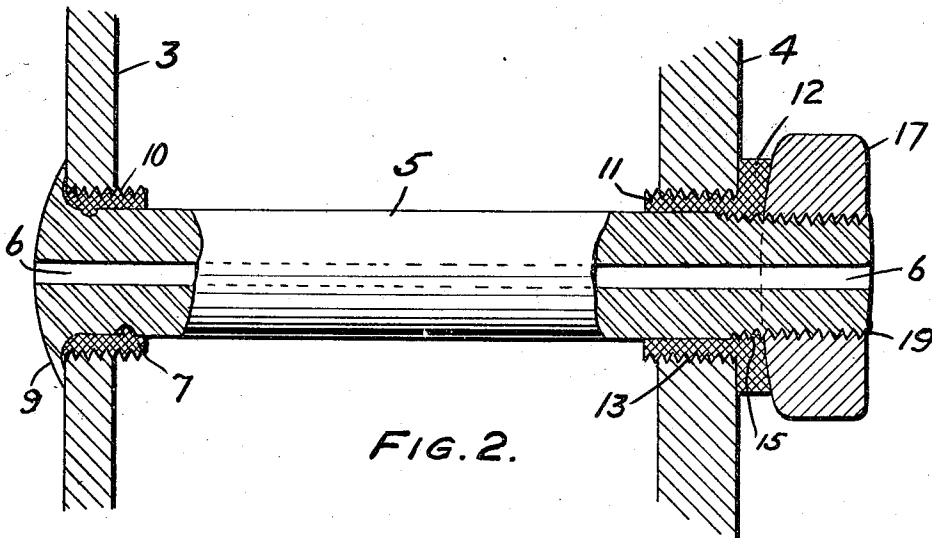
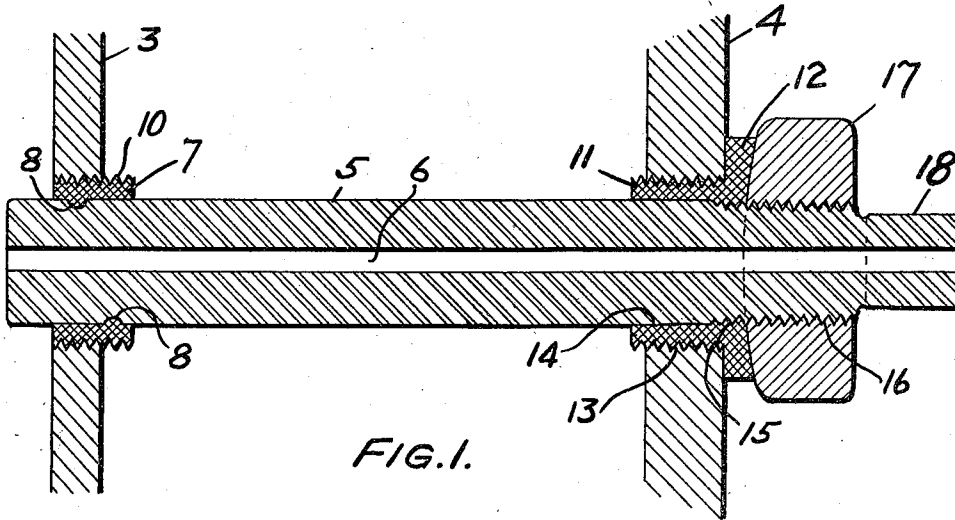


W. JENKINS.
STAY BOLT.
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1,300,399.

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WITNESS:

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UNITED STATES PATENT OFFICE.

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STAY-BOLT.

1,300,399.

Specification of Letters Patent.

Patented Apr. 15, 1919.

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To all whom it may concern:

Be it known that I, WESTON JENKINS, a citizen of the United States, residing at Rome, county of Oneida, and State of New York, have invented certain new and useful Improvements in Stay-Bolts, of which the following is a specification.

This invention has reference to an improved stay-bolt construction such as is commonly used in locomotive boilers and an improved method of making the same.

The first of the objects of this invention is the provision of a stay-bolt which will have a maximum of strength with a minimum of material and which will in fact for a given diameter present a bolt of much greater strength than the stay-bolt made according to the usual manner. Another object of the invention is the provision of an improved cushioning means between the stay-bolt and the fire box sheet in which it is mounted so that it will withstand a much more extreme amount of vibration and strain than the ordinary form of construction and will have in its integral structure a limited capacity of flexure such as will avoid the necessity of using what are known as flexible stay-bolts.

Another object of this invention is the provision of a composite stay-bolt constructed preferably of an iron core or central part and provided with seat ferrules preferably of copper or other similar metal which will facilitate the introduction of the bolt into the fire box sheet or sheets and will, at the same time serve to provide a non-corrosive and partial cushioning protection for the harder metal of the core of the bolt.

Another object of this invention is the provision of a bolt in which the length of the same substantially from inner to outer sheet and for a portion at least of the distance within the sheets will be free of the destructive action of threads whereby the core portion of the bolt will not be so liable to fracture from vibratory strains.

Another object of the invention is the provision of a bolt which will have an increased measure of integral flexibility and yet at the same time may provide a continuous aperture from end to end of the bolt so as to allow ready inspection of the same without the necessity of the removal of any caps or other parts which render the inspection of

certain well known types of flexible bolts a matter of considerable difficulty.

The above, as well as such other objects as may hereinafter appear, I attain by means of a construction which I have illustrated in preferred form in the accompanying drawings, wherein—

Figure 1 is a sectional view showing one of my improved stay-bolts in initial position within the fire box sheet and outer or wrapper sheet and before it has been riveted in place, while Fig. 2 shows the bolt in final applied condition.

Referring now more particularly to Fig. 1, it will be seen that I have therein indicated the fire box sheet 3, an outer sheet 4, and a stay-bolt which is composed of a central part or bar 5, preferably of wrought iron, and having an aperture in the center throughout its length indicated at 6, which aperture may be formed in any manner but is preferably made in the original construction of the bar off which the bar 5 is cut. Adjacent to the inner end of the bar 5 I provide a ferrule or enlargement 7 which is preferably of copper or other similar metal and which may be either shrunk on or rolled or pressed into position so as to engage the bar 5 with certain parts forced into depressions as indicated at 8 arranged at intervals around the bar to serve to hold the ferrule against endwise or rotary motion. The extent of the projection of the bar 5 inside of the ferrule 7 is made sufficient so that when the end of the stay-bolt is riveted over, as indicated in Fig. 2 at 9, it will project beyond the outer periphery of the ferrule 7 and afford strengthening engagement in the plane of the metal of the sheet 3 so that the soft character of the metal in the ferrule 7 will not permit the bar 5 to be pulled out by the heavy pressure which it has to sustain.

The ferrule 7 is made of a sufficient thickness to provide ample room for the threads which engage the sheet 3 and also to permit some flow of the copper or other soft metal outwardly during the riveting of the part 9 as a kind of seal or washer between the part 9 and the sheet 3 which insures a more perfect joint.

At the other end of the bar 5 I provide another ferrule 11 of copper or like material which has a flanged portion 12 and a thread

13 to engage with the sheet 4, but which upon its inner surface embraces the bar 5 for most of its length without any thread as indicated at 14; there being an overlap, however, at 15 such as will form engagement with perhaps a couple of turns of the thread 16 on the outer end of the bar 5 which extends beyond the sheet 4. Engaging the thread 16 I provide a nut 17 which has preferably a ball and socket bearing against the outer surface of the copper ferrule 11 and will serve to pinch the flange 12 between the nut 17 and the sheet 4.

The stay-bolt is made in the first instance with a downwardly projecting squared end 18 or other suitable means for screwing it into place and such end after the bolt is properly placed is to be cut off and the outer surface riveted over as at 19, leaving a continuous tubular passage throughout the length of the stay-bolt and providing a construction which will be tight at all points and which throughout the length of the part which has to carry the strains will be without any threads and will stand on this account and because of its protection by the copper ferrules a very much larger amount of vibratory and other undue strains. The fact that the outer surface of the bar 5 is left with its original scale formation also adds to its durability and reduces the liability to corrosion where it is exposed to contact with the water between the sheets 3 and 4.

It will be seen that by reason of the character and disposition of the aperture 6 a tool may be pushed entirely through the stay-bolt to make sure that the passage therein is open and in condition to properly register any fracture which may occur, and this operation can be accomplished in this structure without the removal or disarrangement of any caps or other parts whatever and also from the outside of the fire box. It will also be observed that if, from undue strains, some leak should start between the copper ferrules and the sheets or either of them, the nut 17 can be slightly tightened and the leak very readily stopped.

In actual vibratory tests which I have made of structures constructed in accordance with the above described improvement, I have found that the durability of the bar 5 by the arrangement of the copper ferrule without the threaded engagement of the same with the bar 5 at its point of flexure is increased many times over as compared with stay-bolts of ordinary construction in which the bar itself is threaded on the outer surface and forms engagement with the threaded interior of the aperture in the sheet, in which last-mentioned arrangement not only is the toughness and protective effect of the scale surface of the bar lost (but as is well known, the base of the thread groove tends in itself to present a point

that initiates the spread of a transverse fracture.

I have found by experiments that the presence of the copper arranged as shown will provide for quite an appreciable lateral working of the two sheets without tendency to fracture the metal of the bolt proper which being of wrought iron has a greater degree of strength than the all-copper stay-bolt which is in common use abroad. Examination of the drawing will show that the iron of the bolt is not threaded at any point where it is subject to flexing strains and experience has demonstrated that when given a vibratory test iron which has not been machined will stand a far greater number of vibrations than iron which has been subjected to the machining action of a cutting tool. A stay-bolt manufactured in accordance with my invention is decidedly inexpensive to construct when compared with the all-copper stay-bolt referred to or with other types of so-called flexible stay-bolts in use in the United States.

I claim:—

1. A stay-bolt having a core of hard metal and a bearing for engagement with the boiler sheet of a relatively softer metal whereby to cushion the bolt against flexing strains.

2. A stay-bolt having a core of hard metal and a relatively soft metal ferrule for engagement with a boiler sheet secured upon the core without threaded engagement at the inner end of the ferrule.

3. A stay-bolt having a hard metal core, a tubular opening through the core, a relatively soft metal ferrule adjacent to each end of the core secured to the core without threaded engagement at the inner ends of the ferrule, the ferrules being constructed for threaded engagement with the boiler sheets, and the core having its inner end projecting beyond the soft metal ferrule for riveting over the ferrule in securing the stay-bolt in place.

4. A stay-bolt having a hard metal core, a tubular opening through the core, a relatively soft metal ferrule adjacent to each end of the core secured to the core without threaded engagement at the inner ends of the ferrule, the ferrules being constructed for threaded engagement with the boiler sheets, and the core having an extension at its outer end provided with a nut constructed to bear against a flange of the ferrule.

5. A stay-bolt having a core of hard metal of a length greater than the distance between the boiler sheets, a relatively soft metal ferrule on the core adapted for engagement with the boiler sheet, and a nut having threaded engagement with the core adapted to compress the ferrule.

6. A stay-bolt having a core of hard metal of a length greater than the distance be-

tween the boiler sheets, a shouldered soft metal ferrule on the core adapted for engagement with a sheet, and a nut having threaded engagement with the core and adapted to take against the shouldered portion of the ferrule. 5

gagement with a boiler sheet, said ferrule having threaded engagement at its outer end 10 only with the core and the remaining contacting portions of the ferrule and core being relatively smooth.

In testimony whereof I have hereunto signed my name.

7. A stay-bolt having a core of hard metal and a relatively soft metal ferrule for en-

WESTON JENKINS.

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