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H. SCHLAICH

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TUBING

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Fig. 1.

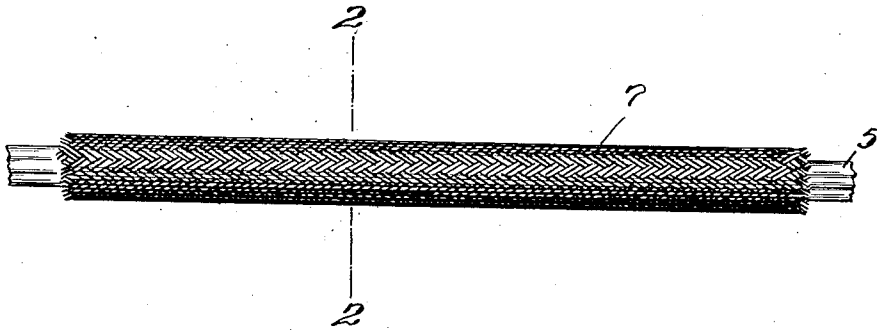
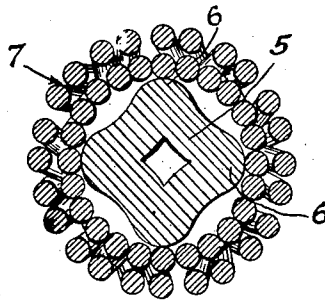


Fig. 2.



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TUBING.

Application filed September 25, 1922. Serial No. 590,276.

This invention relates to tubing intended particularly for use as transmission tubing for thermometers of the distance type, detector tubing for fire alarm systems, or for other purposes where fluid or gas filled transmission tubes may be employed. The invention is hereinafter shown and described as embodied in an improved article, which may be considered as an improvement upon the article described in my co-pending application, Serial No. 227,754, filed April 10, 1918 for improvements in small bore tubing and the making of the same.

The general object of the present invention is to provide for small-size or capillary tubing, an improved form of casing which will protect the tubing and will, at the same time, permit the tubing to be bent as desired without danger of kinking sharply enough to be closed.

The invention is particularly useful in connection with capillary tubing of the kind having longitudinally extending rib-like projections on its exterior, and is shown and described as applied to tubing of that character but its utility is by no means confined to such tubing. Generally speaking, the invention is characterized by the provision of a covering of braided wire around the tubing, said wire being preferably so braided that interstices are left between the wires. When a covering of braided wire of the kind mentioned is used on capillary tubing of the kind provided with longitudinally extending rib-like projections on its exterior, the braided wire makes contact with the tops of the rib-like projections, and spaces are left on each side of said rib-like projections between the tubing and the braided covering. The existence of this space not only permits air passing thru the braided covering to circulate in contact with the tubing, but also gives the effect of a braided covering cushion upon the tubing. This last mentioned effect increases the protection afforded by the braided covering, since the latter is free to yield slightly when it is subject to pressure or a blow as it may often be during installation of the covered tubing. Moreover, a covering of braided wire of the kind mentioned also protects capillary tubing from crystallizing and fracturing when it is subjected to constant jarring as it may be when installed in certain locations. The braided covering itself does not crystallize and fracture even when

subjected to extreme jarring, and it exerts enough cushioning action upon the tubing so that the latter does not crystallize.

The invention will be understood from the following description taken in connection with the accompanying drawing in which Figure 1 is an elevation on an enlarged scale of a piece of tubing embodying the invention; Figure 2 is a sectional view thru the covered tubing on the line II-II of Figure 1.

Referring to the drawing, the soft metal tubing 5 is shown as of the general kind disclosed in my aforesaid co-pending application, said tubing being of capillary size and having longitudinally extending rib-like projections 6. Surrounding the tubing, and braided thereon, is a soft metal covering of wires 7, preferably of copper. As shown, the wires 7 are arranged in pairs and these pairs are rather loosely braided so that interstices are left in the braiding between the pairs of wires enabling the covering to bend readily. As clearly shown in Figure 2, the braided covering is in contact with the projections 6 of the capillary tubing, thereby leaving spaces on each side of the ribs 6 between the tubing 5 and the braided covering, with the advantageous results hereinbefore described.

Tubing made up and covered as has been described has been found to be a remarkable improvement over anything heretofore available for the purpose. The outer braided covering is so flexible that it is practically impossible to injure it during installation of the instrument, or when the instrument is in use. It is not affected by excessive vibration, such as is found in airplanes. It forms a protective sheath or cover which encloses and supports the inner capillary tubing and therefore the likelihood of breaking the latter is very remote. When the covered tubing is bent, the braiding readily stretches at the outside of the bend, and compresses on the inside, thereby avoiding placing a longitudinal stress on the capillary tube and preventing the making of too sharp bends in the tubing which would rupture or weaken its thin walls. The yielding nature of the covering effectively cushions the capillary tubing.

The covering is axially compressible and stretchable to a considerable extent, on account of the loose way in which it is braided, and may readily be pushed back along the

tubing to expose the end of the latter for brazing to seal it to the bulb and bourdon spring of the instrument. The braided cover may then be brought up to the rigid parts of the instrument and fastened to them in any suitable fashion.

What I claim is:

1. A transmission tubing for pressure responsive instruments, comprising a capillary tubing having a covering in the form of a braided wire sheath sufficiently flexible to permit bending the tubing but so proportioned and constructed with reference to the size and bore of the tubing as to make it impossible to kink the tubing sharply enough to close the bore thereof.

2. A transmission tubing for pressure responsive instruments, comprising a capillary tubing having longitudinally extending rib-like projections on its exterior, and having a sheath or covering in the form of a braided wire tube sufficiently flexible to permit bending the tubing and sufficiently strong to protect the capillary tubing against injury, but capable of positively preventing bending of the tubing sharply enough to close the bore of the tubing.

3. In combination corrugated capillary tubing and a flexible inelastic braided covering for said capillary tubing, capable of positively preventing bending of the tubing sharply enough to close the bore of the tubing.

4. In combination, a soft metallic capillary

tubing and a flexible metallic braided covering for said capillary tubing, said braided covering having interstices to permit longitudinal movement of a portion of the covering relative to the capillary tubing, and being constructed of soft enough metal to avoid injuring the tubing when such movement occurs.

5. In combination, a metallic capillary tube of such soft and pliable metal that it is easily scratched or indented, and of such small cross section that it is easily bent and is easily broken off where scratched, by bending due to vibration or other causes, and is also apt to be kinked accidentally, the bore of said tube being so fine that it is apt to be permanently closed by kinking, and a flexible, inelastic, shock absorbing, extensible wire braid armor sheath of soft metal enclosing the tube and forming a protective cover for guarding the tube against contact with other objects, but sufficiently loose upon the tube to permit a limited creeping of the tube within it to accommodate bending, and of soft enough metal to avoid injury to the tube by such creeping, said braid being freely bendable and not disposed to recover its original shape when bent, but being so constructed and proportioned with reference to the tube as to make it impossible to kink the tube sharply enough to close the bore thereof.

In testimony whereof I have affixed my signature to this specification.

HERMAN SCHLAICH. [L. s.]