

F. M. PATTERSON.
STAY BOLT FOR STEAM BOILERS.
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918,193.

Patented Apr. 13, 1909.

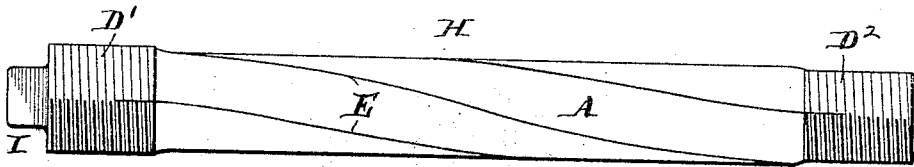
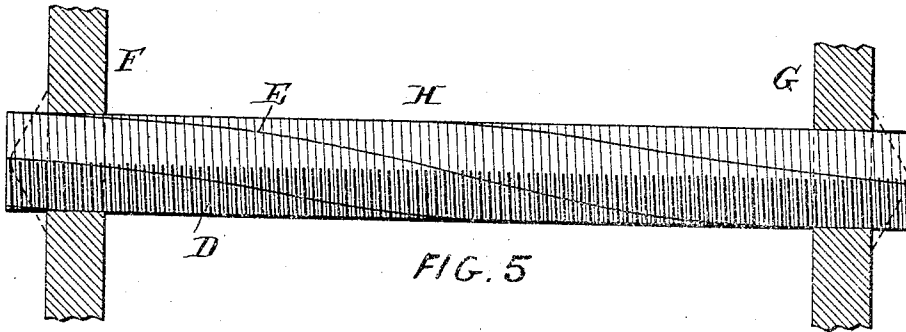
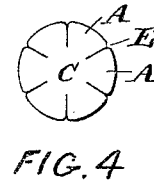
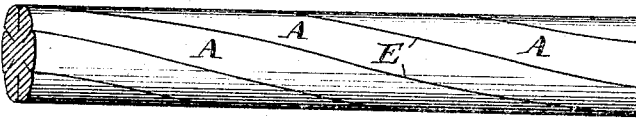
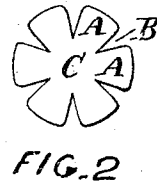
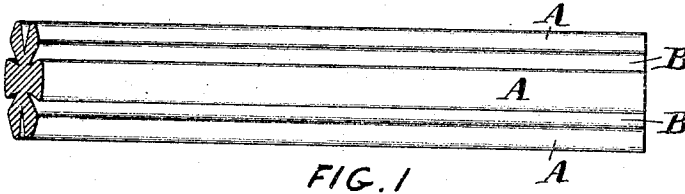


FIG 6 Inventor
Franklin M. Patterson

Witnesses

Daniel Webster, Jr.
O. M. Kelly.

By

[Signature]

Attorney

UNITED STATES PATENT OFFICE.

FRANKLIN M. PATTERSON, OF PHILADELPHIA, PENNSYLVANIA.

STAY-BOLT FOR STEAM-BOILERS.

No. 918,193.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed August 1, 1908. Serial No. 446,367.

To all whom it may concern:

Be it known that I, FRANKLIN M. PATTERSON, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Stay-Bolts for Steam-Boilers, of which the following is a specification.

My invention has reference to stay-bolts for steam boilers and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to provide a construction of stay-bolt which shall have great flexibility and cheapness of construction while maintaining its tensile strength.

My invention consists of a stay-bolt formed of a single rod of metal having radial incisions extending from the outer surface inwardly for part of the radial distance and forming a solid core with a series of integral longitudinal outer portions; further, in the structure above specified when twisted upon itself so that the longitudinal outer portions assume a helical form about a straight core; further, in the construction last stated when screw threaded for engagement with the sheets of the boiler.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:

Figure 1 is an elevation of the rod from which my improved stay-bolt is made; Fig. 2 is an end view of the same; Fig. 3 is an elevation of the same rod when reduced in diameter and twisted upon itself; Fig. 4 is an end view of the rod shown in Fig. 3; Fig. 5 is an elevation of my improved stay-bolt applied to the boiler sheets before the ends are upset; and Fig. 6 is an elevation of a modified form of my invention.

My improved stay-bolt may be made in any suitable manner, but for economy I prefer to make it by the following method. A rod of steel is drawn through a suitable die having cutting blades which produce incisions B of V-shape longitudinally of the rod, so as to form a series of longitudinal outer portions A integrally connected with a center or core C, as clearly shown in Figs. 1 and 2.

This operation may be done while the metal is hot. Instead of drawing the bar through a die, it may be given the incisions B by means of suitable dies employed in a hydraulic or other press. It is immaterial to my invention how the incisions are made, and while I prefer to make them straight in the first operation of making the stay-bolt, they may be made in helical form approximating what is indicated in Fig. 2. After having made the rod with the cross section shown in Fig. 2, I then draw or pass it through other dies to reduce its diameter and close the incisions B into the form at E in Fig. 4, in which the opposing walls of the parts A A contact with each other and the rod becomes a solid rod except for the spaceless incisions E. During the operation just described, or as a subsequent independent operation, the rod may be twisted upon itself so as to cause the outer portions A to take a helical form about the straight core C, such helical or twisted form being shown in Fig. 3. With respect to the pitch of the helical twist, I do not restrict myself, but I prefer that it shall be such that the full pitch would equal twice the length of the stay-bolt between the boiler sheets F, G to be stayed, as indicated in Fig. 5. The reason for this will be referred to later.

After the rod has been brought to the form above described and as shown in Figs. 3 and 4, it is screw threaded from one end to the other, as indicated at D in Fig. 5, so that, when cut up into proper lengths to form the stay bolts H, it may be screwed into the screw threaded holes in the outer sheet F and fire box sheet G preliminary to being upset or riveted on its ends, as indicated in dotted lines.

By dividing the outer portion of the stay-bolt into the longitudinal portions A, I obtain great flexibility without loss in tensile strength and this is increased by the helical form given to the said outer portions. Furthermore, the helical twist given to the said outer portions will, in the preferred form, bring the fibers which are at the top at one end to the bottom at the other and consequently those fibers which are under tension at one place of their length are under compression at another, with the result that these strains compensate and the said fibers

of the parts A are at no time put under rupturing stress, no matter how severe the normal strain to which they may be subjected during commercial use. This same
 5 action takes place for bending of the stay-bolt in any direction. The stay-bolt may be tempered, if so desired, when in the forms shown in Fig. 3 or Fig. 4. By the employment of my invention the usual expansion
 10 and contraction of the firebox may take place without danger of destroying the stay-bolts.

While I prefer to give the helical form to the outer portions A, nevertheless, under
 15 some conditions such helical form may be omitted. In place of making the rod in long lengths and cutting it into the shorter lengths to form the stay-bolts, I may make each stay-bolt separately of the form shown
 20 in Fig. 6. In this case the body is of substantially the form above described, but the ends are solid as the incisions E do not extend to the extreme ends of the stay-bolt. These ends are of different diameters and are
 25 screw threaded, one end D' being larger in diameter than the body portion and the other end D² being smaller. The larger end may also have a square part I or other form for applying a wrench or other tool with
 30 which to rotate the stay-bolt when applying it to boiler sheets. In this form of stay-bolt the body part, between the ends, need not be screw threaded. It is also evident that, by making the rod, shown in Figs. 3 and 4,
 35 sufficiently large in diameter, it may be turned down to the multiple diameters shown in Fig. 6, and, under such conditions, be screw threaded on the ends alone.

I have shown my improved stay-bolt in the
 40 form which I prefer in commercial practice, but I do not confine myself thereto as the mode of manufacture and the details of construction may be varied without departing from the spirit of the invention.

45 Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A stay bolt formed of a core portion and a series of radial longitudinal outer portions divided with respect to each other but
 50 integral with the core portion and said series of outer radial portions being closely compacted side by side into a bolt having a continuous cross section.

55 2. A stay-bolt formed of a core portion and a series of radial longitudinal outer portions divided with respect to each other but integral with the core portion and in which the longitudinal outer portions are helically
 60 arranged about the core portion.

3. A stay-bolt formed of a core portion and a series of radial longitudinal outer portions divided with respect to each other but

integral with the core portion and in which the longitudinal outer portions are helically
 65 arranged about the core portion and compressed into close contact so as to form a solid rod with helically arranged spaceless incisions.

4. A stay-bolt formed of a core portion 70 and a series of radial longitudinal outer portions divided with respect to each other but integral with the core portion and in which the longitudinal outer portions are helically
 75 arranged about the core portion and screw threaded for attachment to the boiler sheets.

5. A stay-bolt formed of a core portion and a series of radial longitudinal outer portions divided with respect to each other but
 80 integral with the core portion and in which the longitudinal outer portions are helically arranged about the core portion and compressed into close contact so as to form a solid rod with helically arranged spaceless
 85 incisions and screw threaded throughout its whole length.

6. A stay-bolt formed of a core portion and a series of longitudinal outer portions integral with and helically arranged around
 90 the core, the said stay-bolt having screw threads for connection with the threaded holes in the boiler plates.

7. A stay-bolt having a body portion less than its whole length formed of a core portion surrounded with a series of integral
 95 longitudinal outer portions helically arranged and in which the helical twist is extended through approximately 180 degrees.

8. A stay-bolt provided with screw threads for attachment to the boiler sheets and having a body portion less than its whole length
 100 formed of a core portion surrounded with a series of integral longitudinal outer portions helically arranged and in which the helical twist is extended through approximately 180
 105 degrees.

9. The combination of the two sheets F and G of a boiler, with a stay-bolt H having screw threaded portions engaging threaded holes in said sheets, and said stay-
 110 bolt being formed with a body portion between the sheets made of a core portion surrounded with a series of longitudinal helical outer portions integral with the core, the curve of the helical portions extending
 115 through approximately 180 degrees.

10. A stay bolt formed of a core portion and a series of radial longitudinal outer portions integral with the core portion and compacted in close contact throughout their
 120 length side by side, the core portion and the radial longitudinal outer portions being each of approximately the same cross sectional area.

11. A stay bolt having a body formed of 125 a core portion and a series of radial longi-

5 tudinal outer portions divided with respect to each other, but tightly compressed one upon the other and each being integral with the core portion, said bolt also having screw-threaded ends, one of which is of smaller and the other of which is of larger diameter than the body portion.

In testimony of which invention, I have hereunto set my hand.

FRANKLIN M. PATTERSON.

Witnesses.

R. M. KELLY,
A. W. RETTIG.