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W. ZWILLING

STAY BOLT

Filed Nov. 28, 1919

Fig. 1

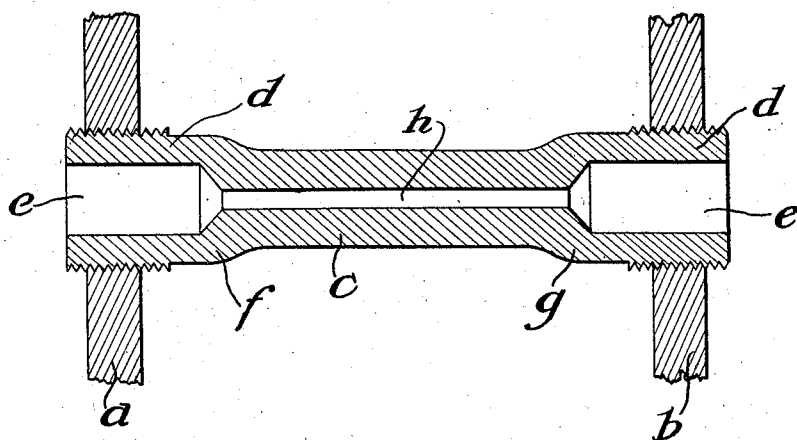
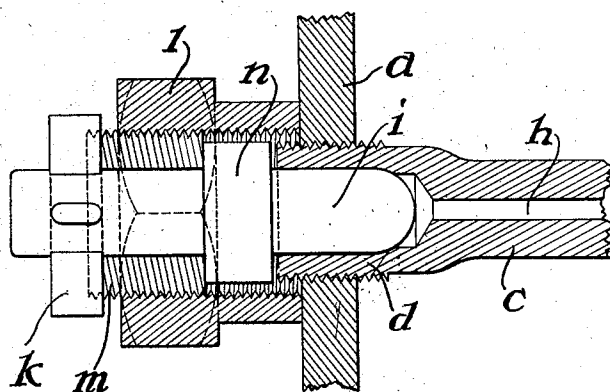


Fig. 2



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WILHELM ZWILLING, OF OSNABRUCK, GERMANY.

STAY BOLT.

Application filed November 28, 1919. Serial No. 341,311.

To all whom it may concern:

Be it known that I, WILHELM ZWILLING, a citizen of the German Empire, residing at Osnabruck, Germany, have invented certain new and useful Improvements in Stay Bolts (for which I have filed an application in Germany on September 17, 1918, Patent No. 333,055), of which the following is a specification.

My invention relates to threaded bolts in general and more especially to stay-bolts and the like, to be fixed for instance in the walls of boilers such as locomotive boilers; and its particular object is to provide an improved bolt which can be secured in its seat in such manner as to withstand high pressure at the joint without leaking. The present application is directed to the structure of the bolt; while my copending application, Serial No. 442,877, filed February 5, 1921, is directed to the method of securing the bolt.

When a threaded bolt, such as a stay-bolt or the like, is fixed by screwing it into a threaded hole or seat in a boiler wall or the like, great difficulty is experienced in rendering the joint sufficiently tight to withstand high pressure without leaking. This is especially the case where the usual copper bolts are replaced by iron bolts.

In order to overcome the above difficulty it has been proposed to employ for the bolt a hollow tube having external screw threads at an end, into which tube is forced, after the tube has been screwed into its seat, a tapered or conical-shaped die for the purpose of spreading out the end of the tube and forcing the threads on it into intimate contact with the threads in the seat. This arrangement has the disadvantage that the spreading effect takes place only adjacent the mouth of the tube and the intimate contact of the threads is thus only secured along a relatively small axial distance. My improved staybolt is designed to obviate these difficulties, and I have also provided a stay-bolt having a removable die. I employ a bolt having a threaded end provided with a substantially cylindrical cavity; and, after the bolt has been screwed into its seat in the boiler wall or the like, I spread out or widen the cavity and thus the threaded end by forcing into the cavity a substantially cylindrical die of greater diameter than the cavity, or, better still, by successively inserting in the cavity a plurality of such dies,

the successive dies being of gradually increasing diameter. A suitable appliance such as a pneumatic hammer, hydraulic press, or the like, is preferably employed for inserting the dies. Further, means are provided, associated with the die, for withdrawing the latter, as will be described more in detail hereinafter.

In order to prevent the die from touching the bottom of the cavity I prefer providing it with a flange at a distance from its end less than the length of the cavity, such flange resting on the edge of the said cavity when the die is forced in and thus preventing the die from progressing any further.

In order to facilitate the withdrawal or removal of the die from the cavity I prefer providing it with screw threading or placing an externally screw-threaded ring on the die, said ring being held thereon by a cotter or the like engaging the ring and passed through a slot in the die head. When a nut is screwed onto the die or cylinder and up against the edge of the bolt or the boiler wall it serves to withdraw the die.

In the drawings affixed to this specification and forming part thereof I have illustrated the preferred form of a stay-bolt and the means for fixing it in place according to my invention,

Fig. 1 being a longitudinal section of the bolt and a portion of the wall in which it is fixed, while

Fig. 2 is a similar view of the bolt showing the die employed in widening a cavity of the bolt and the means for withdrawing it.

Referring to the drawings, *a* and *b* are the walls to be braced and *c* is the stay-bolt. *d, d* are the screwthreaded ends of the bolt, and *e, e* are longitudinally extending substantially cylindrical cavities provided therein, said cavities being connected in this case by the usual boring or tell-tale hole *h*. The ends *d, d* of the bolt are represented as of larger diameter than the body *c*; this is done in order that a sufficiently large cavity may be accommodated.

The letter *i* (Fig. 2) designates a die of greater diameter than original cavity *e*, but which has been forced into the cavity by means of a hammer, hydraulic press or the like, thus widening the cavity to such an extent that its threaded external walls are forced tightly into the screw-threads in the hole or seat for the stay-bolt. The active

portion of the die is cylindrical; and, for this reason, when it is inserted into the cavity it expands the walls thereof outwardly to the same extent along the full
5 length of the expanded portion. n is the annular flange formed on the die to prevent its point from touching the bottom of the cavity. m is the threaded ring fitting on the head of the die, and k is the cotter
10 passed through the die head, and serving as an abutment for the ring when the nut l fitting in its threads is being screwed down upon the wall a in order to extract the die. In the drawing the die is represented with a
15 hemispherical point, but it may be formed differently according to requirements.

I claim:—

1. Stay-bolt securing means, comprising in combination, a staybolt having an end
20 provided with external screwthreads and with a longitudinally extending cylindrical cavity; and a die, having a cylindrical active portion of greater diameter than the di-
25 ameter of said cavity, adapted to be inserted into said cavity, the die being provided with a flange adapted to engage the edge of the wall of the cavity to limit its movement into the cavity.

2. Stay-bolt securing means, comprising in combination, a stay-bolt having an end
30 provided with external screw-threads and with a longitudinally extending cylindrical cavity; a die, having a cylindrical active portion of greater diameter than the diame-
35 ter of the cavity, adapted to be inserted into said cavity; and means for withdrawing said die.

3. Stay-bolt securing means according to claim 2, in which the means for withdraw-
40 ing the die comprise screw-threads associated with said die and a screw-threaded nut adapted to engage said screw-threads and when screwed thereon to abut against a fixed
45 member other than said die to withdraw the die.

4. Stay-bolt securing means according to claim 2, in which the means for withdraw-
ing the die comprise an externally screw-
threaded sleeve secured to said die, and a
50 screw-threaded nut adapted to be screwed on to said sleeve and to abut against a fixed member other than said die to withdraw the die.

In testimony whereof I affix my signature.

WILHELM ZWILLING.