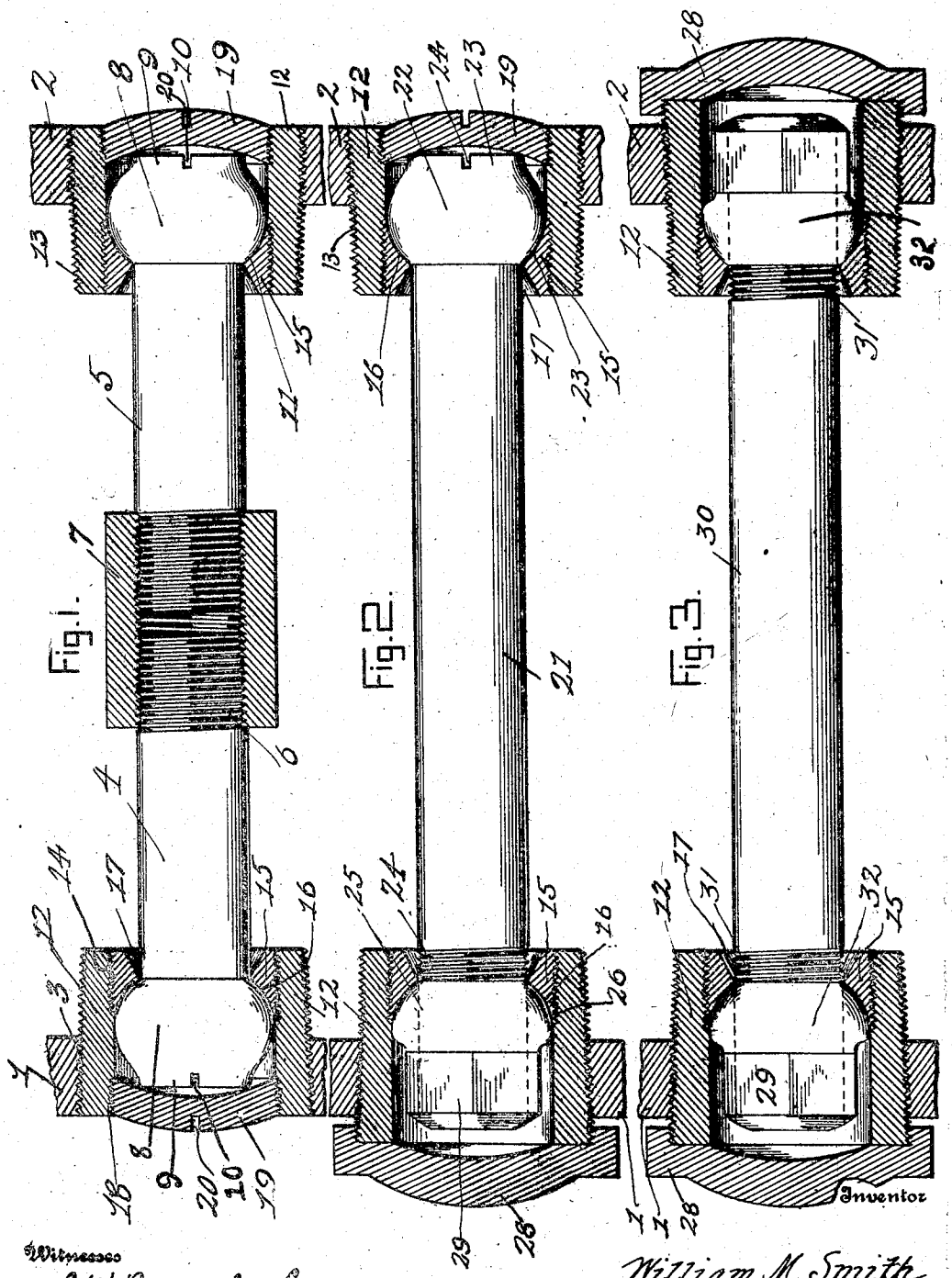
W. M. SMITH.

STAY BOLT.

APPLICATION FILED MAY 7, 1909.

930,810. **Patented Aug. 10, 1909.**



Witnesses:
C. W. Reichenbach.
W. Lamm Bryan

Inventor
William M Smith
By
A. M. Wilson
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM M. SMITH, OF TURTLE CREEK, PENNSYLVANIA.

STAY-BOLT.

No. 930,810. Specification of Letters Patent. Patented Aug. 10, 1909.

Application filed May 7, 1909. Serial No. 494,691.

To all whom it may concern:

Be it known that I, WILLIAM M. SMITH, a citizen of the United States, and residing at Turtle Creek, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Stay-Bolts, of which the following is a specification.

This invention relates to that class of stay bolts which are used for the purpose of staying the sheets of locomotive and other steam boilers and the object thereof is to provide a stay bolt with means in a manner as hereinafter set forth and at each end of the bolt whereby a steam tight connection is had between the boiler sheets and the ends of the bolt and furthermore whereby the necessary degree of flexibility for the bolt is obtained to overcome distorting or breaking of the bolt due to expansion of the boiler sheets when building up the fire or to high pressure steam.

Further objects of the invention are to provide a flexible stay bolt which shall be simple in its construction, flexing when occasion so requires, durable, efficient in its use, conveniently adjustable, readily set up in operative relation with respect to the sheets of the boiler, and inexpensive to manufacture.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings, wherein like reference characters denote corresponding parts throughout the several views: Figure 1 is a side elevation, partly in longitudinal section, of a flexible stay bolt in accordance with this invention showing the adaptation thereof in connection with the inner and outer sheets of a boiler, and, Figs. 2 and 3 are similar views of modified forms.

Referring to Figs. 1, 2 and 3, 1 indicates the outer sheet of a boiler and 2 the inner sheet, the said sheets 1 and 2 are provided with openings 3, the openings in the sheet 1 being arranged opposite the openings in the sheet 2.

Referring to Fig. 1 of the drawings, the shank of the bolt is formed of two sections 4, 5, respectively, each of the said sections is provided at its inner end with threads 6 with which engage a threaded coupling sleeve 7 whereby the said sections 4 and 5 are adjustably coupled together. Each of the sections 4 and 5 at its outer end is formed with a rounded head 8 having an annular protuberance 9 grooved as at 10 for the reception of a suitable tool to adjust a section of the shank so as to increase or decrease the length of the bolt when occasion so requires. The inner portion 11 of the periphery of the head 8 constitutes a bearing surface and is capable of shifting upon its bearing, the latter to be hereinafter referred to, during the expansion of the boiler sheets whereby breakage of the bolt will be prevented. The bearings for the heads 8 of the sections 4 and 5 of the shank consist of hollow plugs 12 which are formed with peripheral threads 13 for engagement with the threaded walls of the openings 3 whereby the said plugs 12 are secured to the boiler sheets 1, 2. The outer ends of the plugs 12 are flush with the outer faces of the sheets 1, 2. The plugs 12 are open from end to end, and are of a length as to project inwardly beyond the inner faces of the said sheets. The internal face of each of the plugs 12 at its inner end is threaded as at 14 with which engages a peripherally threaded hollow annular member 15. The internal face of each of the said members 15 is provided with an annular seat 16 which is curvilinear in cross section. Upon the said annular seat engages the bearing surface 11 of a head 8 of one of the sections of the shank. The remaining portion of the internal face of the annular member 15 is flared as at 17 to provide a clearance to allow of the shifting of a section of the shank of the bolt during the flexing of the bolt due to the expansion of the boiler sheets. By setting up the annular members 15 in the manner as stated, they are removably secured to the plugs 12 so that when worn, they can be

readily removed and new ones substituted. The internal face of each of the plugs 12 at its outer end is threaded as at 18 and with the said threads 18 engage a threaded closure 19, the latter being grooved as at 20 for the reception of a suitable instrument to facilitate the positioning of the closure in the plug or the removal of the closure from the plug.

Referring to Fig. 2 of the drawings, the shank of the bolt which is indicated by the reference character 21 is formed of one piece and has one end thereof provided with a head 22 formed with a protuberance 23 grooved as at 24 for the same function as the groove 10 hereinbefore referred to. The head 22 is formed with a bearing surface 23. The head 22 is seated in a bearing of a construction similar to that in which the head 8 is seated, like reference characters being used for the elements of the bearing for the head 22 as those used for the elements of the bearings for the heads 8. The other end of the shank 21 is screw-threaded as at 24 for the reception of the removable head 25 having rounded inner portion as at 26 which constitutes a bearing surface and engages the annular seat 16 of the annular member 15. The bearing for the head 25 is of the same construction as that illustrated for the heads 8 or the head 22. The plug 12 in which is mounted the head 22 extends from the outer face of the sheet 1 and is closed through the medium of a cap 28. The removable head 25 has its outer portion squared as at 29 for the reception of a suitable tool for the purpose of positioning the head 25 upon the threaded end 24 of the shank 21 so as to increase or decrease the length of the bolt when occasion so requires. If desired, the head 25 can be positioned by hand, as the outer squared end 29 of the head enables it to be readily gripped by the fingers.

Referring to Fig. 3 of the drawings, the shank of the bolt is indicated by the reference character 30, and is threaded at each end as at 31 for the reception of the removable heads 32 which are constructed in a manner similar to the head 25. The manner of mounting the heads 32 in the boiler sheets 1 and 2 is the same as that set forth in connection with the mounting of the head 25 and it is thought unnecessary to specifically describe the mountings under such circumstances. By providing the two removable heads 32, the adjusting of the bolt so as to increase or decrease its length can be had from either end thereof.

By providing each end of the bolt with a head whether removable or fixed, and associating with each of the heads a seat upon which the head can be shifted, provision is made for the flexing of the bolt so as to overcome breakage when either the inner or the outer boiler sheet expands. Furthermore owing to the manner in which the bolt is connected with either one of the boiler sheets, it can be readily removed or positioned at any time without destroying or removing the hollow plugs. By providing the hollow plugs which slightly taper, it is obvious that they can be readily positioned in the screw-threaded openings of the boiler sheets and that if through some cause, the bolt should become damaged, it can be readily removed without necessitating the removal of the plugs, these latter can then be utilized in connection with a new bolt as is evident.

What I claim is:

1. In a flexible stay means for boiler sheets, a pair of hollow bearing plugs adapted to be secured to the opposite sheets of the boiler, an annular member detachably secured in each of said plugs at the inner end thereof, each of said annular members having a portion of its internal face provided with an annular seat curvilinear in cross section, the remaining portion of the internal face of each of said annular members flaring, and an adjustable bolt having a head at each end provided with a bearing surface, said bearing surfaces engaging the seats of the said annular members and adapted to shift thereon on the expansion of the boiler sheets.

2. In a flexible stay means for boiler sheets, a pair of hollow bearing plugs adapted to be secured to the opposite sheets of the boiler, an annular member detachably secured in each of said plugs at the inner end thereof, each of said annular members having a portion of its internal face provided with an annular seat curvilinear in cross section, the remaining portion of the internal face of each of said annular members flaring, an adjustable bolt having a head at each end provided with a bearing surface, said bearing surfaces engaging the seats of the said annular members and adapted to shift thereon on the expansion of the boiler sheets, and means for closing the outer end of each of said plugs.

3. In a flexible stay means for boiler sheets, a hollow bearing plug adapted to be secured to the sheet of the boiler, an annular member detachably secured to the inner face of said plug, said annular member having a portion of its internal face provided with an annular seat and the remaining portion of its internal face flaring, and a bolt having a head provided with a bearing surface, said bearing surface engaging the seat of said annular member and adapted to shift thereon on the expansion of the boiler sheet.

4. In a flexible stay means for boiler sheets, a hollow bearing plug adapted to be

secured to the sheet of the boiler, an annular member detachably secured to the inner face of said plug, said annular member having a portion of its internal face provided with an annular seat and the remaining portion of its internal face flaring, a bolt having a head provided with a bearing surface, said bearing surface engaging the seat of said annular member and adapted to shift thereon on the expansion of the boiler sheet, and removable means for closing the outer end of the plug.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM M. SMITH.

Witnesses:
NORTON L. GLEASON,
WILLIAM H. MOSSMAN.