No. 876,912. PATENTED JAN. 14, 1908.

H. A. PIKE.

FLEXIBLE STAY BOLT.

APPLICATION FILED OCT. 16, 1906.

Fig. 1.

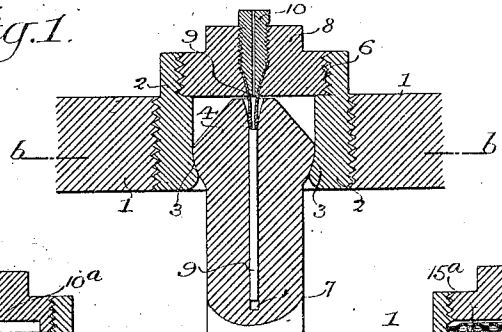


Fig. 3.

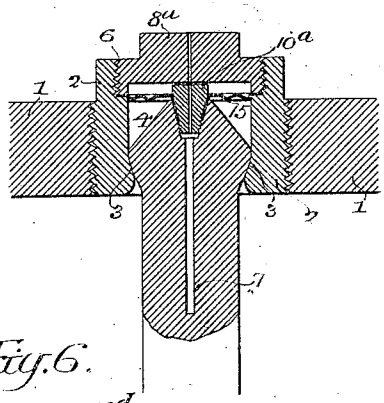


Fig. 4.

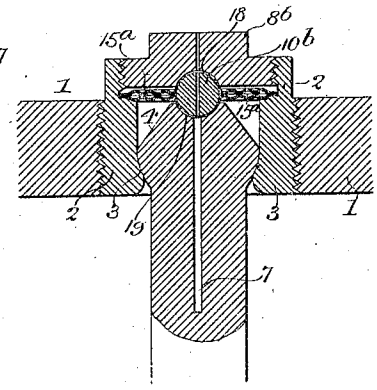


Fig. 6.

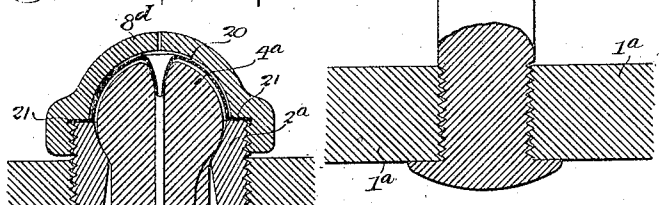


Fig. 2.

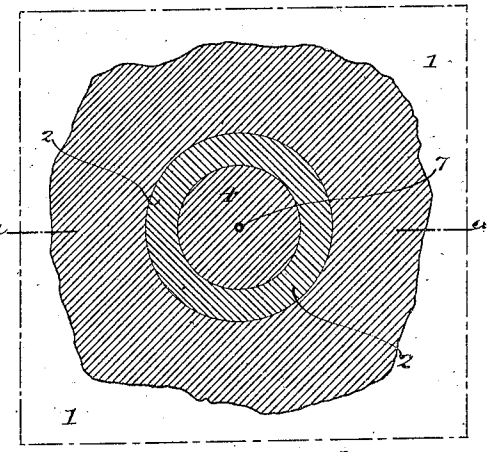
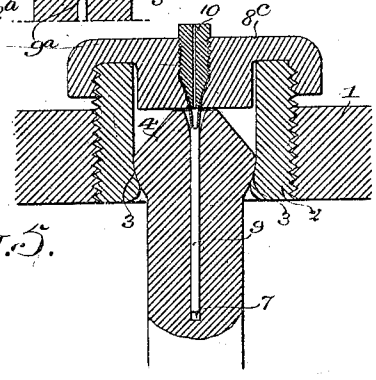


Fig. 5.



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UNITED STATES PATENT OFFICE.

HARVEY A. PIKE, OF NEW YORK, N. Y.

FLEXIBLE STAY-BOLT.

No. 876,912. Specification of Letters Patent. Patented Jan. 14, 1908.

Application filed October 16, 1906. Serial No. 339,223.

To all whom it may concern:

Be it known that I, HARVEY A. PIKE, a citizen of the United States, and a resident of New York city, New York, have invented certain Improvements in Flexible Stay-Bolts, of which the following is a specification.

My invention relates to securing or staying means for boiler-shells, and consists of certain improvements in structures of that character familiarly known as flexible stay-bolts; the object of my invention being to provide a structure of maximum efficiency and minimum cost, as well as one that is simple in its construction and mode of operation.

My invention is fully shown in the accompanying drawings, in which: Figure 1, is a sectional view of a stay-bolt embodying my invention, fitted in place, such view being taken on the line *a*—*a*, Fig. 2; Fig. 2 is a sectional plan view taken on the line *b*—*b*, Fig. 1, and Figs. 3, 4, 5 and 6, are sectional views similar to the upper part of Fig. 1, illustrating modifications embodying my invention.

As is well known, stay-bolts are employed for the purpose of securing and staying the sheets of steam boilers; their function being to provide proper and sufficient resistance to the exertion of internal pressure.

In the drawings, 1 represents the plate forming one wall of a boiler-shell into which is tapped a sleeve-plug 2 suitably threaded for the purpose, said sleeve-plug having an internal seat 3 for the head 4, of a bolt 5, and being internally threaded at 6. The bolt is centrally bored for a short distance, as shown at 7, for a purpose to be described. Fitting the internally threaded portion 6 of the sleeve-plug 2, is another plug 8, to the lower part of which a tube 9 is secured, and this tube is adapted to enter the central bore 7 of the bolt. The lower part of the opening in the plug 8 is contracted, and the upper end of said tube 9 is expanded into the same by means of a screw-plug 10, threaded into said plug 8; said plug 10 being also centrally bored at 11 in line with the bore of the tube 9, and these parts are shown in their assembled position in Fig. 1. The opposite end of the bolt 5 is threaded into the plate 1^a forming the other wall of the boiler-shell, the projecting portion of the same being riveted down as shown in the lower part of Fig. 1.

The tube 9 is of material that will expand to a greater degree than the metal of the bolt, and consequently as soon as the parts are heated by the steam generated within the boiler, such tube hugs tightly the wall of the bore 7 within said bolt 5. I prefer to use copper as the material for this tube, although it will be understood that other metals may be used without departing from my invention. When the parts are assembled, any leakage of steam past the seat for the bolt-head within the sleeve-plug will be stopped by the tube 9 as it will be pocketed in the space between the head of the bolt and plug carrying said tubular member.

In practice the expansion of the shell of the boiler, due to the heat and pressure within the same, will tend to distort said shell, but this is compensated for by the ball-and-socket joint between the head of the bolt and the seat 3 for the same formed in the sleeve-plug 2. Should the pressure within the boiler be so great as to effect sufficient distortion to break the bolt adjacent its head, the steam will find its outlet through the tube 9 within said bolt and the openings in the several plugs in line therewith.

I prefer to form the head of the bolt of the shape shown in Fig. 1; being substantially the same as a rivet head, as less material will be required and such structure is easier to make and finish.

In Fig. 3 I have shown a modified form of structure embodying my invention, in which I employ a flexible metallic washer 15. The bolt is substantially the same as that illustrated in Fig. 1, except that its upper end is provided with a recess threaded at the bottom; the bore 7 extending therefrom. The washer rests on a ledge within the sleeve-plug at the base of its internally threaded portion, and has a central flanged portion 16 to enter the recess in the head of the bolt, such flange being engaged by a plug 10^a threaded into said bolt recess. A plug 8^a fits the internally threaded portion 6 of the sleeve-plug 2 and serves as a guard for said internal plug 10^a holding the washer in place. Both of the plugs 8^a and 10^a are centrally bored in line with the central bore of the bolt.

In the structure shown in Fig. 4, two flexible metallic washers 15^a are employed, each having outwardly extending central flanges 16^a, and between these flanges a spherical member 10^b is mounted. A plug 8^b is provided for engagement with the sleeve-plug 2; said plug having a semi-circular recess 18.

The bolt is also provided with a semi-circular recess 19, and into these recesses the flanges of said washers fit; the central bore 7 extending from the recess 19. The spherical member lies between these flanges and when the plug 8^b is secured in place, it engages the flange of the upper washer overlying said spherical member, and upon the continued movement of said plug, the flanges of said washers will be pressed by the engagement of the several parts into close contact with said spherical member.

In lieu of having the sleeve-plug with an internally threaded portion 6 for the reception of a screw-plug, as shown in Figs. 1, 3 and 4, such internal threads may be omitted and the external threads of said sleeve-plug extend the entire length of the same, as indicated in Figs. 5 and 6; cap-plugs being employed with the same for confining the several parts of the structure in place.

In Fig. 5, I have shown a structure embodying my invention which is substantially like that shown in Fig. 1, except that a cap-plug 8^c is employed instead of the screw-plug 8. The parts are otherwise the same.

In the structure shown in Fig. 6, however, the head 4^a of the bolt is substantially spherical in shape and the shoulders of said head rest in a suitable seat 3^a formed within a screw plug 2^a which is slightly different than those shown in the other figures. The position of the seat may be changed and formed at any desirable point within such sleeve-plug, the essential point being to provide for movement between the head of the bolt and the seat for the same. In this particular instance, the head of the bolt projects above the sleeve-plug and a semi-circular cap-plug 8^d is employed therewith, engaging the upper portion of the threads of said sleeve-plug. The bolt is bored centrally in the same manner as indicated in the structures shown in the other figures, and the cap-plug is also bored in line therewith. Disposed within the bore of the bolt is a tubular member 9^a, which in this instance has a semi-circular cap-like portion 20, disposed between the bolt-head and the cap-plug 8^d, and having a flanged portion 21 lying between the top of the sleeve-plug and an internal shoulder of the cap-plug. This tubular member serves the same purpose as those indicated in the other views.

In all instances the purpose of my invention is to provide a connection for the head of the bolt that will permit movement; to provide means for trapping any steam that may pass the seat of bolt, such means being of a flexible character so as to avoid interference with any movement that may be imparted to the bolt or its head due to stresses or strains within the boiler shell, and at the same time to insure that any breakage of the bolt due to excessive strain and internal pressure will immediately permit the escape of steam.

I claim:

1. A stay-bolt structure, comprising the usual bolt, a sleeve-plug fitting the plate of a boiler-shell and having a seat for said bolt-head, said bolt having a central bore, means carried by the sleeve-plug for normally retaining said bolt in place, and a flexible connecting member between said retaining means and the bolt.

2. A stay-bolt structure, comprising a bolt having the usual threaded end and a head at the opposite end, a sleeve plug fitting the plate of a boiler-shell and having a seat for said bolt-head, said bolt having a central bore, means carried by the sleeve-plug for normally retaining said bolt in place, said means having an aperture communicating with the bore of the bolt, and a flexible connecting member between said retaining means and the bolt.

3. A stay-bolt structure, comprising the usual bolt, a sleeve-plug fitting the boiler-shell and having a seat for the head of said bolt, a separate threaded member engaging said sleeve-plug for normally retaining the bolt in place, and a flexible connecting member between said retaining members and the bolt.

4. A stay-bolt structure, comprising a bolt suitably secured at one end to one portion of a boiler-shell and having a head at the other end of the same, a sleeve-plug fitting the other shell and having a seat for the head of said bolt, a separate threaded member engaging said sleeve-plug for normally retaining the bolt in place, and a flexible connecting member between said retaining member and the bolt.

5. A stay-bolt structure, comprising the usual bolt, a sleeve-plug fitting the boiler-shell and having a seat for the head of said bolt, said bolt being centrally bored, an independent plug engaging said sleeve-plug for normally retaining the bolt in place, and a tube extending from said retaining plug and entering the bore of the bolt.

6. A stay-bolt structure, comprising a bolt suitably secured at one end to one portion of a boiler-shell and having a head at the other end of the same, a sleeve-plug fitting the other shell and having a seat for the head of said bolt, said bolt being centrally bored, an independent plug engaging said sleeve-plug for normally retaining the bolt in place, said independent plug having a central bore, and a tube extending from said retaining plug and entering the bore of the bolt.

7. A stay-bolt structure, comprising the usual bolt, a sleeve-plug fitting the boiler-shell and having a seat for the head of said bolt, said bolt being centrally bored, an independent plug fitting said sleeve-plug for normally retaining said bolt in place, a tube

extending from said independent retaining plug and entering the bore of the bolt, and means for securing the upper end of said tube in said independent plug.

8. A stay-bolt structure, comprising a bolt suitably secured to one portion of a boiler-shell and having a head at the other end of the same, a sleeve-plug fitting the other shell and having a seat for the head of said bolt, said bolt being centrally bored, an independent plug fitting said sleeve-plug for normally retaining said bolt in place, a tube extending from said independent retaining plug and entering the bore of the bolt, and a centrally bored screw-plug for securing the upper end of said tube in said independent plug.

9. A stay-bolt structure, comprising a headed bolt, a sleeve-plug tapped into the boiler-shell and having a seat for the head of said bolt, said bolt being bored, a plug fitting the interior of the sleeve-plug, and a tube fitting the bore of the bolt and having its outer end confined by the plug fitting the sleeve-plug.

10. A stay-bolt tructure, comprising a headed bolt, a sleeve-plug tapped into the boiler shell and having a seat for the head of said bolt, said bolt being bored, a supplemental plug fitting the interior of the sleeve plug, a flexible tube fitting within said bore and having its outer end extending into said supplemental plug, and means for confining said end thereto.

11. A stay-bolt structure, comprising a sleeve-plug tapped into the boiler-shell and having an internal seat, a bolt having a head adapted to said seat, retaining means for the sleeve plug serving to hold the bolt in position, and a flexible closing member between said bolt and said retaining means.

12. A stay-bolt structure, comprising a sleeve-plug tapped into the boiler-shell and having an internal seat, a bolt having a head adapted to fit said seat, a supplemental plug fitting within the sleeve-plug and serving to retain the bolt in place, and a flexible member forming a joint between said supplemental plug and said bolt, said plug being apertured and communicating with the interior of said flexible joint forming means.

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

HARVEY A. PIKE.

Witnesses:
MURRAY C. BOYER,
JOS. H. KLEIN.