No. 859,803. PATENTED JULY 9, 1907.

C. L. CUMMINGS.

THREADED TUBE.

APPLICATION FILED MAR. 28, 1906.

Fig. 2.

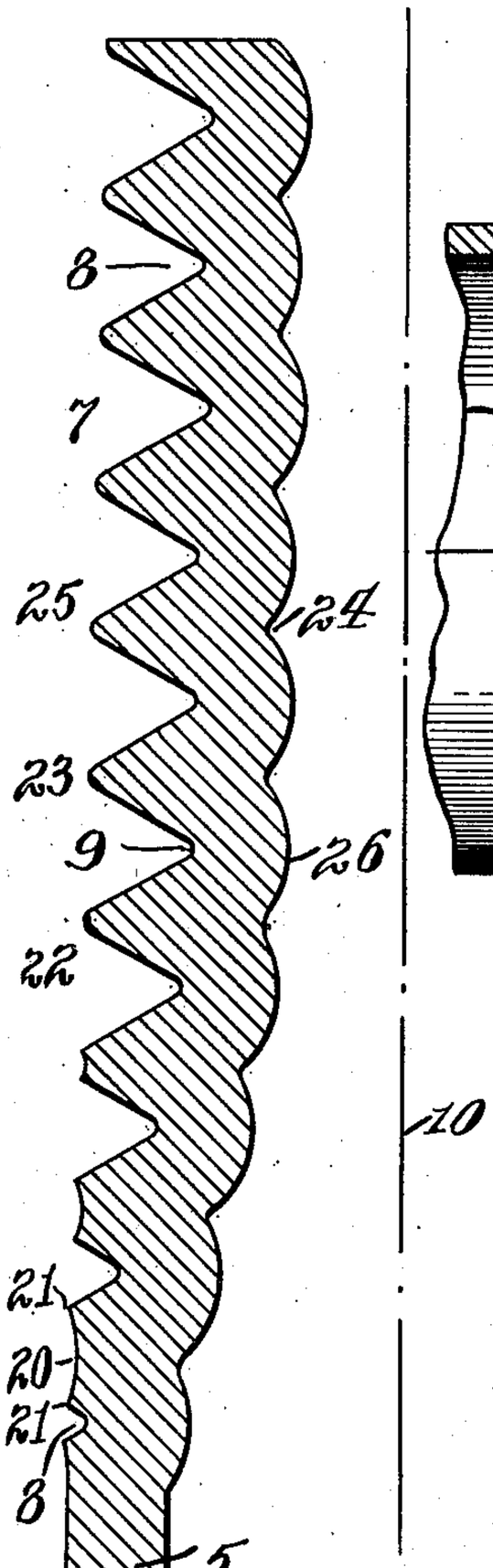
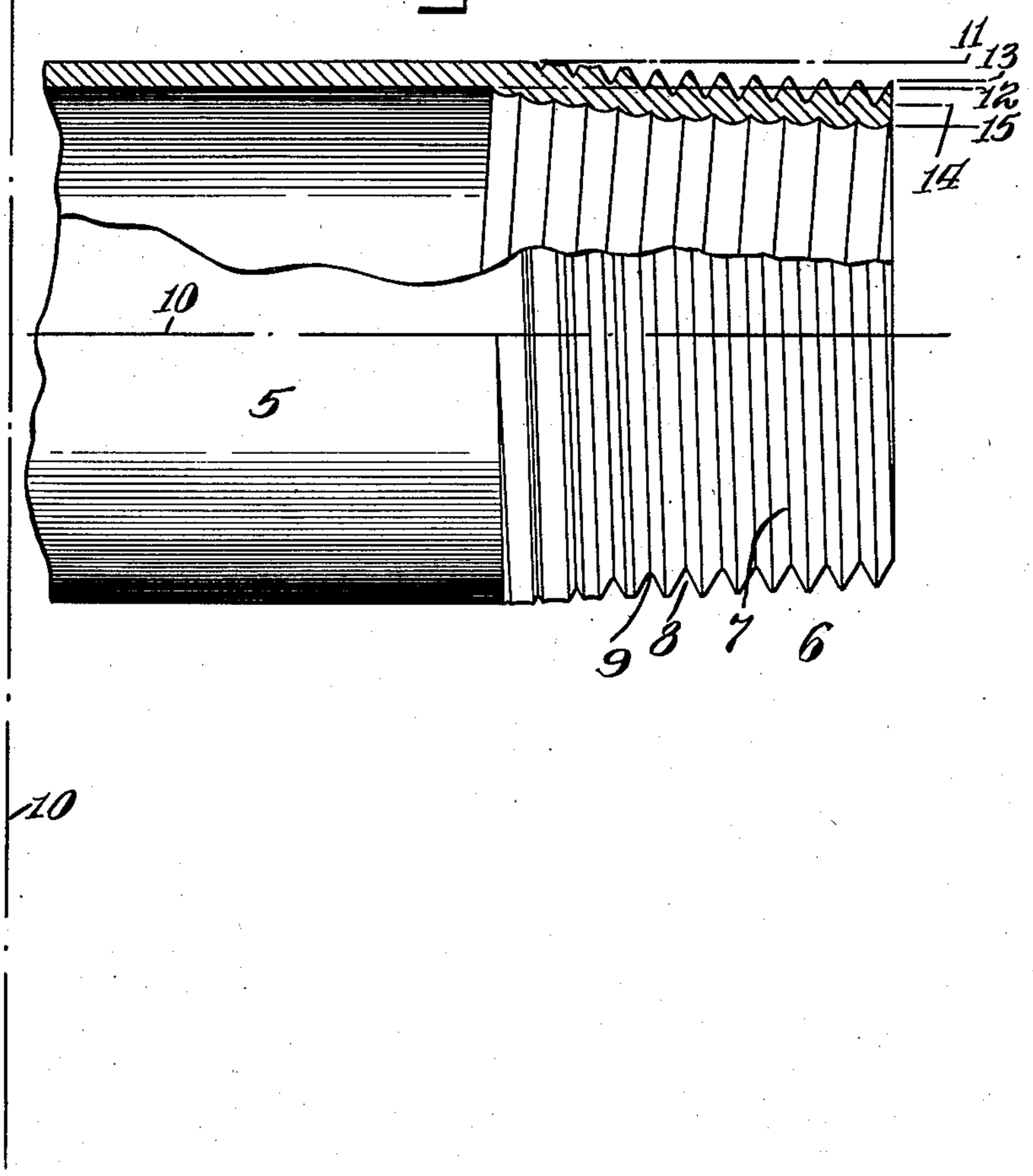


Fig. 1.



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UNITED STATES PATENT OFFICE.

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THREADED TUBE.

No. 859,803. Specification of Letters Patent. Patented July 9, 1907.

Application filed March 28, 1906. Serial No. 308,464.

To all whom it may concern:

Be it known that I, CHARLES L. CUMMINGS, a citizen of the United States, residing in the borough of Manhattan, city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Threaded Tubes, of which the following is a specification.

This invention relates to and has for its object to provide a tube having at its end a forged-up screw thread, and which end may be tapered and be provided with a forged-up screw thread disposed in a conical helix.

One of the primary objects of the present improvement is to present a tubing which may have relatively thin walls compared with iron pipe sizes of tubing, and which wall may carry a thread of sufficent height for engaging with the screw threads upon another piece of metal, as for instance a coupling.

When cutting is resorted to for the purpose of forming threads, particularly on tubing, a considerable amount of metal has to be removed for the purpose of producing the thread forming groove. And when the thread is to be given a taper formation, that is, when it is to be disposed in a conical helix, the bottom of the thread forming groove will approach toward the inner face of the tube wall to such an extent that in selecting the tubing to be employed consideration must be given to the amount of metal which will be left at the region inward of the thread forming groove at the smaller end of the taper. This will require the tube wall proper in its unworked upon portion to be considerably in excess of that really required merely to give strength to the threaded portion, and particularly at the tapered end.

The tube, the subject-matter of this present improvement, presents a structure wherein the normal thickness of the metal radially of the tube at the unthreaded wall or portion thereof, and its thickness at the apex of the thread and the bottom of the thread forming groove may be substantially the same, the thread being composed of wrought or forged-up metal integral with the tube, and the wall at the bottom of the thread forming groove being also composed of wrought or forged-up metal integral with the metal of the body of the tube.

A wrought thread which has been pressed and forged into shape has a smooth surface and the metal forming such surface is of close grain. The surface of the thread in this improvement is much smoother and the grain much closer than in a thread which has been cast or cut, and having the smooth and compact surface the thread faces lay up closer to the female threads, and thereby form a more perfect contact. Ductile metals after having been kneaded, forged and drawn have increased tensile strength, and the threaded end of the tube has a higher tensile strength than if it had been machined. The outer and inner spiral convolutions of the screw-thread and reinforce for the thread forming groove present a shape which resists internal pressure, and this article of manufacture will in many instances take the form of a coarse thread on thin metal tubing.

When sheet metal is corrugated, even when the sheet metal is in the form of a tube, the metal at the summits of the corrugations is made thinner than the normal thickness of the metal. This attenuation is due to the stretching of the metal. Of course, in lapping or bending the piece of sheet metal there is a tendency upon one side to compact and upon the other side to stretch, but actual tests have demonstrated that the result of the operation is an attenuation or thinning of the metal below its normal thickness. This present improvement can readily be distinguished from a corrugated metal in that the summits of what would be corrugations are built up so that instead of there being attenuation there is a reorganization of the molecules of the metal, and in the redistributed condition the metal will be found to have been strengthened, there not only being a greater cubical mass of metal than is present at the ridges of the corrugations, but the metal is in a denser condition. In the corrugated metal the apexes of the ridges are stretched, thereby being weakened in that the metal is rendered thin, and also due to the crystallizing tendency in metal when subjected to stretching and bending. In the present product the metal has had its tensile strength increased and the reformation which has taken place has improved the quality of the metal.

In the drawings accompanying and forming a part of this specification, Figure 1 is an elevation of an end of tubing made according to the present improvement, and which shows the tapered tube end having upon it a forged or wrought-up screw thread disposed in a conical helix and Fig. 2 is an enlarged longitudinal section of one wall of a tube such as is illustrated in Fig. 1.

It will be seen by reference to Fig. 1 that the tube 5 has its end, designated in a general way by 6, tapered, and upon this end is disposed a screw thread 7 each convolution of which is of less diameter than the preceding convolution, and that the thread forming groove 8 at its bottom portion 9 gradually approaches toward the center of the tube, here indicated by the dotted axial line 10. It will be seen that the lines 11 and 12 indicate the outer and inner surfaces respectively of the tube wall at the unthreaded portion 5, this indicates the original thickness of metal. The line 13 indicates the apex of the thread at the last convolution, the difference between the lines 11 and 13 indicates the

amount of taper given to the screw thread. The line 14 indicates the bottom of the thread forming groove at its last convolution, and the difference between the lines 13 and 14 indicates the height of the thread. The difference between the lines 11 and 14 indicates the reduction of the metal radially of the tube at the bottom of the thread forming groove from its original position to its final position, and in a cut thread would indicate the amount of metal removed in producing a thread having equal height and equal taper. The present practice is to taper the thread three-quarters of an inch to the foot. The line 15 indicates the inner surface of the tube wall below the bottom of the last convolution of the thread forming groove, and indicates when compared with the line 14 the thickness of metal radially of the tube at such point. The difference between the lines 11 and 15 indicates the thickness of a tube which would have to be employed for having a similar cut thread, and giving a similar thickness of metal below the bottom of the thread forming groove at its last convolution. The difference between the lines 12 and 15 indicates the excess of metal which would have to be employed for such a cut thread. Not only is a saving of material effected, but also a saving in weight.

By reference to Fig. 2 it will be seen that the thread 7 has been wrought or forged up from the metal of the tube, the forging at the end adjacent to the unworked upon portion 5 producing the first convolutions of the groove 8, and the thread being at that point incomplete, the apex presenting a surface concave in its center, as at 20, the side walls of the thread having been forged up at 21 to a greater extent than the center. As the convolutions proceed it will be seen that at about the region of the reference character 22 the concavity has disappeared, and that at about the region 23 the threads have commenced to be forged up with their proper apex and the remainder of the convolutions have such proper apex, the thread groove gradually advancing toward the center. The axis 10 is here also indicated for the purpose of comparison. It might here be stated that both of the figures of the drawing are enlargements from a tube made of copper, but which was three-quarter inch iron pipe size, which is one and five one hundredths of an inch outside diameter. It will be seen that there is a helically disposed groove 24 below the apex 25 of the thread, and there is a forged-up reinforcement 26 below the bottom 9 of the thread forming groove.

The entire tube end is a wrought or forged structure, and reference may here be made to my application for Letters Patent for the art of pipe thread formation filed March 17, 1906, Serial No. 306,508, which describes a method whereby this present article may be produced, and my application for threading tool, filed September 11, 1905, Serial No. 277,828 illustrates mechanism which may be employed in the production of this present article. But since applicant does not desire to limit himself to such mechanism for the production of this article, nor to the practicing of such method or art for its production specific reference to the same will not be made, but reference may be had to these for further illustration by those seeking information upon the subject.

Having described my invention, I claim:

1. As an article of manufacture, a tube having a forged-up screw thread upon its wall and said wall at the bottom of the thread-forming groove having a forged-up reinforcement.

2. As an article of manufacture, a tube having its wall tapered at the end and a forged-up tapered screw thread upon such end, the bottom of the thread-forming groove at each convolution being of less radius than the preceding convolution and the tube wall along the path of such groove bottom having a forged-up reinforcement.

3. As an article of manufacture a metal tube having a wrought or forged-up screw-thread upon it, the thickness of the metal in the direction radially of the tube at the apex of the thread and at the bottom of the groove being not less than the normal thickness of the unthreaded portion of the tube wall.

4. As an article of manufacture, a tube having a forged up screw thread upon one side of its wall, and a spiral groove of equal pitch upon the other side radially of said thread.

Signed at Nos. 9 to 15 Murray street, New York, N. Y. this 27th day of March, 1906.

CHARLES L. CUMMINGS.

Witnesses:
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