said sheets together which consists in first providing alined openings in said sheets, introducing into said openings a body member of substantially tubular form, then introducing into said body member another  
 130 member, forming on the ends of said last-named member wedge-like heads snugly fitting the ends of said body member and simultaneously expanding said last-named



member, and then permitting the contraction of said last-named member so that said wedge-like heads thereof will expand the surrounding portions of the body member, substantially as described.

5 8. The combination, with the boiler-sheets or other like bodies to be connected, of a tubular body member penetrating said sheets, and another member penetrating said tubular member and having the portions thereof in the plane of said sheets expanded against

the surrounding portions of said body member so as to render hermetic the joints between said body member and the sheets, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 3d day of July, 1902.

SAMUEL H. DUNNING.

Witnesses:

JOHN W. STEWARD,  
ROBERT J. POLLITT.