F. M. PATTERSON.

METHOD OF MANUFACTURING BOLTS.

APPLICATION FILED OCT. 31, 1908.

1,034,643.

Patented Aug. 6, 1912

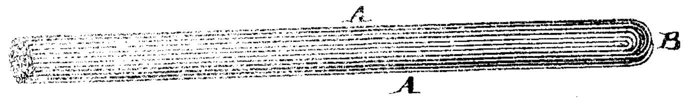

FIG. 1

FIG. 2

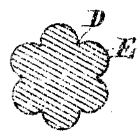

FIG. 3

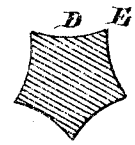

FIG. 4

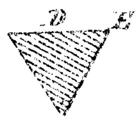

FIG. 5

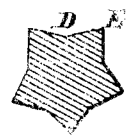

FIG. 6

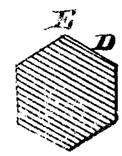

FIG. 7

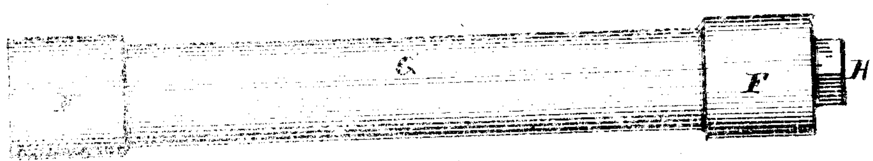

FIG. 8

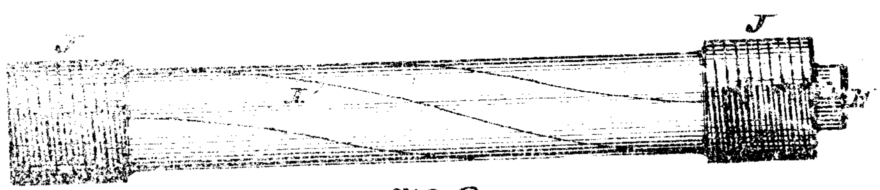

FIG. 9

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Witnesses

By

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UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING BOLTS.

1,034,643. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed October 31, 1906. Serial No. 340,377.

To all whom it may concern:

Be it known that I, FRANKLIN M. PATTERSON, a citizen of the United States, and resident of New York city, county of New York, State of New York, have invented an Improvement in Methods of Manufacturing Bolts, of which the following is a specification.

My invention has reference to methods of manufacturing bolts 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 a stay bolt for steam boilers and bolt for other purposes which shall embody great tensile strength coupled with elasticity whereby the bolt may adapt itself in use to the frequently occurring changes in stress due to expansion and contraction of the fire box sheets, tubes or other parts of the boiler or other apparatus in which the stay bolts are employed.

My invention consists of the method hereinafter described for making a stay bolt formed of a solid rod of steel or other metal having a distinctly fibrous structure in which the fibers run longitudinally of the bolt and preferably twisted into helical form, the said bolt preferably having a body of longitudinal fibers twisted upon itself and the said body upset at its ends into larger cross section and screw threaded.

My invention will be better understood by reference to the drawings, in which:

Figure 1 is a diagram illustrating one manner in producing a fibrous structure of bar from which to form the stay bolts; Figs. 2 to 7 inclusive are cross sections of various forms of bars of fibrous steel suitable for the body part of my improved stay bolt; Fig. 8 is an elevation of the stay bolt when in forged and partly finished condition; and Fig. 9 is an elevation of the finished stay bolt.

A A represent a large number of steel wires laid together or bent upon themselves as at B. The wires may be bent over upon themselves a number of times if so desired one of such bends being sufficient for illustration. The series of fibrous parallel strands so arranged may be then brought to a welding heat and subjected to compression by any of the well known methods, such as rolling, drawing or compression in dies. The cross section of the fibrous bar thus produced may be round or of any geometrical form, such as shown, for example, in Figs. 2 to 7 inclusive. In the cases of those cross sections which are not round, there may be a series of outer longitudinal masses E of maximum radii with interposed depressed portions D of minimum radii so as to give more elasticity to the stay bolt in its completed form. The bar so formed will be exceedingly tough and strong and of a highly fibrous character, the fibers being longitudinally arranged and cohering so as to give great elasticity to transverse or torsional strains coupled with great strength against rupture in the direction of the length of the bolt. I have disclosed what I believe to be the best method of preparing the fibrous bar from which the stay bolts are to be made, but I do not restrict or confine myself to this or any method of preparing the fibrous bar so long as the finished bar is a solid and homogenous and with a strongly defined cohering fibrous structure. The bar so formed may be cut into definite lengths and the ends upset into cylindrical form of greater cross section than the intermediate or body portion as indicated in Fig. 8 in which G is the body portion and F F the upset end portions. One of these end portions may be provided with a square boss H or otherwise formed for receiving a wrench or suitable tool for screwing the bolt into place. The body portion may then be twisted upon itself so as to give to the longitudinal fibers a helical direction or form, the twist at the surface extending preferably through 180 degrees. This helical twist of the fibers will usually be somewhat more extended at and near the surface and more especially of the parts of greatest radii than at the more deep seated portions, but as the latter are bound in and protected by the outer portions, it is more necessary to give to said outer portions the proper twist to secure immunity against rupture under bending stress.

By giving to the body a twist through 180 degrees or thereabout, it is evident that when the body bends the tendency is to relieve the tension upon one portion of the length of any fiber while putting strain upon another portion thereof and vice versa, so that the total length of the fibers making

up the body portion is not materially altered under any normal strains. Moreover, it is evident that as the greatest stress under bending comes upon the fibers nearest the surface such is compensated for by the greater helical twist given to these fibers. While the best form of the body is one in which the fibers are so arranged that any nber is preferably at approximately uniform distance from the center throughout its length, it is evident that this condition may be modified by intertwisting of the fibers which may intentionally or unintentionally occur in the preparation of the fibrous bar.

When the stay bolt is prepared in the form above described the upset ends are screw threaded so as to be capable of being screwed into the steel sheets to be connected preliminary to being made steam or water tight by riveting or flanging out the ends into heads in the customary manner. The completed stay bolt ready for use is shown in Fig. 9 in which I indicates the helical twisting of the fibers of the body and J J, the screwthreaded ends. The cross section of the body part shown in Figs. 8 and 9 is indicated as circular but may be of any other section such for example as in Figs. 3 to 7 inclusive. The stay bolt may be made of steel, iron, bronze or other metal, and if of steel, may be tempered, if so desired.

In this application I do not make claim to the bolt structure, as that is reserved for a separate application.

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

1. The herein described method of making a bolt which consists in forming a fibrous bar by welding together and densifying a plurality of wires of small cross section into a solid bar upsetting the ends of the bar into a greater cross section than the intermediate portion of the bar, twisting the bar upon itself, and cutting screw threads upon the upset welded ends.

2. The method of making a bolt which consists in placing together a large number of parallel wires of small cross section, heating the said wires to a welding temperature and welding them throughout their length into a solid bar whereby it has a strongly developed longitudinal fibrous composition, and finally rolling or drawing the welded bar to the desired cross section and density from the center outward and throughout its length.

3. The method of making a bolt which consists in placing together a large number of parallel wires of small cross section, heating the said wires to a welding temperature and welding them into a solid bar whereby it has a strongly developed longitudinal fibrous composition, finally rolling or drawing the welded bar to the desired cross section and density from the center outward, increasing the diameter of the ends by upsetting, and screw threading said upset ends.

4. The method of making a bolt which consists in placing together a large number of parallel wires of small cross section, heating the said wires to a welding temperature and welding them throughout their length into a solid bar whereby it has a strongly developed longitudinal fibrous composition from the center outward, densifying the bar by reducing its cross section by rolling or drawing, twisting the bar while maintaining the welded union of the wire strands throughout their length, and screw threading the twisted bar.

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

FRANKLIN M. PATTERSON.

Witnesses:

R. M. HUNTER,

R. M. KELLY.