

C. RUDOLPH.
FLEXIBLE METALLIC TUBE.
(Application filed Mar. 1, 1902.)

(No Model.)

FIG. 1

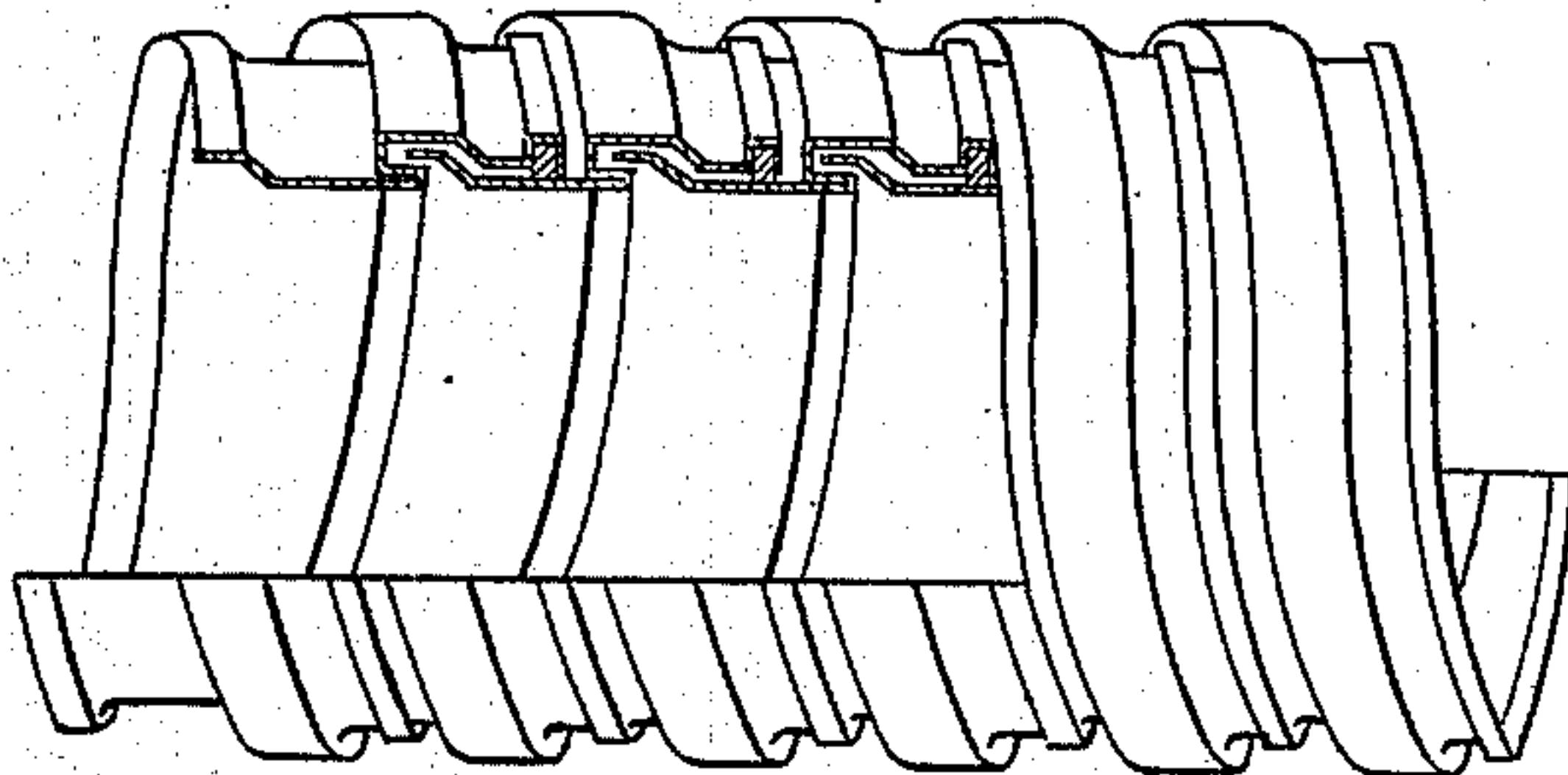


FIG. 2

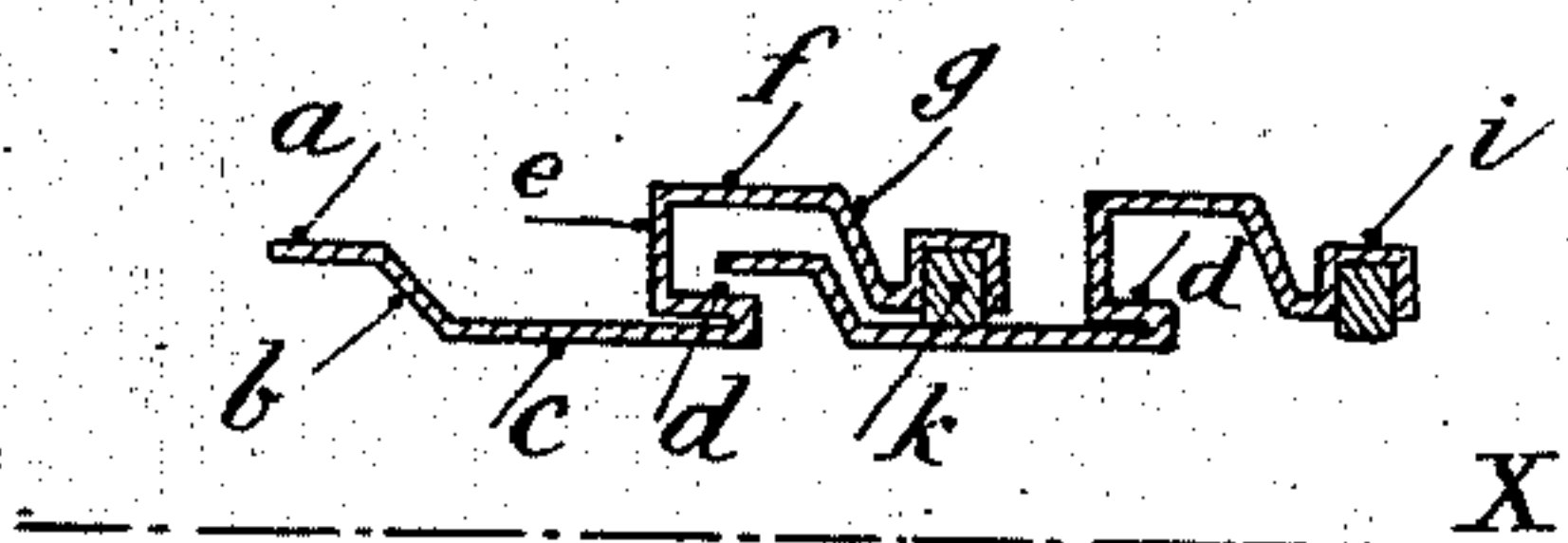


FIG. 5

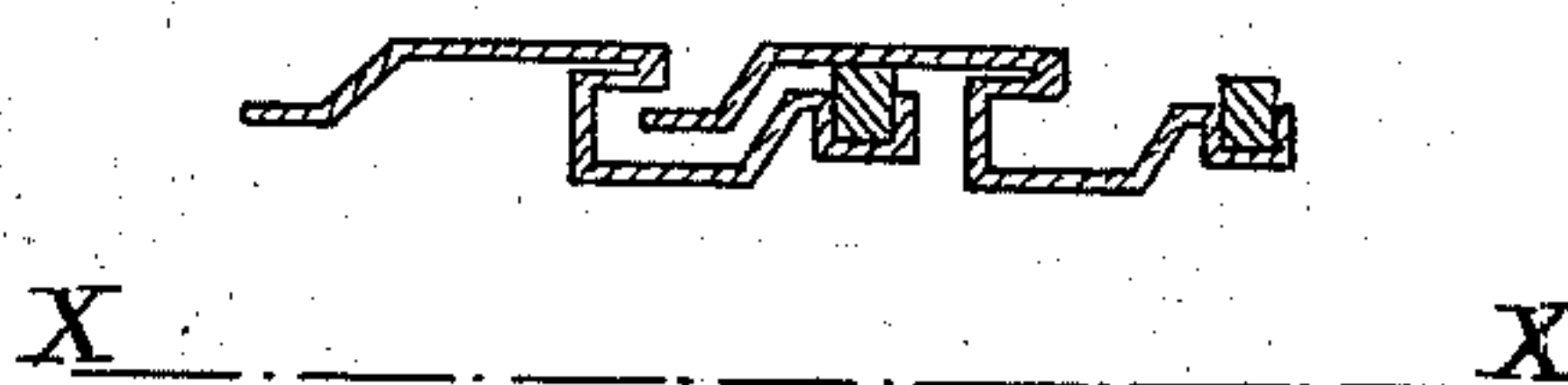


FIG. 3

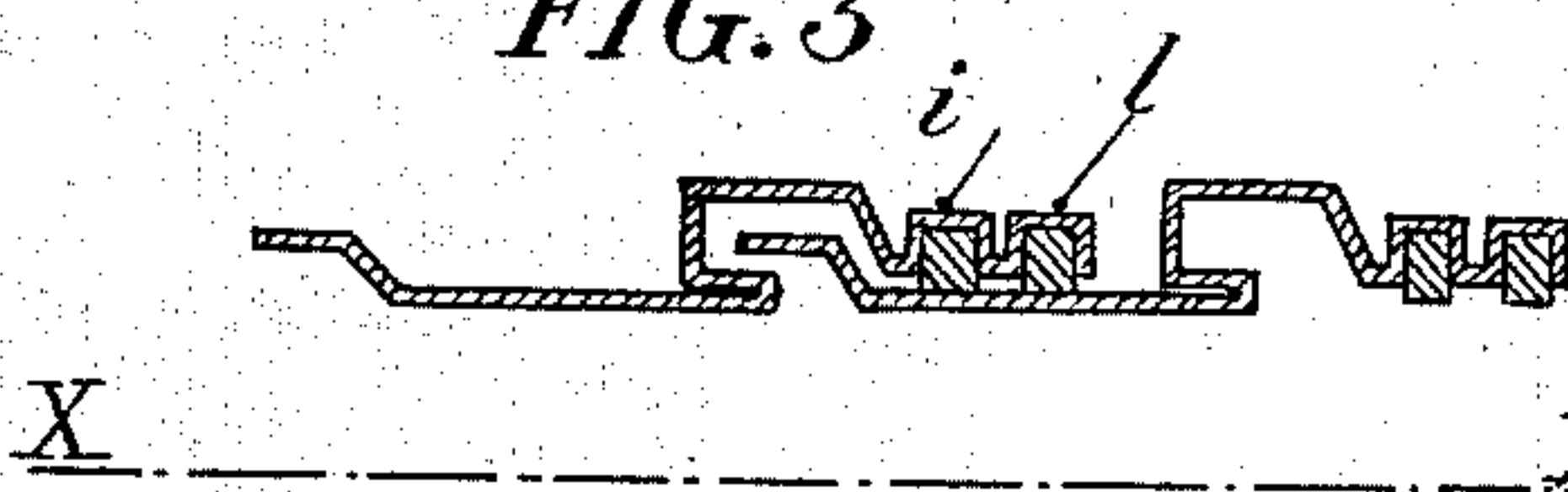


FIG. 6

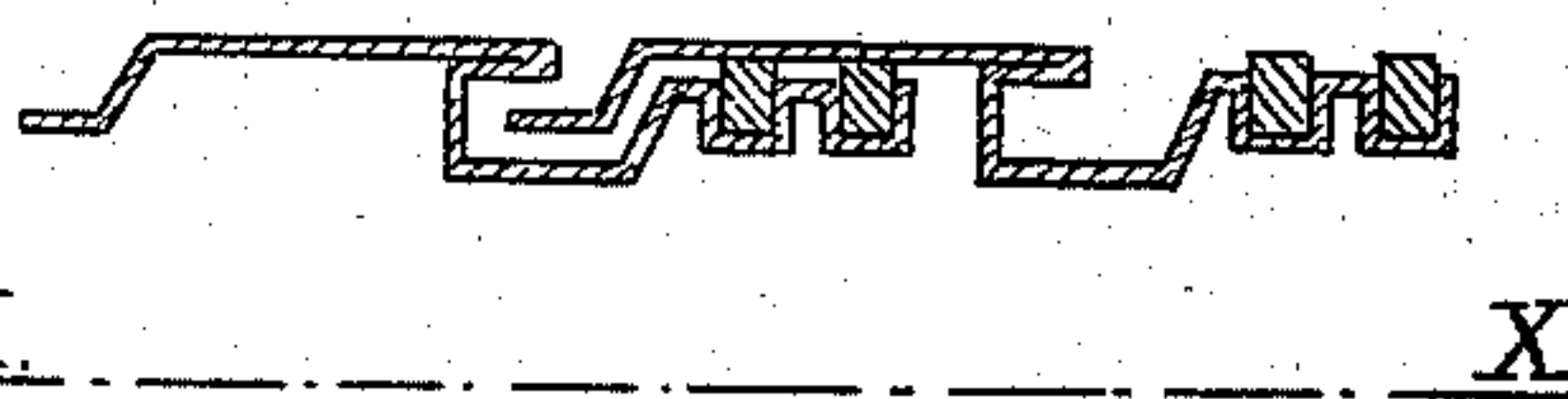


FIG. 4

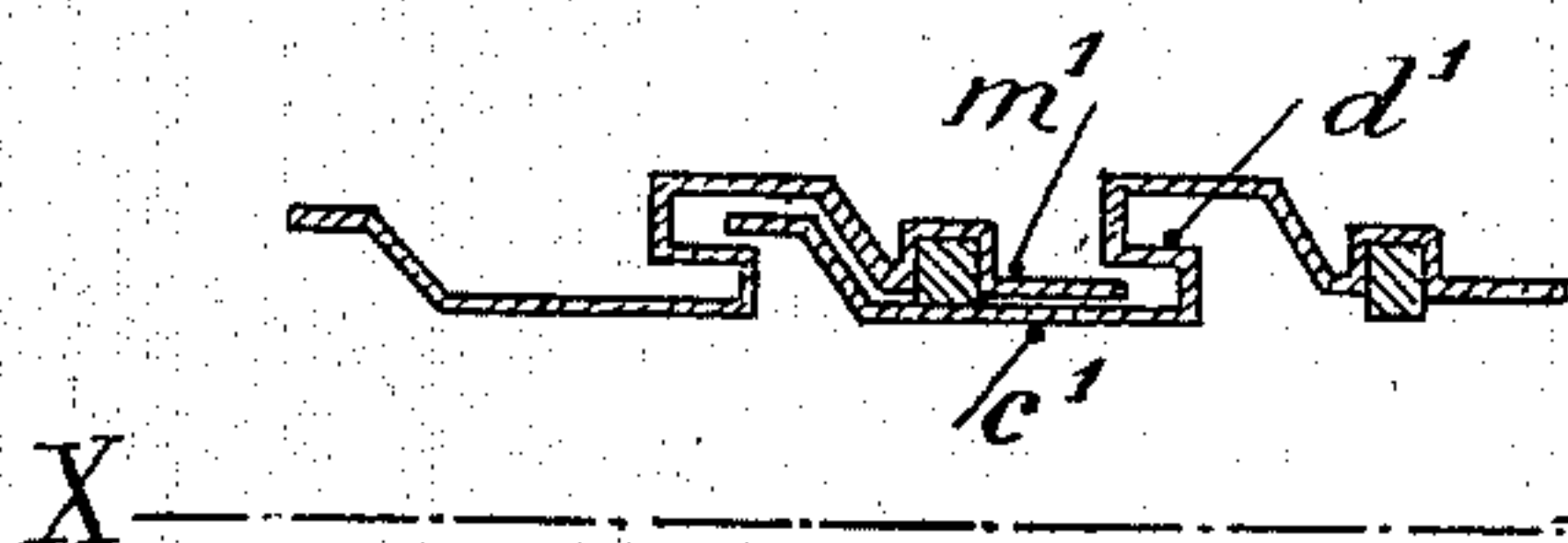
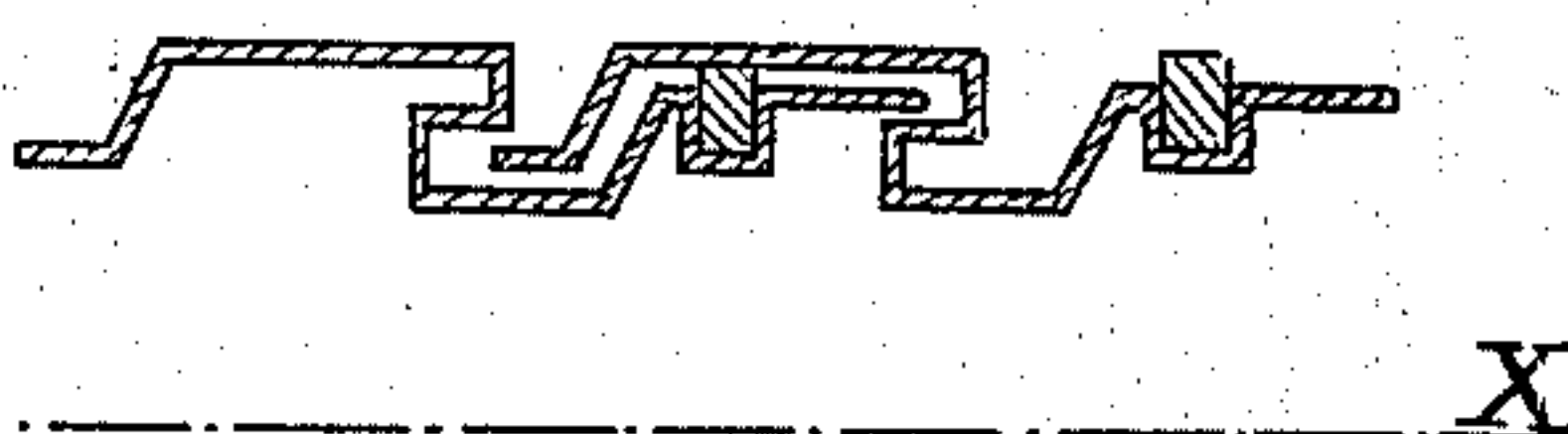


FIG. 7



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES RUDOLPH, OF PARIS, FRANCE, ASSIGNOR TO JAMES B. BRADY, OF NEW YORK, N. Y., AND CHARLES THOMAS SCHOEN, OF PHILADELPHIA, PENNSYLVANIA.

FLEXIBLE METALLIC TUBE.

SPECIFICATION forming part of Letters Patent No. 714,332, dated November 25, 1902.

Application filed March 1, 1902. Serial No. 96,312. (No model.)

To all whom it may concern:

Be it known that I, CHARLES RUDOLPH, manufacturer, a citizen of the Republic of France, residing at Paris, France, (post-office address 66 Rue du Theatre, Paris,) have invented a certain new and useful Improvement in Flexible Metallic Tubes, of which the following is a full, clear, and exact description.

This invention relates to the kind of flexible metallic tubes formed by rolling up in spiral shape of suitably-shaped strips of metal in such manner that the consecutive coils hook one into another.

The object of the invention is to furnish a new kind of tube, in which the cross-section of the metal strip is shaped in such manner as to give a tighter and stronger tube than those generally manufactured.

With my new design I can furnish a tube which stands very great pressure of steam and other liquid or gaseous fluids and in which no leakages occur.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a view partly in section and partly in elevation, illustrating the profile of the tube of this invention. Fig. 2 is a longitudinal section on a larger scale, showing the characteristic profile of my invention. Figs. 3 and 4 are views similar to Fig. 2, showing modifications. Figs. 5, 6, 7 show the same profiles as Figs. 2, 3, 4, rolled up inside out to form the tube.

As shown in Fig. 1, the tube is formed by rolling up in spiral shape a strip of metal, of which the profile constituting the essential character of the invention is fully described below. The successive coils hook into one another with a certain amount of play, thus rendering the tube flexible.

As shown in Fig. 2, the profile of the tube includes a part *a* parallel to the center *X X* of the tube, a part *b* inclined toward the center line, a part *c* parallel to the center line, a part *d* bent back over the part *c* and partly covering it, a part *e* perpendicular to part *d*, a part *f* parallel to the center line, a part *g* slightly inclined toward the center line, and a square or rounded groove *k*, in which a lining

of suitable material (by preference rubber or asbestos) is fitted in order to insure the tightness of the joint.

By means of the bent-back part *d* it is possible to combine together the elements of the tube in quite a new manner and effect a much stronger fastening than has been possible in tubes as made up to the present. This is due partly to the fact that in a certain part of the profile there are three thicknesses of metal *c d f* superposed and forming part of the same profile, which gives great strength to withstand the tendency of the tube to become untwisted under the strain of pressure or of manipulations, in consequence of which untwisting, as is well known to persons in this trade, the coils jump over one another and become unhooked.

The profile of the tube shown in Fig. 3 is similar to that of Fig. 2, with this difference, that instead of there being only one groove *k* there are two grooves *i* and *l*, which admit of the insertion of two distinct linings, thus insuring more thoroughly the tightness of the joint in the case of very high pressure.

The profile of Fig. 4 shows a modification of the profile of Fig. 2. In the former the part *d'* is partially bent back over the part *c'*, covering it; but the parts *c'* and *d'* are not jointed together, as is the case with the parts *c* and *d* in Fig. 2. On the contrary there is a space between them into which a horizontal part *m'*, which is a wing of the groove, is inserted. By this means a new additional fastening is obtained, which gives greater strength to the tube.

Figs. 5, 6, and 7 show that the tube can also be formed by rolling the profiles represented in Figs. 2, 3, 4 inside out—that is to say, that the part of the strip which in the one case is inside the tube is placed outside in the other, and vice versa.

Let it be understood that I do not limit my invention to the particular profiles described, and shown in the drawings, but that I reserve to myself the right to introduce modifications of the elements which constitute the profile, provided its chief characteristic is maintained—namely, the bending back of one of the elements of the profile.

What I claim is—

1. A flexible metallic tube, comprising a shaped strip, the profile of which includes opposite horizontal elements with intermediate inclined elements, an element bent back on another and partially covering the latter, and one or more grooves, the grooves containing a lining, and the strip being rolled spirally and its successive coils hooking into one another.

2. A flexible metallic tube, composed of a spirally-rolled-shaped strip including in its profile successively a part parallel to the center line of the tube, a part inclined toward

the center line, another part parallel to the center line, a part bent back on and joined to the last-named part, a part perpendicular to the center line, a third part parallel to the center line, a part slightly inclined toward the center line, and one or several grooves containing a lining.

In witness whereof I have hereunto signed my name, this 12th day of February, 1902, in the presence of two subscribing witnesses.

CHARLES RUDOLPH.

Witnesses:

LOUIS TAILFER,

WORLDWIDE HARTMANN.