

W. WILLS.
STRUCTURAL TUBING.
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1,154,955.

Patented Sept. 28, 1915.

Fig. 1.

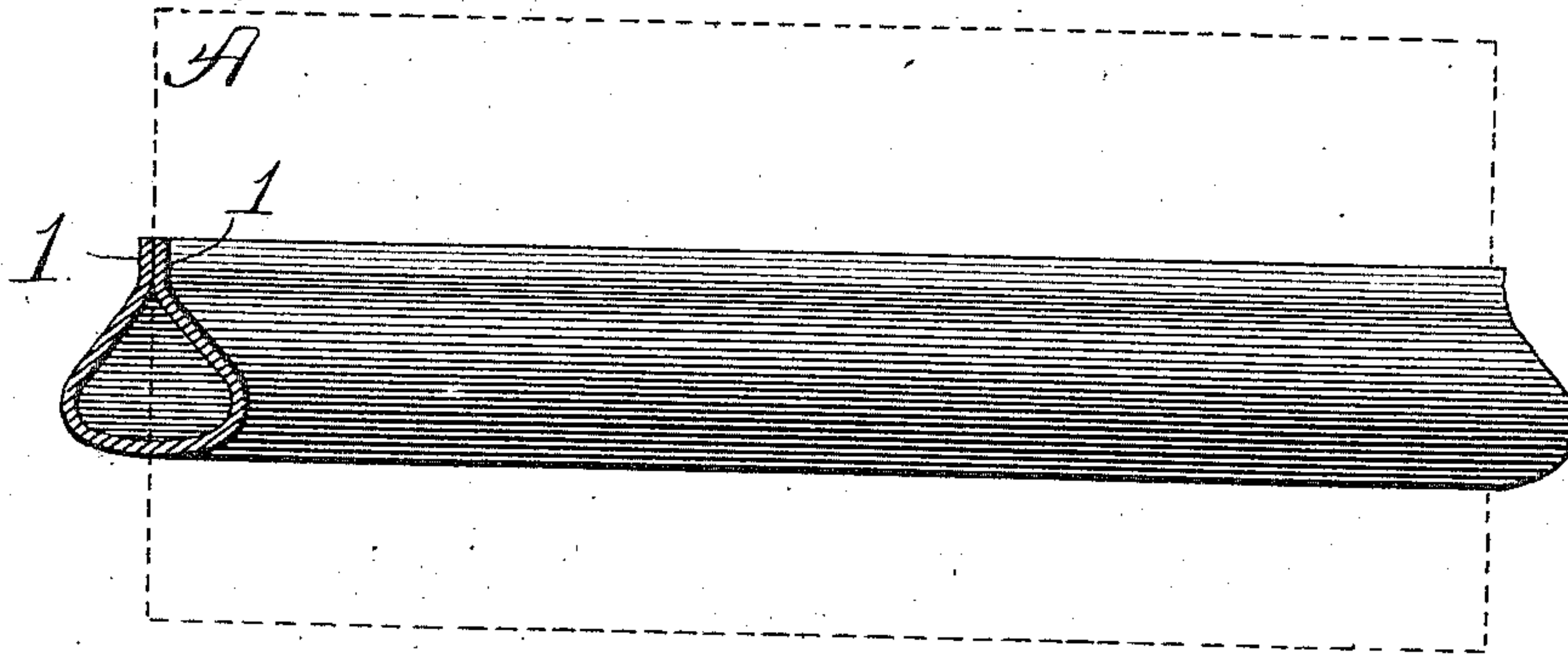
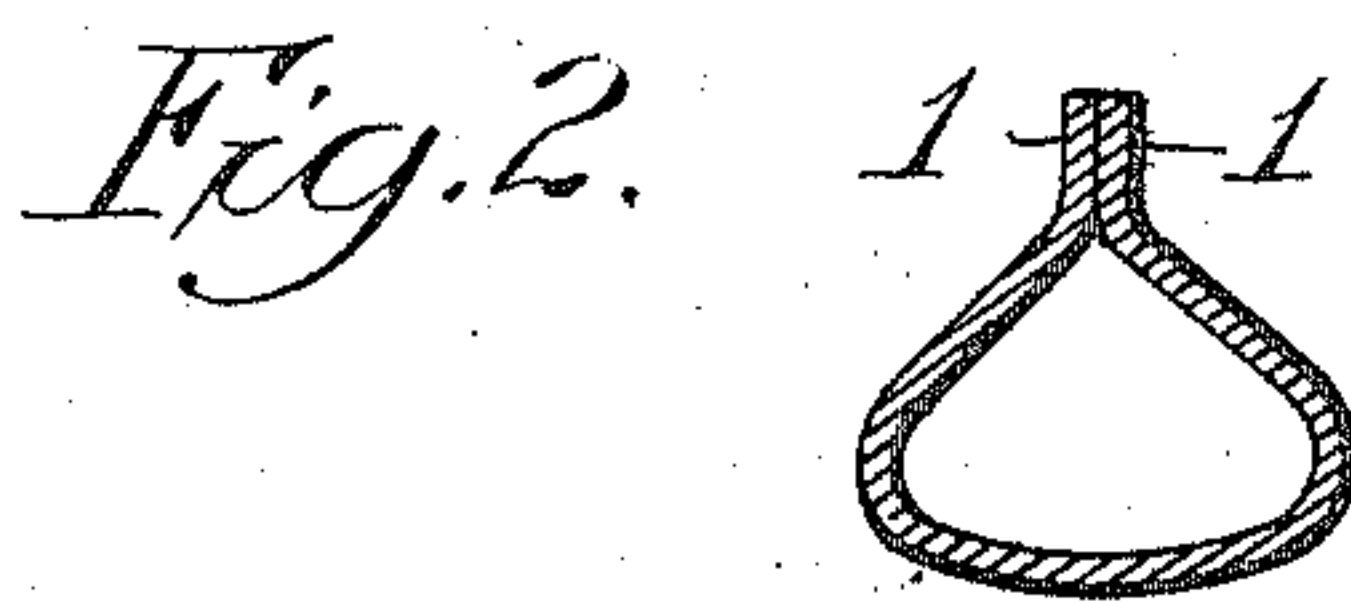
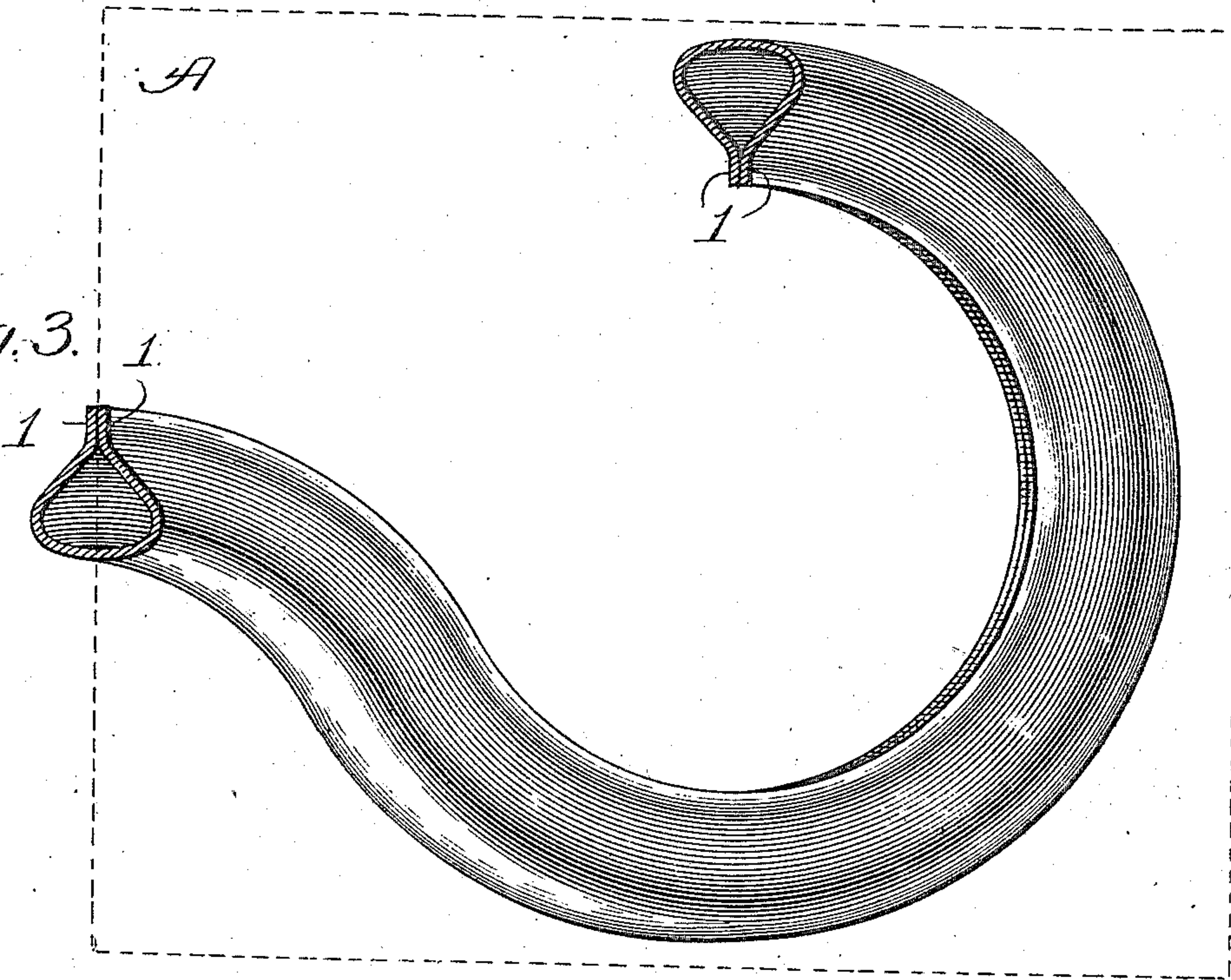


Fig. 3.



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UNITED STATES PATENT OFFICE.

WAYNE WILLS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
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STRUCTURAL TUBING.

1,154,955.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WAYNE WILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Structural Tubing, of which the following is a specification.

The object of my invention is to provide metallic tubing of steel, or metal having properties similar to steel, and possessing characteristics that adapt it for many purposes for which cast metal, rolled bars of flat or angular section, and other materials, are now used.

While cast iron, or other cast metal, lends itself readily to the production of irregular forms, it does not possess the degree of strength desirable for many purposes. Rolled bars of flat or angular section, while well adapted to many uses, do not for some purposes possess the rigidity of a tubular construction and where a finished and pleasing appearance is desirable are inferior to tubular forms. The high cost of seamless tubing restricts its use to a comparatively narrow field. Tubing of the cross sections heretofore available, formed of a strip of metal welded or otherwise secured together at its edges, possesses disadvantages in both the matter of initial cost and the cost and difficulty of bending or otherwise forming the tubular material. Tubing formed from a strip of metal, the edge portions of which abut against each other without being secured together, which I shall in this application designate as "open tubing", can be produced at a lower cost than seamless or welded tubing, but "open tubing" of the usual shape or cross section heretofore available cannot be economically bent cold to any considerable extent without a marked change in section or buckling.

The object of my invention more particularly stated is the production of a type of tubing that can be readily bent either during the operation of forming the tubing from a strip of metal or after the manufacture of the tubing has been completed.

In the drawing—Figure 1 represents a straight section of a preferred form of tubing embodying my invention. Fig. 2 is a transverse section of the tubing shown in Fig. 1; and Fig. 3 shows a piece of the tubing reversely bent and illustrating the man-

ner in which it may be curved in the construction of articles for which it is adapted.

I have discovered that tubing approximately triangular in cross section can be bent cold without a marked change in section or buckling, and without the necessity of using means within the tubing to prevent such change of section or buckling. Triangular section tubing may be bent as described, regardless of whether the meeting edge portions of the strip of material of which the tube is formed are welded together or merely abut against each other. The latter, *i. e.* "open tubing" of triangular section, will be found preferable for most purposes, as it costs less to produce than tubing closed by welding.

I preferably make the triangular tubing referred to by rolling the same from a strip of metal.

I do not in this application, however, lay claim to any particular method of manufacturing the tubing, but claim as my invention the triangular section tubing independently of the method by which it is made, and shall not therefore in this application enter upon any description of the process of forming the tubing.

Specifically the method of forming tubing of the section herein described and the method of bending the same may take many different forms, and in this application, therefore, I claim the method or process generically and without reference to the particular instrumentalities, whether the same be rolls, dies, or other suitable mechanism.

Referring to the drawing, it will be observed that the preferred embodiment of my invention consists of a strip of metal rolled or otherwise formed into a tube approximately triangular in cross section, the edge portions of the strip being brought together to form one of the angular edges of the tube and there turned outward to form a longitudinal projecting flange. The walls of the tube diverge in substantially V-form in cross-section from the flange and from the extremities of the divergent portions the walls converge in a direction away from the flange toward the part opposite the flange. The approximately triangular form shown in the drawings with the side opposite the flange convex is one embodiment of

the shape described, although, of course, strict adherence to the specific form illustrated is not necessary provided the shape conforms to the foregoing description. The edge portions 1 of the strip of metal contact with each other, as illustrated in the drawing, and may or may not be welded or otherwise secured together.

The initial tension between the edge portions of the strip of metal of which the tube is formed may be brought about during the manufacture of the tubing in a variety of ways. The sides of the tubing which converge toward the meeting edges 1 may at one stage of the formation of the tube be given an outwardly curved or convex form, and later the convexity may be rolled out of these side portions, thus causing the edge portions 1 to move in converging planes toward the junctions between the two edges. Such converging movement of the side walls of the tubing would set up the tension or pressure referred to between the meeting edge portions of the material.

The tubing above described, of approximately triangular cross section, can be bent cold, and without the use of means within the tubing to prevent change of section or buckling, provided the bending be effected in a plane passing through one of the angular edges of the tube and midway between the other two angular edges.

In the drawing I illustrate tubing of approximately triangular cross section having the edge portions, 1, of the metal meet at one of the angular edges of the tubing and being there turned outwardly in the form of a longitudinal flange. The plane in which the tubing is bent is represented in Figs. 1 and 3 by the dotted line rectangles A, and, as illustrated in Fig. 3, the tubing may be so bent in the plane A either toward or from the angular edge thereof at which the edge portions of the strip of metal meet. Tubing of this type is preferably so disposed in the structure in which it is used that the principal stresses act in the plane of the longitudinal flange formed by the meeting edges, 1, 1, of the strip of metal. The flange thus adds greatly to the strength of the structure,

while the tubular part contributes largely to its rigidity and to its resistance to stresses in other directions.

While I have illustrated and described a preferred form of triangular flanged tubing, my invention is not confined to the precise cross sectional form illustrated or to the precise form or manner of forming the longitudinal flange at the meeting edge portions of the strip of metal, and therefore it will be understood that in the following claims I do not use the words "triangular" and "flange" as necessarily limited to the precise structure shown in the drawings. As above explained, I use the term "open tube" as descriptive of a tube formed from a strip of metal, the edge portions of which meet and abut against each other but are not necessarily secured together by welding or otherwise.

What I claim is:—

1. A structural element consisting of an integral open tube with the edge portions of the material of which the tube is formed meeting and projecting in a flange, the walls of the tube diverging in substantially V-shaped form in cross section from the flange and the extremities of the divergent parts merging by curves into a flattened curved wall located opposite said flange whereby the tube may be readily bent into curved forms.

2. A metal tube consisting of a strip of metal bent into the form of an open tube with the edge portions of the strip meeting and projecting in a flange and with the walls of the tube diverging in substantially V-form in cross section from the flange and the extremities of the divergent parts merging by curves into a flattened curved wall located opposite said flange, said tube being curved in a plane passing through said flange and substantially bisecting the cross section of the tube.

In testimony whereof, I have subscribed my name.

WAYNE WILLS.

Witnesses:

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