

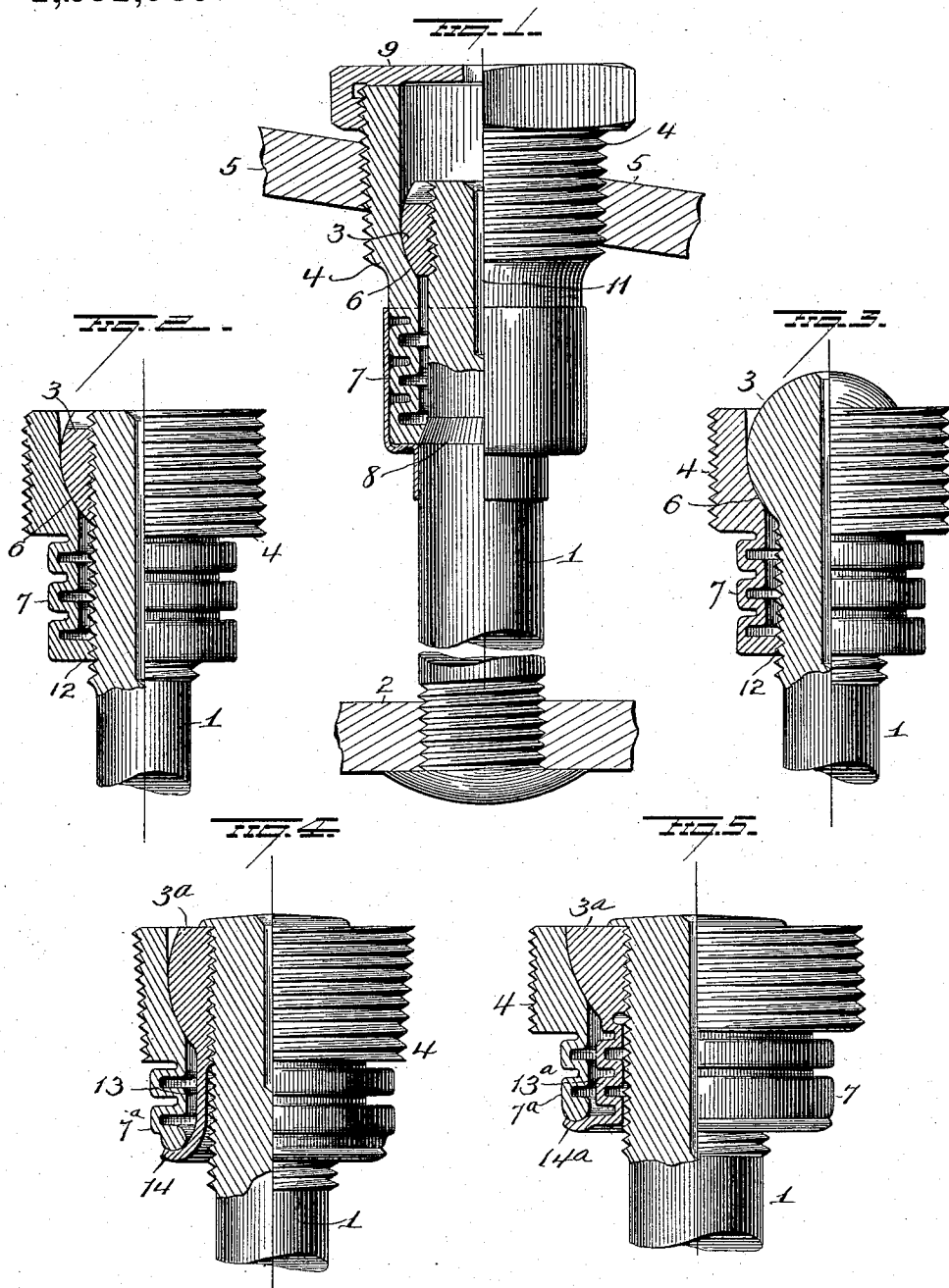
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STAY BOLT FOR BOILERS,

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, BENJAMIN E. D. STAFFORD and ETHAN I. DODDS, citizens of the United States, and residents of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Stay-Bolts for Boilers; and we 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.

Our invention relates to an improvement in stay bolts for boilers, the object being to provide a yielding coupling for one end of the bolt, whereby the latter will be free to follow the movements of the fire box sheet of the boiler without buckling or unduly straining either of the sheets.

A further object is to provide a construction designed to prevent scale getting between the bolt and the part of the bearing directly supporting the bolt head.

With these objects in view our invention consists in the parts and combinations of parts as will be hereinafter more fully explained.

Our invention further consists in the details of construction as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view partly in section and partly in elevation of our improvement, and Figs. 2 to 5 inclusive are views in section of modifications.

1 represents a rigid bolt one end of which is adapted for attachment to the inner sheet 2 of the fire box or boiler, and the other end threaded for the attachment of the head 3, the outer surface of which is spherical in shape. 4 is the sleeve, threaded externally at its outer end for attachment to the outer sheet 5, and provided internally with a curved seat 6 on which the head 3 of the bolt 1 rests, and which is shaped to conform to the shape of the head.

The sleeve 4 is provided at its inner end with an extension 7 which is circumferentially fluted as shown, so as to yield or give and act as a spring under longitudinal or lateral stresses to which the bolt may be subjected. The sleeve so constructed is preferably heat treated and cooled in oil so that the fluted or spring section thereof will retain its elasticity when exposed to the high

temperatures to which they are subjected in use.

The bolt 1 is provided at the inner free end of the spring extension of the sleeve, with a peripheral shoulder 8, having an inclined face against which the inwardly turned edge of the spring extension 7 abuts, the edge of said extension being beveled to conform to the face of the shoulder 8, so as to form a tight joint with said shoulder and thus prevent the passage of scale into the space between the bolt and the sleeve, above said shoulder.

The head 3 and shoulder 8 of the bolt normally rest on or against their respective seats, so that a pulling strain on the bolt falls solely on the head 3 and seat 6 which are rigid and unyielding, whereas a pushing stress, or lateral movement, falls on the free end of the spring extension which gives or yields to a limited extent and permits the bolt to move outwardly.

The outer open end of the sleeve 4 is covered by a cap 9 which may have a central opening for the escape of steam or water in the event the bolt should be broken adjacent its head, which is the point where they usually give way, the telltale 11 in the end of the bolt permitting the steam or water to escape into the sleeve.

In the construction shown in Fig. 2, the inner end of the spring extension is secured by threads 12 to the shank of the bolt, and in Fig. 3 it is similarly secured, and the head of the bolt is made integral with the bolt shank.

In Fig. 4 the bolt head 3^a is provided with an extension 13 having an outwardly turned outer edge 14 which rests against the inner free end of the spring extension 7^a, and in the construction shown in Fig. 5 the extension 13^a from the head 3^a is also provided with an outwardly turned outer edge 14^a to bear against the inner edge of the extension 7^a, and the extension itself is also fluted, so that with this construction, we get the combined spring action of the extension of the sleeve and also that of the extension from the head.

With each of the constructions above referred to, it will be apparent that pulling stresses on the bolt simply seat the head solidly in its unyielding seat in the sleeve, and it then acts as an ordinary flexible bolt of the Tate type. When the bolt elongates or is

forced outwardly due to movements of the inner sheet, the shoulder movable with the bolt, bearing against the inner end of the spring extension of the sleeve, compresses the latter sufficiently to compensate for the movement, and when the stress is relieved the spring action of the fluted extension forces or draws the bolt back to its normal position.

By means of the fluted extension to the sleeve, sufficient elasticity may be available to absorb or take care of all necessary longitudinal lateral and vibratory movements to which the bolt may be subjected, due to elongation of the bolt itself, or to longitudinal and lateral movement of the bolt due to outward or lateral movement or buckling action of the inner sheet and provides in effect for universal movement of the end of the bolt within the coupling.

If desired the fluted extension of the sleeve may be covered by the thin sheet metal jacket 15, shown in Fig. 1. This jacket embraces the fluted portion of the sleeve and also the bolt shank in rear of the fluted extension. It may be secured at its outer end to the sleeve, but is free at all other points so as not to interfere with the free contraction or expansion of the fluted extension, or the movement of the bolt within the same. This jacket assists in preventing the passage of scale between the bolt and sleeve and also prevents its lodgment within the outer grooves of the fluted portion. If desired the outer grooves of the fluted part may be filled with a grease which will not melt below 800°, and which will be retained in place by the jacket.

It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of our invention. Hence we would have it understood that we do not wish to confine ourselves to the exact construction and arrangement of parts shown and described except as required by the scope of the appended claims.

Having fully described our invention what we claim as new and desire to secure by Letters-Patent, is:—

1. In stay bolt construction, the combination of a sleeve adapted for attachment to a boiler sheet and having a seat for the head of a stay bolt, and a yielding extension at its inner end and a stay bolt having a head for said seat and also having means for engaging the free end of the yielding extension.

2. In stay bolt construction, the combination of a sleeve adapted for attachment to a boiler sheet and having a spring extension at

its inner end, and a stay bolt rigidly restrained against inward movement beyond its normal position and yieldingly restrained by said spring extension against outward movement.

3. In stay bolt construction, the combination of a sleeve threaded for attachment to a boiler sheet and having a spring extension at its inner end; and a curved seat adjacent its outer end, and a bolt having a head to engage said seat and also having means to engage the free end of the spring extension of the sleeve.

4. In stay bolt construction, the combination of a sleeve threaded for attachment to a boiler sheet, and provided at its inner end with an integral spring extension, and with an internal seat for the head of a bolt, a bolt having a head to rest on said seat and also provided with means to engage the inner free edge of the spring extension.

5. In stay bolt construction, the combination of a sleeve threaded for attachment to a boiler sheet and provided at its inner end with a yielding extension and a bolt having engagement with the free end of said extension whereby the bolt will be yieldingly restrained against outward movement.

6. In stay bolt construction, the combination of a sleeve having an internal curved seat and an inward extension the latter being yielding, and a bolt having a head to engage said seat and also provided with a shoulder to engage the free end of the yielding extension.

7. In stay bolt construction, the combination of a sleeve having an internal curved seat and an inward extension, the latter being yielding, and a bolt having a detachable head to rest on the curved seat and also provided with a shoulder to engage the inner free end of the yielding extension.

8. In stay bolt construction, the combination of a sleeve threaded for attachment to a boiler sheet and having a fluted yielding extension at its inner end, a bolt having engagement with the free end of said extension whereby the bolt will be yieldingly restrained against outward movement and a sheet metal jacket covering said fluted extension.

In testimony whereof, we have signed this specification in the presence of two subscribing witnesses.

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Witnesses:

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