E. I. DODDS.

METHOD OF MAKING BOLTS.

APPLICATION FILED MAR. 31, 1914. RENEWED JUNE 26, 1916.

1,271,142. Patented July 2, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

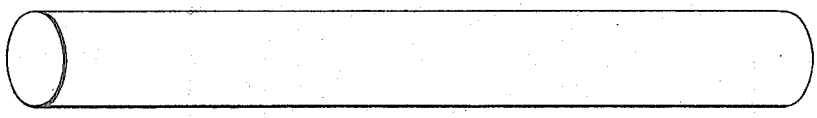


Fig. 2.

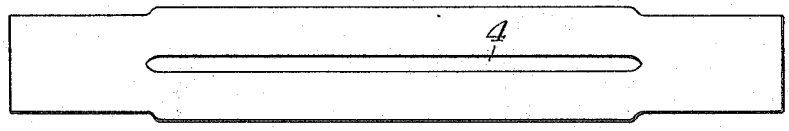


Fig. 3.

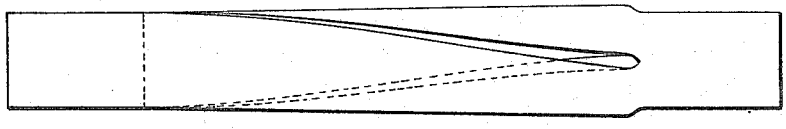


Fig. 4.

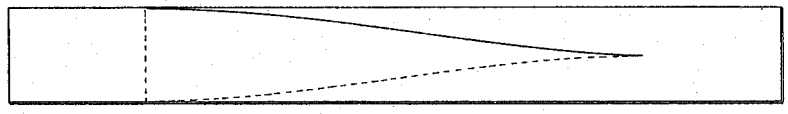


Fig. 5.

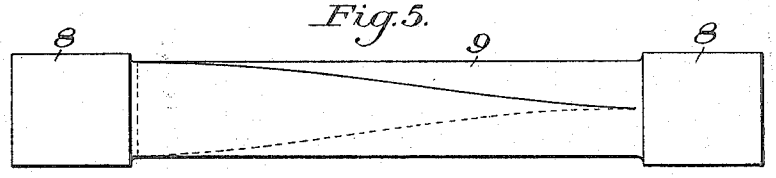


Fig. 6.

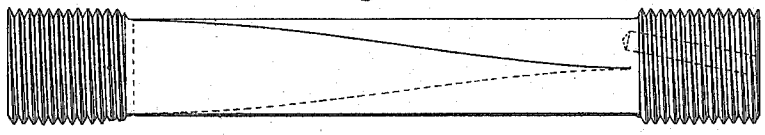
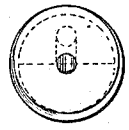


Fig. 7.



WITNESSES

R. A. Balderson

Jesse B. Keller

INVENTOR

E. I. Dodds,

by Bakewell, Byrnes & Parmelee

Attys.

E. I. DODDS.

METHOD OF MAKING BOLTS.

APPLICATION FILED MAR. 31, 1914. RENEWED JUNE 26, 1916.

1,271,142. Patented July 2, 1918.

2 SHEETS—SHEET 2.

Fig 8

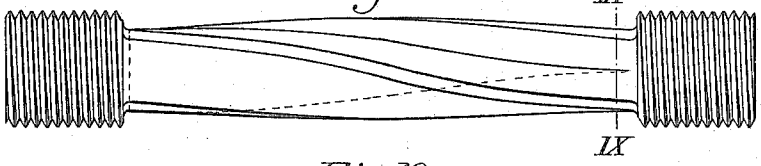


Fig.9.

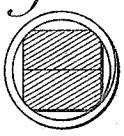


Fig.10.

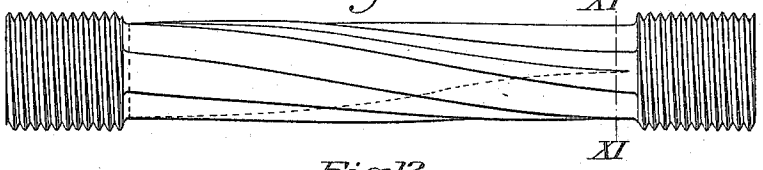


Fig.11.

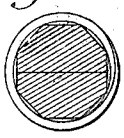


Fig.12.

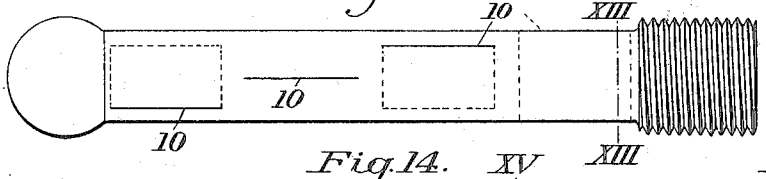


Fig.13.

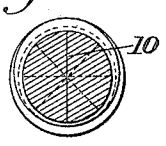


Fig.14.

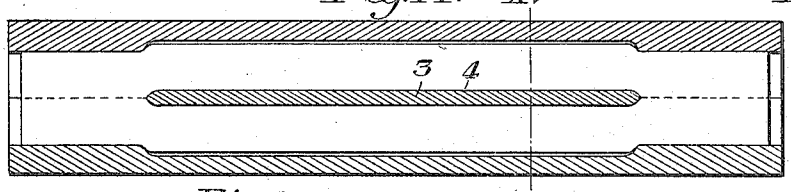


Fig.15.

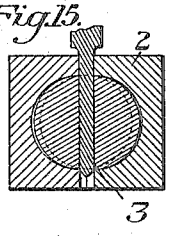


Fig.16.

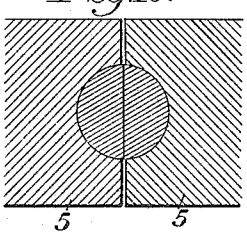


Fig.17.

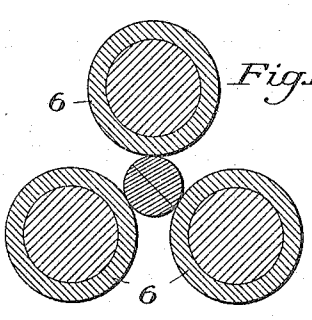
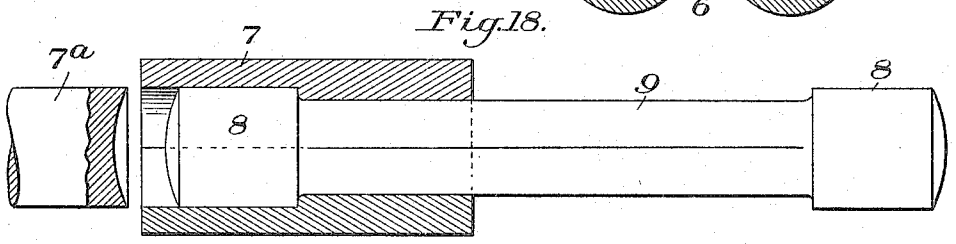


Fig.18.



WITNESSES

R. A. Balderson

Jesse B. Keller

INVENTOR

E. I. Dodds,

by Bakewell, Byrnes & Carmody,

Attys.

UNITED STATES PATENT OFFICE.

ETHAN I. DODDS, OF ZELIENOPLE, PENNSYLVANIA, ASSIGNOR TO KERNER MANUFACTURING COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

METHOD OF MAKING BOLTS.

1,271,142. Specification of Letters Patent. Patented July 2, 1918.

Application filed March 31, 1914, Serial No. 828,494. Renewed June 26, 1916. Serial No. 106,056.

To all whom it may concern:

Be it known that I, ETHAN I. DODDS, a citizen of the United States, and a resident of Zelienople, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Methods of Making Bolts, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of one form of blank from which a bolt is made by my improved method;

Fig. 2 is a side elevation of the blank after it has passed through the first step of my improved method;

Fig. 3 is a similar view of the blank after it has passed through the second step;

Fig. 4 is a similar view after the blank has been passed through the third step;

Fig. 5 is a similar view showing the blank after it has been headed;

Fig. 6 is a similar view of a finished bolt made from a blank such as shown in Fig. 1;

Fig. 7 is an end view of the finished bolt shown in Fig. 6;

Fig. 8 is a side elevation of a finished bolt made from a differently shaped blank from that shown in Fig. 1;

Fig. 9 is a sectional view on the line IX—IX of Fig. 8;

Fig. 10 is a view similar to Fig. 8 of a bolt made from another form of blank;

Fig. 11 is a sectional view on the line XI—XI of Fig. 10;

Fig. 12 is a modified form of bolt;

Fig. 13 is a sectional view on the line XIII—XIII of Fig. 12;

Fig. 14 is a sectional plan view of one portion of the dies for slitting the blank;

Fig. 15 is a sectional view through the die on the line XV—XV of Fig. 14, showing the punch in position in the die;

Fig. 16 is a sectional view through one form of closing die;

Fig. 17 is a similar view of a plurality of rolls for closing the opening in the body of the bolt; and

Fig. 18 is a sectional view through a heading die.

This invention relates to an improvement in the method of making bolts, and particularly stay bolts for steam boilers.

The object of my invention is to provide a method whereby I can readily and cheaply make a bolt from a single piece or blank having integral heads and a plurality of members which extend from head to head, and in which the body portion is of reduced diameter and is provided with the outer scale.

In manufacturing these bolts, I take a blank of approximately the diameter of the body portion, then form a slit or opening or a plurality of them in the central or body portion of the blank by piercing without removing any metal to form the blank having a plurality of members between the ends, and after the blank has been slit, I twist the members about the axis of the bolt and then close up the slit or slits; or if desired, I can close up the slit first and then twist the members of the body portion about the axis of the bolt. After the body portion has been twisted and reduced to its initial diameter, I form heads on the blank by means of upsetting dies.

I am aware that it is old to form bolts of a plurality of members, upsetting and welding the head portions to form heads of greater diameter than the body portion, then twisting the body and threading the heads. By this method it is necessary to heat the blank several times between the different operations, and at the same time care must be taken so as not to weld the two members together beyond the heads. By my improved method, I am enabled to overcome several of the heating steps, and at the same time be sure that the two members forming the body portion are not welded to each other beyond the desired point.

I am also aware that it is old to form bolts from a single member which has been slotted by means of a saw, threaded and then the portions between the threads turned off to reduce the body of the bolt to a diameter less than the bottom of the threads.

In structures of this character, the scale formed by working the material while hot is removed, which greatly reduces the strength of the bolt, and at the same time provides a surface which is more readily attacked by the acids and other chemicals contained in the feed water for the boilers.

The precise nature of my invention will

be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various devices may be used to carry out my invention without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to the accompanying drawings, in Fig. 1 I have shown a blank of circular cross section, the diameter of which is about equal to the diameter of the body of the finished bolt. This blank may be first heated and is then placed in dies such as shown at 2 in Fig. 15, and the body of which is pierced by means of a punch 3 to form a slot such as shown at 4 in Fig. 2. The body of the blank may be then twisted 90 degrees or more, as shown in Fig. 3, and the body portion then reduced to its initial diameter by means of closing dies, such as shown at 5 in Fig. 16, or by means of rolls such as shown at 6 in Fig. 17 to bring the blank to the shape shown in Fig. 4. If desired, the body portion may be reduced by the dies immediately after the slitting and before twisting. I then take a blank such as shown in Fig. 4 and upset heads on the ends thereof by means of upsetting dies, such as shown at 7 and 7^a in Fig. 18 to form a blank having heads 8 and a body 9, as shown in Fig. 5. The heads are then threaded so as to provide continuous threads on the heads.

In Figs. 8 and 9, I have shown a bolt which is formed from a blank of approximately square cross section, and in Figs. 10 and 11, I have shown a bolt formed of a member of octagonal shape. If desired, I can pierce the body of the blank at a plurality of points, as indicated at 10 in Fig. 12; the various piercings being at an angle to the piercings adjacent thereto, and after the blank has been pierced, the body is reduced to its initial diameter by means of dies or rolls hereinbefore described, and the ends may be provided with any form of heads. If a bolt is made by this process, it is unnecessary to twist the body thereof as flexibility will be given to the body at various points throughout the length to compensate for the vibrations set up in the bolt when in use.

If desired, I can punch out a portion or portions of the central or body portion of the bolt and then reduce the body portion and close up the openings as shown in Figs. 1, 2 and 5.

By slitting, piercing, or forming an opening in the blank as set forth in the specification and claims, I mean forming an opening either entirely through, or through the major portion of, the body without removing any metal.

The advantages of my invention result from the provision of a method of making bolts from a blank of approximately the cross sectional area of the body of the bolt, by which I produce a bolt having enlarged heads and a body portion having the initial scale caused by working the metal, and in which a bolt can be made with one heating operation. Furthermore, from the provision of a method in which the bolts will be absolutely straight, and in which the heads and body portion are formed from one integral piece without the loss of any metal whatsoever.

I claim:

1. The method of making bolts, which consists in piercing the central portion of a blank and spreading apart the portions on each side of the opening, then closing the opening in the body and reducing the blank to its initial size and contour; substantially as described.

2. The method of forming stay-bolts which consists in longitudinally piercing the intermediate portion of a blank between the ends thereof without removing any metal and spreading apart the portions on each side of the opening, and then forcing the spread apart portions toward each other and twisting the blank; substantially as described.

3. The method of forming stay-bolts which consists in longitudinally slitting the intermediate portion of a blank between the ends thereof without removing any metal and spreading apart the portions on each side of the opening, then forcing the spread apart portions toward each other and twisting the blank, and then upsetting enlarged heads on the ends thereof; substantially as described.

In testimony whereof, I have hereunto set my hand.

ETHAN I. DODDS.

Witnesses:
JESSE B. HELLER,
H. M. CONWIN.