Aug. 7, 1928. 1,680,229

W. POLLOCK

FLEXIBLE STAY BOLT

Filed Sept. 8, 1926 2 Sheets-Sheet 1

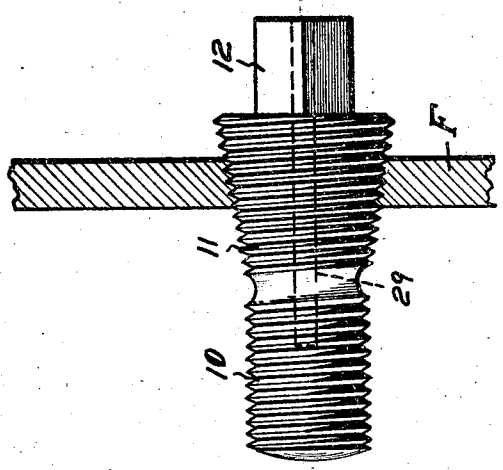
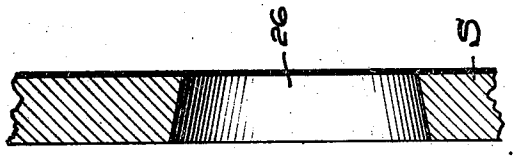


Fig. 1.



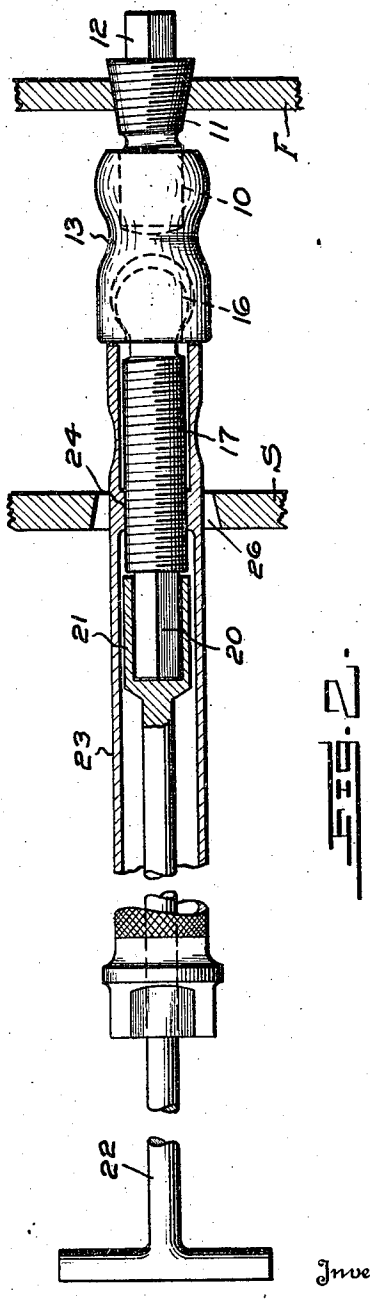


Fig. 2.

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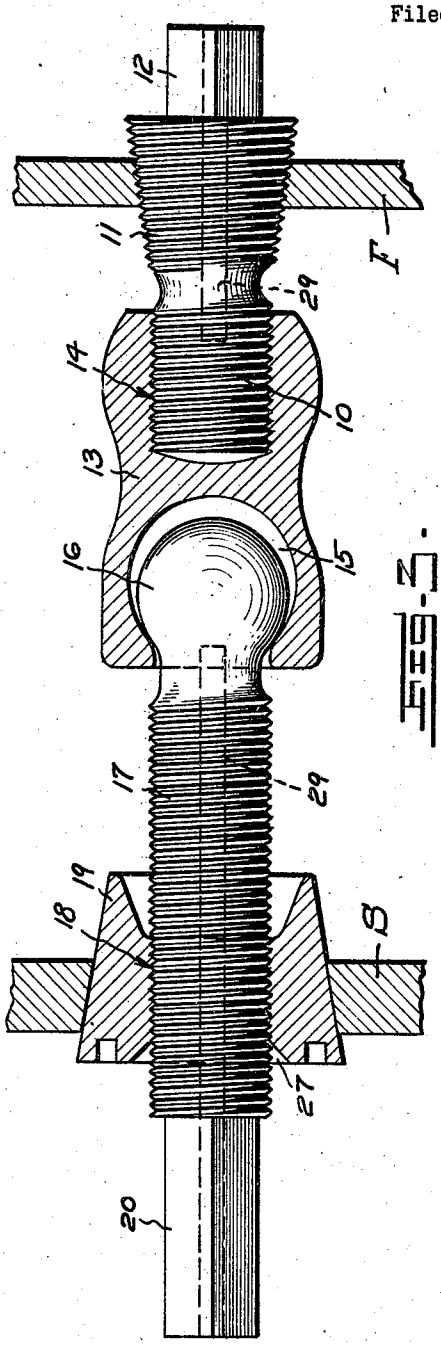


Fig. 3.

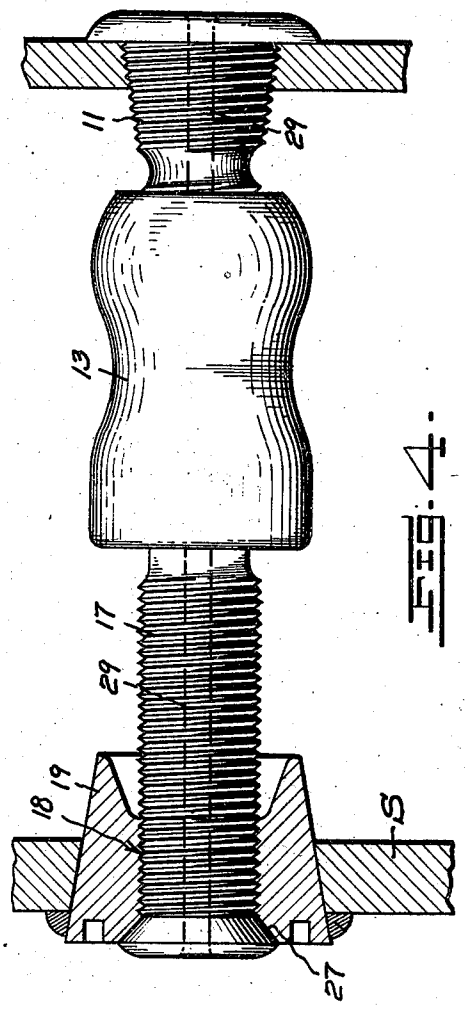


Fig. 4.

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UNITED STATES PATENT OFFICE.

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FLEXIBLE STAY BOLT.

Application filed September 8, 1926. Serial No. 134,256

This invention relates to stay bolts such as are used in locomotive and other boilers to hold the fire box in proper spaced relation within the boiler shell.

It has long been recognized that the connection between the fire box of a boiler, especially in locomotive boilers, must be of flexible nature so as to permit a certain amount of movement of the fire box sheets relative to the wrapper sheet or "wagon top" while yet restraining this relative movement within due bounds. Practically all modern locomotive boilers are thus constructed and the flexibility is sought to be obtained by, so-called, flexible stay bolts.

As examples of such flexible stay bolts attention is first called to the type shown in the patent to Dodds, No. 1,393,351, of October 11, 1921. In this type one end of the bolt is screwed into the fire box sheet and the other end connected to the wrapper sheet by a ball and socket joint. This type is not truly flexible since the rigid connection requires bend of the bolt itself to permit unequal expansion or stretching of the sheets. A second type is that shown in the patent to Flannery, No. 1,359,587, of November 23, 1920, in which both ends of a bolt are supported after the manner of a ball and socket joint and the bolt is thus truly flexible. However, the socket at the wrapper sheet end is formed directly in that sheet and cannot be kept tight so that it is necessary to weld a cap over that end to keep the boiler from leaking at each stay bolt. Consequently the usual tell tale holes to indicate a broken bolt cannot be used. A third type which is also flexible is shown in the patent to Pitkin, No. 1,430,321, of September 26, 1922, but in this type the straight thread at the fire box end prevents water and steam tightness being assured at that end while the tapered plug and thread at the wrapper sheet end renders difficult the fitting of the parts at that end.

The principal objects of the present invention are to provide an improved form of flexible stay bolt wherein the objections to former types of bolts such as noted above will be eliminated and wherein the construction is such that perfectly tight joints are formed both at the fire box and the wrapper sheet without preventing the use of tell tale holes.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and specifically claimed.

In the accompanying drawings like characters of reference indicate like parts in the several views, and:

Figure 1 is a section through portions of the fire box and wrapper sheets of a boiler showing the first step in the application of my stay bolt.

Figure 2 is a similar view to a somewhat smaller scale showing the second step in such application.

Figure 3 is a view with the bolt partly in section and showing the parts fully assembled and ready for finishing.

Figure 4 is a view similar to Figure 3 showing the finished bolt.

As here shown there is indicated a portion F of a fire box sheet and a portion S of a boiler shell or wrapper sheet.

The stay bolt itself consists of three parts; namely, a fire box section, an intermediate section and a boiler shell section. The fire box section consists of a body having one end of general cylindrical form and threaded as at 10, an intermediate tapered and threaded part 11 formed with the smaller end of the tapered portion adjacent the straight threaded part 10, and having the remaining end squared as at 12 to receive a rotating device such as a wrench or the socket of an electric or air bolt screwing machine.

The intermediate section 13 has at one end a threaded socket 14 to receive the threaded end 10 and, at its other end, is provided with a somewhat elongated ball socket 15.

The remaining portion of the bolt has a ball end 16 fitting in the socket 15 to rotate freely and swing universally within limits. The body 17 of this part is of general cylindrical form and is threaded to fit in the cylindrical and threaded opening 18 of a tapered plug 19 having its smaller end toward the head 16. The remaining end 20 of this section of the bolt is squared to receive the squared socket 21 of a wrench 22 forming part of the means by which the bolt is applied. A sleeve 23 having a threaded portion 24 and a wrench receiving head 25 forms the remainder of the bolt applying means.

In using the device the sheet F is drilled and taper tapped to receive the tapered part 11. Similarly the sheet S is drilled and reamed as at 26 to receive the plug 19. The fire box section of the bolt is now screwed in place from inside the fire box, either manually or by machine, as shown in Figure 1. Next, the sleeve 23 is slipped over the shell end of the bolt until the square 20, which is made sufficiently long for the purpose, can be engaged by the socket 21 after which the sleeve and the wrench are relatively rotated so that the sleeve is forced tightly against the intermediate member as shown in Figure 2. The intermediate member, carried by the sleeve is now inserted through the opening 26 and the intermediate member is screwed tightly on the part 11. After this the sleeve is unscrewed by the aid of the wrench 22, which is used to prevent rotation of the shell end of the bolt, and the plug screwed on this shell end until it fits water and steam tight in the opening 26, the plug being preferably welded as at 27 as a matter of precaution.

After as many of the bolts have been applied as desired and thus drawn up tightly the wrench 22 may be again applied and rotated to unscrew each part 17 from its plug to whatever extent may be desired to allow proper play as, for instance, one half turn. Finally, the projecting ends are cut off and riveted as shown in Figure 4, the plug 19 being recessed at 28 for this purpose.

It will be noted that the connection with each sheet is tapered so that it is substantially impossible for a bolt to pull out of either sheet and this is an especially valuable point at the fire box end where the riveting sometimes burns off or loosens. Also it will be noted that this construction does not in any way interfere with the tell tale holes 29.

Having thus described the invention, what is claimed as new, is:

1. A boiler stay bolt comprising an end section having a central tapered and threaded portion, a straight threaded end portion and a wrench receiving opposite end portion; an intermediate section having a threaded socket in one end receiving the threaded end portion and having a ball socket in the remaining end; a second end section having a straight threaded body, a ball end held in said ball socket and a remaining end portion adapted to receive a wrench; and a tapered plug screwed on the last mentioned straight threaded portion, the smaller ends of the tapered threaded portion and of the plug confronting each other.

2. A boiler stay bolt comprising an end section having a central tapered and threaded portion, a straight threaded end portion and a wrench receiving opposite end portion; an intermediate section having a threaded socket in one end receiving the threaded end portion and having a ball socket in the remaining end; a second end section having a straight threaded body, a ball end hold in said ball socket and a remaining end portion adapted to receive a wrench; and a tapered plug screwed on the last mentioned straight threaded portion, the smaller ends of the tapered threaded portion and of the plug confronting each other, said end sections having tell tale holes extending from their remote ends towards their adjacent ends and terminating in spaced relation to said adjacent ends.

In testimony whereof I affix my signature.

WILLIAM POLLOCK.