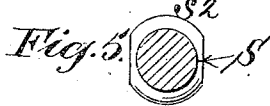
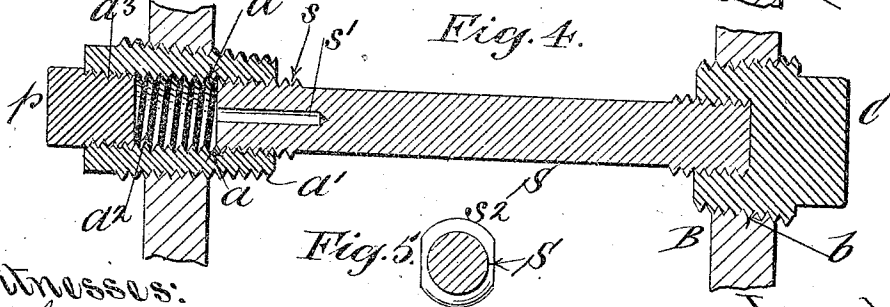
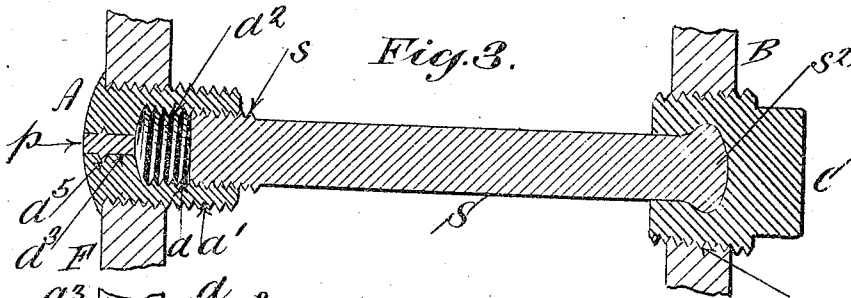
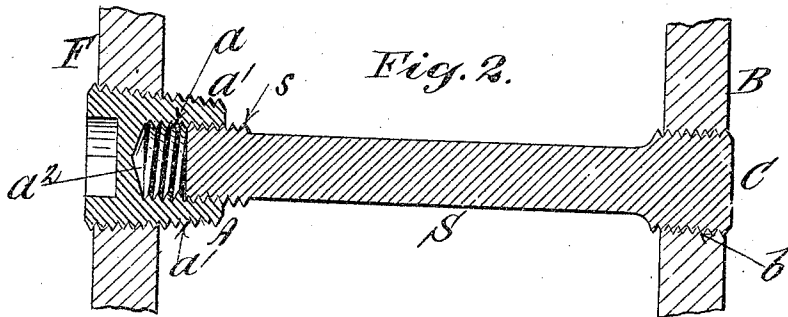
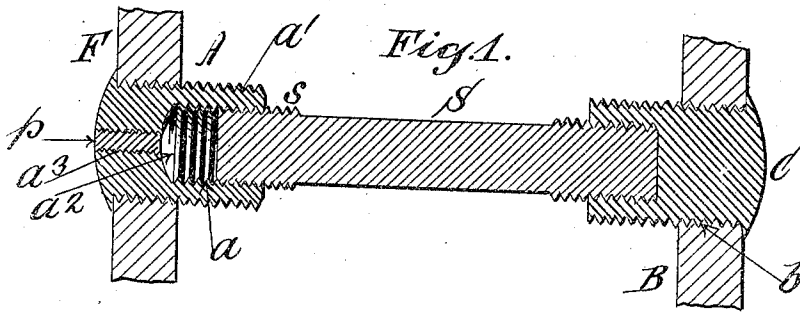


G. S. THOMPSON.
STAY BOLT.
APPLICATION FILED JULY 1, 1908.

1,004,937.

Patented Oct. 3, 1911.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE S. THOMPSON, OF HOCKESSIN, DELAWARE, ASSIGNOR TO THE FLEXIBLE BOLT COMPANY, A CORPORATION OF DELAWARE.

STAY-BOLT.

1,004,937.

Specification of Letters Patent.

Patented Oct. 3, 1911.

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To all whom it may concern:

Be it known that I, GEORGE S. THOMPSON, a citizen of the United States, residing in Hockessin, county of Newcastle, and State of Delaware, have invented certain new and useful improvements in Stay-Bolts, of which the following is a specification.

My improvements relate to stay bolts having metal shanks of relatively high tensile strength provided with a head or heads of a softer metal. While not restricted thereto, my stay bolt is designed more especially for use between the fire boxes and the outer shells of boilers, particularly locomotive boilers, in which, owing to the inequality and variability of expansion of the fire box plates as compared with the outer boiler shell, the stay bolts are subjected to severe lateral strain.

One object of my invention is to provide means for fastening a stay bolt of this character to the boiler sheets named without the necessity of riveting the ends, or where the riveting of one end is desirable, to obviate the necessity of subjecting the shank to the thrust and impact of the riveting operation.

Another object is to provide for the adjustment of the length of the bolt within itself, to compensate for slight variations of distance between the boiler sheets; also to provide means for testing the bolt to ascertain if it is in proper condition for service.

The invention consists in the specific construction and arrangement of parts herein-after described and claimed,—distinguishing features being the use of one or more tapered plug ends of relatively low tensile strength in conjunction with a shank of relatively high tensile strength; the formation of a take-up or compensating recess in one head; and in conjunction with the latter feature, in the formation of a testing passage communicating with said take-up recess; and in the provision of means for effecting the closure of said testing passage substantially as hereinafter set forth.

In the accompanying drawings, Figure 1, is a central longitudinal section of my improved stay bolt, both ends of which are provided with soft heads capable of being riveted; Fig. 2, is a central longitudinal section of a two piece stay bolt embodying my invention; Fig. 3, a central longitudinal section of the bolt illustrating a modification

of structure; Fig. 4, is a similar view showing another modification; Fig. 5, is a detail of one end of the shank shown in Fig. 3.

As is well known, the usual method of fastening rigid stay bolts to boiler plates is to use a straight threaded bolt and topeen or rivet over the ends thereof to make tight joints with the boiler sheets. This riveting of the ends has heretofore involved the use of a bolt of comparatively low tensile strength, such as iron, copper or copper alloy, and even then if the male and female threads do not fit perfectly, or the riveting is carelessly done, leaks are apt to occur. Furthermore, in order to attain the requisite degree of tensile strength the shanks of such bolts have heretofore been made of comparatively large diameter. On the other hand, steel stay bolts have been used, and would be used generally were it not for the difficulty involved in making tight joints with the ends thereof and the boiler plates. Hence a steel shank provided with ends that will insure tight joints affords many practical advantages which I attain by my structure of stay bolt. Since it is obvious that the smaller the diameter of steel shank the greater will be its flexibility, and hence the greater the lateral or bending strain it will stand, I am enabled to materially reduce the size and weight of the bolt and still retain the requisite degree of strength. This reduction in size and weight also lessens the cost of the stay bolts; and they occupy less of the water space between the boiler sheets as compared with those heretofore used, thereby facilitating the circulation of water, and as a result, rendering the temperature of the parts more uniform and obviating excessive strain on the shanks of the bolts.

The shank S is made preferably of metal of comparatively high tensile strength, and relatively small in diameter. Its inner end is formed with a male screw thread *s*, for engagement with the female screw thread *a*, in the socket head A, which latter is formed also with an external thread *a'*, for engagement (preferably) with a threaded hole tapped in the fire box plate F. The take-up recess *a''*, in the socket head A, is of sufficient depth to afford a margin of adjustment of length of bolt as a whole, to compensate for variations in distance between the fire box plate F and the shell B. My stay bolt is thus adjustable within itself after the socket

head A has been secured to the fire box plate F, so that a shank S of uniform and prescribed length may be used within certain limits or variations of distance between plates.

The socket head A, may be provided with a test or indicator passage a^2 , communicating with the take up recess a^2 , and closed by a plug p . This test passage a^2 , admits of the insertion of a gage for the purpose of ascertaining the extent of penetration of the threaded inner end s , of the shank into the socket head A, to determine for instance, if the shank S, is screwed into the head sufficiently to hold securely.

When the socket head A is to be riveted to the plate F as in Figs. 1 and 3, a "dolly bar" is introduced through the perforation b , in the plate B, to sustain said socket head A, during the operation.

The test passage a^2 , may be closed by plugs p , of various forms. In Fig. 1, a screw plug is used, while in Fig. 3, the plug is driven so as to spread laterally into a groove a^2 in the head. In Fig. 4, the test passage consists of a continuation of the take-up recess a^2 , closed by a threaded plug.

By making the test passage a^2 , and take-up recess of uniform diameter, with a continuous female thread for engagement with the male threads on the shank S, and by threading both ends of the latter, as shown in Fig. 4, both the outer head C and the socket head A, may be securely fixed and made tight in the plates F and B before the shank S is inserted,—the latter being introduced through the socket A. In such manner the shank is not subjected to strains which it otherwise would sustain and which are incident to the securing of the heads A and C in the plates F and G. By providing the inner end of the shank S with a tell-tale bore s' , the cracking or fracture of the shank S at this point would be indicated by the presence of water in the take-up recess a^2 , to be ascertained by the removal of the plug p .

I prefer to make either one or both of the heads A, C, tapering externally, with male threads for engagement with corresponding tapering female threads in the plates. Thus in Fig. 2, the socket head A, consists of a plug tapered and threaded externally in a direction opposite to the threaded external taper formed directly on the outer end of the shank S, a similar arrangement being shown in Fig. 4, excepting that the outer head C is in this case formed of a separate piece of metal softer than the shank S. In Fig. 3, only the outer head C is tapered. In this case, also, the head is welded around the flattened or spread end s^2 , of the shank S.

In the two piece form of bolt shown in Fig. 2, the riveting up of the ends is not

necessary, since the oppositely tapered heads insure tight joints.

It is to be noted that the shank S is of relatively small diameter as compared with the heads, the diameter being reduced in proportion to the degree of tensile strength of the metal used in the formation of the shank.

What I claim as my invention and desire to secure by Letters Patent is,

1. The combination in a stay bolt of the character designated, of a threaded metal shank of relatively high tensile strength and small diameter formed with a tell-tale bore in its inner end, an externally threaded socket head of less tensile strength formed with a female thread extending through said head for engagement with the male thread on the shank, and a screw plug engaging said female screw thread and closing the end of said head.

2. The combination in a stay bolt of the character designated, of a threaded metal shank of relatively high tensile strength and small diameter, and an externally threaded tapering socket head of less tensile strength formed with a female thread for engagement with the male thread of the shank, and with a take-up recess, with a test passage, and with a plug for closing said test passage.

3. The combination of a stay bolt of the character designated, a threaded metal shank of relatively high tensile strength and small diameter, formed with a tell-tale bore in its inner end, an externally threaded tapering socket head of less tensile strength, formed with a female thread for engagement with the male thread on the shank and extending through said head, and a screw plug engaging said female screw thread and closing the end of said head.

4. The combination of two oppositely disposed boiler plates and a joining device consisting of a head member of relatively low tensile strength screwed into an opening in one of said oppositely disposed plates, and a shank member of material of relatively high tensile strength removably engaging at one end one of said oppositely disposed boiler plates and removably engaging at its opposite end the aforesaid head member carried in the opposite of the said two boiler plates, substantially as described.

5. The combination in a stay bolt of the character designated, of a threaded metal shank of relatively high tensile strength and small diameter and an externally threaded socket head formed with a female screw thread extending through the head for engaging the male screw thread on the shank and a screw plug engaging said female screw thread and closing the end of said head.

6. The combination in a stay bolt of the character designated of a threaded metal

- shank of relatively high tensile strength and a small diameter formed with a tell-tale bore at its inner end, a hollow socket head threaded internally and externally for engagement with the threaded shank and with the shell of the boiler and a screw plug adapted to engage the internal thread of the plug and closing the outer end of the latter.
- 10 7. The combination in a stay bolt of the character designated, of a threaded metal shank of relatively high tensile strength and small diameter, and an externally threaded tapering socket head of less tensile strength formed with a female screw thread engaging with the male screw thread of the shank and extending through said head and a screw plug engaging said female screw thread and closing the end of said head.

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