

Oct. 30, 1923.

R. T. GILLETTE ET AL

1,472,518

METAL JOINT

Filed Aug. 23, 1920

Fig. 1.

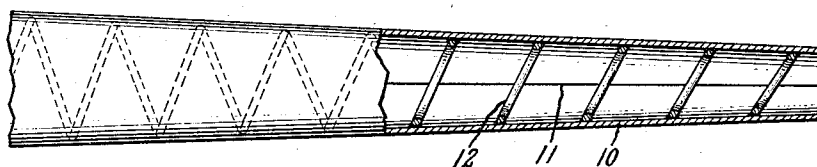


Fig. 2.

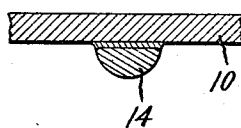
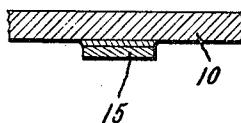


Fig. 3.



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UNITED STATES PATENT OFFICE.

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NEW YORK.

METAL JOINT.

Application filed August 23, 1920. Serial No. 405,458.

To all whom it may concern:

Be it known that we, ROBERT T. GILLETTE and JAY L. BUTTERFIELD, citizens of the United States, residing at Schenectady and Alplaus, respectively, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Metal Joints, of which the following is a specification.

10 This invention relates to metal joints and particularly to means for firmly securing together the edges of the seams in metal tubes.

It has been heretofore proposed to form joints in steel articles by applying to the 15 adjacent surfaces metallic copper in a molten condition, preferably in a non-oxidizing or reducing atmosphere. The copper upon cooling forms an adhesive binder which effectively unites the parts. We have, however, 20 found it desirable in certain cases, particularly where the seam is apt to be subject to an excessive tension or tortional strain, to reinforce the seam by placing across the same and uniting thereto by 25 copper or other binder some reinforcing means which has a greater tensile strength than that of the binder alone.

One embodiment of our invention is illustrated in the accompanying drawing, wherein Fig. 1 represents a portion of a tapered 30 tube partly in section showing the use of a wire coil as a reinforcing means; Fig. 2 is a section of a sheet metal article, showing a reinforcing means of slightly modified cross section; and Fig. 3 is a view similar to Fig. 35 2, but showing a still further modified reinforcing means.

Referring to Fig. 1, 10 represents a tapered steel tube such as may be used to 40 form the shaft of a golf club. This tube has a seam 11 running longitudinally thereof and the edges of the metal at the seam are united by copper or similar binding material. 12 represents a coil of steel wire bearing outwardly against the inner surface 45 of the tube 10 and secured thereto by the same binding material as is used for the seam. This coil thus forms in effect a series of reinforcing pieces extending across the seam 50 and rigidly secured to the body of the tube.

The tube 10 is preferably formed of a steel sheet which has been appropriately cut and formed upon a mandrel. The steel coil 12 55 is formed by winding a steel wire upon a mandrel or upon the tube 10 itself. The

coil is then inserted in the tube and drawn tightly in order that when released the turns will press outwardly against the inner surface of the tube. It is obvious that in winding the tube successive turns of the coil may 60 be formed at any desired distance apart. In this way the seam may be reinforced to a greater extent along certain portions thereof. After the insertion of the coil 12 the tube 10 is tightly wound with asbestos cord 65 or by some other means, is held in such a way that the edges of the seam will be forced into close contact and the binding material preferably in the form of a wire is introduced into the interior of the tube. The 70 tube is then heated to the melting point of the binding material in some reducing medium, preferably hydrogen, and then allowed to cool. Subsequent heat treatments may be employed as desired, such as tempering 75 and annealing.

In Fig. 2 a reinforcing wire 14 instead of being circular in cross section, as is shown in Fig. 1, has its surface adjacent to the tube flattened to provide a greater surface in close 80 proximity to the tube to which the binding material may effectively attach. The space between the wire 14 and the tube 10 is exaggerated in Fig. 2 in order that the binding material may be clearly shown. Better results are, however, obtained when the wire 85 is in close contact with the tube.

It is obvious that other forms of reinforcing means may be employed, such for example as a thin ribbon where lightness is 90 required, such as is shown in section at 15 in Fig. 3, or a continuous sheet of metal may likewise be employed if desired. In certain cases it may be desirable to place the reinforcing material on the outside of the 95 tube in the form of a coil or a series of metal ferrules. As a binding material we prefer to use copper in a highly purified state, particularly copper which is free from occluded gases and from which all oxide has 100 been eliminated. There are, however, other binders which we have found to be effective, such for example as certain alloys of copper. One such alloy consists of 93 parts of copper and 7 parts aluminum. Another is composed of 90 parts of copper and 10 parts 105 nickel. Silver also under certain conditions may be used as a binding agent.

We have described the tube 10 and also the wires 12 and 14 as composed of steel. It 110

is to be noted, however, that neither is necessarily limited to material of this composition. Among the metals which may be united by the above mentioned binding materials are tungsten, molybdenum and nickel.

Having described our invention, what we claim and desire to secure by Letters Patent is:—

1. A steel body having a seam provided with steel reinforcing means extended across the same and a binder of cupreous material securing the edges of the seam together and also securing the reinforcing means to the body, said binder being formed by causing molten copper to flow into contact with the parts to be joined in an atmosphere of hydrogen.

2. A tapered tube provided with a longi-

tudinal seam, a coil of reinforcing material bearing throughout its length against the surface of said tube and a binder securing the edges of said seam together and also securing said coil at points adjacent said seam to the surface of said tube.

3. A tapered steel tube provided with a longitudinal seam, a steel coil located within said tube and bearing throughout its length against the inner surface thereof and a cupreous binder securing the edges of said seam together and also securing said coil throughout its length to the inner surface of said tube.

In witness whereof, we have hereunto set our hands this 20th day of August, 1920.

ROBERT T. GILLETTE.
JAY L. BUTTERFIELD.