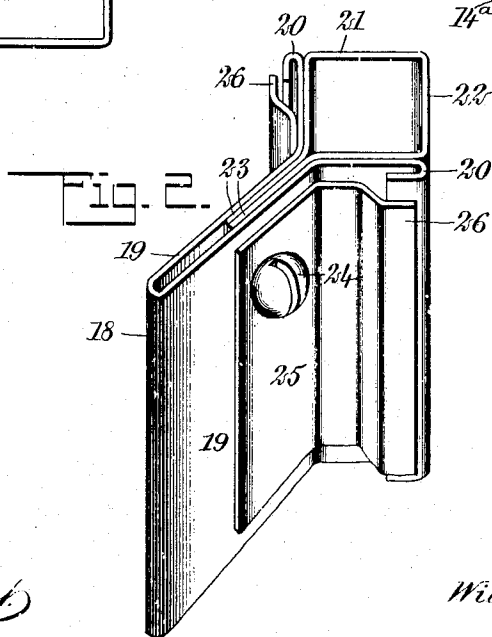
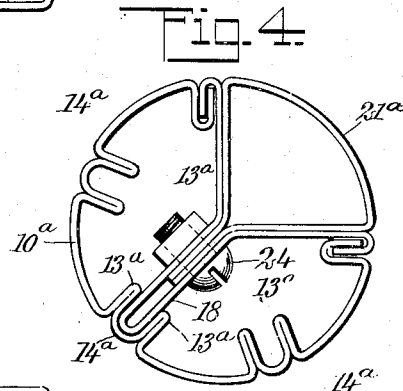
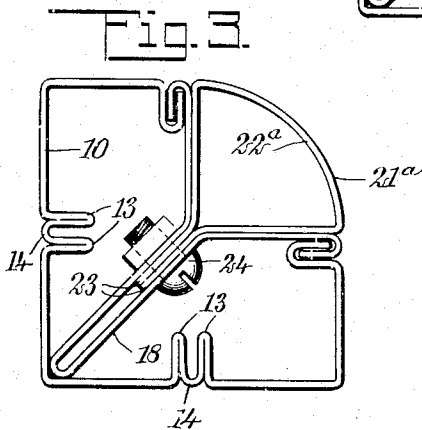
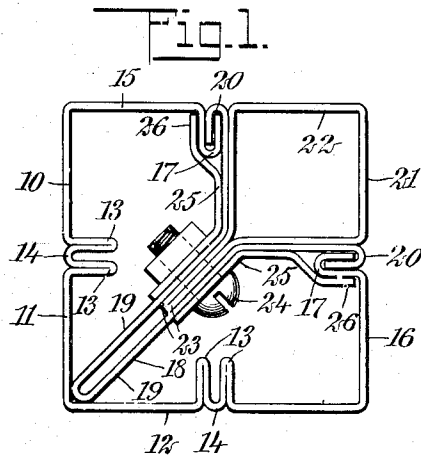


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SHEET METAL TUBING.
APPLICATION FILED NOV. 19, 1908.

939,039.

Patented Nov. 2, 1909.
2 SHEETS—SHEET 1.



WITNESSES

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Fig. 7.

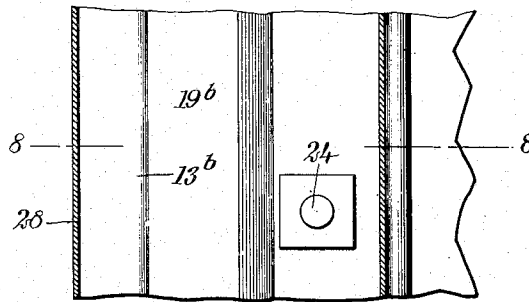


Fig. 8.

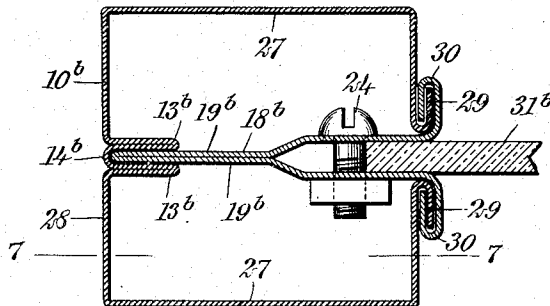


Fig. 5.

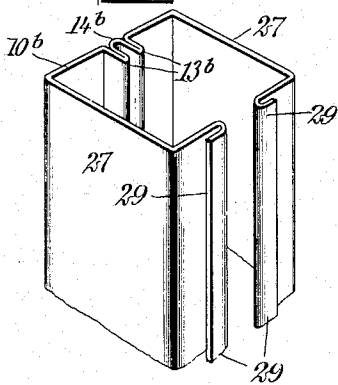
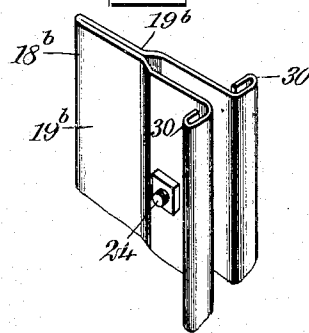


Fig. 6.



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SHEET-METAL TUBING.

939,039.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed November 19, 1908. Serial No. 48,365.

To all whom it may concern:

Be it known that I, WILLIAM P. LAWRENCE, a citizen of the United States, and a resident of Colorado Springs, in the county of El Paso and State of Colorado, have invented a new and Improved Sheet-Metal Tubing, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in sheet metal tubing, and more particularly to a construction of tubing for use in the frames of window sashes, window screens, or for the uprights or transverse members of metal furniture, or for paneling or any other similar structure in which it may be desired to employ sheet metal tubing.

The main object of the invention is to so construct the tubing that all unsightly fastenings will be concealed and the tubular structure present an ornamental appearance.

A further object is to so form the tube of separate sections, that the entire tube will be rigid and firm yet easily taken apart or put together in the manufacture of articles from the tubing.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is an end view of a tube constructed in accordance with my invention; Fig. 2 is a perspective view of a portion of the tube shown in Fig. 1; Figs. 3 and 4 are end views of tubes embodying slightly modified details of construction; Figs. 5 and 6 are perspective views of two members going to make up a further modified form of tube adapted for use in window frame or screen frame construction; Fig. 7 is a longitudinal section through a tube constructed of the members shown in Figs. 5 and 6, said section being taken on the line 7—7 of Fig. 8; and Fig. 8 is a transverse section taken on the line 8—8 of Fig. 7.

In each and all of the forms illustrated in the accompanying drawings, my improved tube is formed of a plurality of sections, one of which is formed of sheet metal and bent to bring the opposite edges adjacent each other but spaced apart, and a second section is disposed within the first-mentioned section and has its edges secured to the edges of the first-mentioned section. In connection with these two sections, I preferably employ a third section which, in the forms

shown in Figs. 1, 3 and 4, is also of sheet metal to form a complete tube; while in the form shown in Figs. 5 to 8, inclusive, this third section may constitute the edge of a pane of glass, a sheet of wire netting, or any other plate, sheet or device which it is desired to secure to the remainder of the tube.

The specific form of tube illustrated in Fig. 1 is rectangular in cross section, and the main portion or section 10 of the tube forms two adjacent sides of the rectangle and approximately one-half of each of the two remaining sides. The two adjacent sides 11 and 12 of this section, which form two complete sides of the rectangle, are each provided with two inwardly-directed folds, plaits, or plicatures 13, spaced a short distance apart and extending longitudinally of the side intermediate the edges thereof. These folds or plicatures serve to reinforce the sides and prevent them from bending, and they also serve to present an ornamental appearance, inasmuch as they are spaced apart a very short distance so that the portion of the material intermediate the two plicatures forms an outwardly-curved bead 14, extending longitudinally of each of the two sides midway between the edges. The other two sides 15 and 16 of the section 10 are each of a width substantially equal to one-half the width of the sides 11 and 12, and each terminates in an inwardly-directed bead 17. The two free edges of the sheet metal forming the section 10, terminate slightly below the planes of the two sides 15 and 16, and the two beads 17 adjacent these free edges each have an interior width substantially equal to the thickness of the metal.

The second section 18 of the tube forms a diagonal brace within the section 10, so as to add rigidity to the structure. The section 18 is folded intermediate its side edges to form two substantially parallel plates 19, lying diagonally of the tube and having the folded edge disposed within the angle of intersection of the two sides 11 and 12 of the other section. Adjacent the center of the tube, the two plates 19, 19, are bent away from each other at substantially right angles and at their free edges they are folded back upon each other to form two beads 20, 20, which cooperate with the beads 17 of the section 10, to hold the two sections together. The two beads 20, 20, extend over and in-

close the free edges of the sheet metal forming the section 10, and the free edges of the section 18 extend down into the beads 17. In appearance the outer portions of the beads 20, 20, are exactly the same as the beads 14, 14 in the sides 11 and 12. The two sections 10 and 18 are held together by the co-acting beads and flanges at their free edges and can be separated only by relative longitudinal movement.

The third section 21 is formed of sheet metal bent to form a tube 22 of substantially one-quarter the cross sectional area of the main tube and disposed between the diverging ends of the plates 19 of the section 18. The two sides of the tube 22 complete the other two sides of the main tube and are in alinement with the two sides 15 and 16 of the section 10. The other two sides of the tube 22 extend diagonally of the main tube and form plates 23 lying between the two plates 19, 19. The plates 19 and 23 are rigidly secured together in any suitable manner, as, for instance by a series of bolts 24, which may be readily placed in position before the sections 18 and 10 are brought together.

From an inspection of the outside of the tube, all four sides are exactly the same and no fastening members of any kind whatsoever are visible. No free edges of the sheet metal are disclosed and the adjacent portions of the tube at each of the four corners are formed of the same piece of metal, so that there are no beads, flanges or ridges along the corner angles of the tube. The plates 19 of the member 18 by extending diagonally, rigidly brace the entire tube and the several sides are prevented from being bent inwardly by the reinforcing action of the beads and folds or plicatures. In order to additionally brace the tube and particularly to prevent the side portions 15 and 16 of the section 10 from being bent inwardly adjacent the beads 17, I may, if desired, provide two separate plates 25, rigidly secured to the outer sides of the plates 19 by the bolts 24 and having their outer free edges 26 disposed in engagement with the sides 15 and 16 closely adjacent the beads 17. These plates may be secured to the section 18 before the latter is brought into engagement with the section 10.

In the specific form shown in Fig. 1, all four sides of the structure present substantially the same appearance and they are all of the same size. If desired, one or more of the corners may be rounded, so as to form a tubular structure circular in cross section or having some square and some rounded corners.

In the specific form illustrated in Fig. 3, I form the sections 10 and 18 identical with the corresponding sections shown in Fig. 1, but in place of the section 21, I employ a

section 21^a, having the tubular portion 22^a substantially sector-shaped, otherwise this form of my invention is substantially the same as that shown in Fig. 1.

In Fig. 4, I have illustrated a further modification in which the complete structure is circular in cross section. In this form, I employ the section 18 substantially identical with the sections 18 of Figs. 1 and 3, and I employ the section 21^a substantially identical with the section 21^a of Fig. 3. In combination with these two sections, I employ a third section 10^a, which is joined to the section 18 by interlocking grooves and flanges, but the section 10^a differs from the section 10 in that its outer peripheral wall lies substantially in the circumference of a circle rather than forming the sides of a rectangle. As many folds or plicatures 13^a and the intermediate beads 14^a, may be formed, as desired. One of these beads 14^a is preferably so disposed as to receive the folded edge of the section 18 and retain the latter and brace and reinforce the structure.

In case I desire to employ my invention for a tube, upright, bar, or in any other similar or analogous form, I preferably employ an arrangement of parts similar to the forms shown in Figs. 1, 3 and 4, but in case I employ my tube as a frame for a window, screen, or panel, I preferably utilize the plate or sheet of the window, screen or panel, to constitute the third section and close one side of the tube.

In Figs. 5 to 8, inclusive, I have illustrated a tube outlined as the frame for a window, the edge of the pane of glass going to form the equivalent of the third section. The outer or main section 10^b is substantially rectangular in form and two of its sides 27, 27, are oppositely disposed and substantially parallel. A third side 28 is provided intermediate its side edges with two inwardly-directed plicatures or folds 13^b, forming between them a bead or groove 14^b, the outer surface of which is substantially in the plane of the sides. The fourth side of the section 10^b is formed by portions of the opposite edges of the sheet metal forming the section, and these two edges terminate in outwardly and backwardly-folded flanges 29 lying parallel to the outer surface of the tube and spaced therefrom a distance substantially equal to the thickness of the sheet metal. The two flanges are spaced apart to leave an opening or slot therebetween into which extend the other two sections of the tube. The section 18^b is formed of sheet metal folded to present two substantially parallel plates 19^b, 19^b, which extend between the plicatures or folds 13^b, to brace the tube. The outer edges of the plates diverge and extend out through the opening in the side of the section 10^b and are folded outwardly and then inwardly to form flanges 30 interlocking

with the flanges 29 of the section 10^b, to hold the two sections against any relative movement save a longitudinal one. A plate of glass 31^b extends between the outer diverging ends of the plates 19^b and thus constitutes a section filling the opening or slot along the side of the tube. The plate of glass is rigidly secured to the section 18^b by a bolt 24 extending through the two plates 19^b, 19^b, said bolt being placed in position before the sections 10^b and 18^b are assembled.

The distance between the edges of the plates 19, 19 or 19^b, 19^b may vary within wide limits, but in each of the forms illustrated, it will be noted that each plate is locked to the outer or main section by co-acting flanges and that the space between the two plates adjacent these flanges, is filled by a third section which may constitute a permanent portion of the tube or which may be, to a certain extent, a portion of a panel, screen or window. It will also be noted that in each and all of the forms shown, all of the free edges of the sheet metal are entirely concealed and that no fastening members of any kind whatsoever are visible. The second and their sections are rigidly secured together before they are brought into engagement with the first section, and the second section extends transversely of the first section to constitute a diagonal or transverse brace.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A sheet metal tubular structure formed of separate longitudinally-disposed sections, one of said sections having the opposite edges thereof spaced apart, a second section disposed within said first-mentioned section and formed of sheet metal folded intermediate its edges and having the fold thereof in engagement with the inner surface of the first-mentioned section opposite to said spaced edges and having its edges extending outward radially and interlocked with the edges of the first-mentioned section, and a third section disposed between the edges of the second-mentioned section and forming a portion of the outer surface of the structure and having its edges extending inwardly into the fold of the sec-

ond-mentioned section and rigidly secured therein.

2. A sheet metal tubular structure formed of separate longitudinally-disposed sections, one of said sections having the opposite edges thereof spaced apart, a second section disposed within said first-mentioned section and formed of sheet metal folded intermediate its edges and having the fold thereof in engagement with the inner surface of the first-mentioned section opposite to said spaced edges and having its edges extending outward radially and interlocked with the edges of the first-mentioned section, a third section disposed between the edges of the second-mentioned section and forming a portion of the outer surface of the structure and having its edges extending inwardly into the fold of the second-mentioned section and rigidly secured therein, and separate bracing means entirely concealed within said structure and including two plates rigidly secured to said second section and each having an edge thereof adjacent the corresponding interlocking edge of the first section.

3. A sheet metal tubular structure formed of separate longitudinally-disposed sections, one of said sections having the opposite edges thereof spaced apart, a second section disposed within said first-mentioned section and formed of sheet metal folded intermediate its edges and having the fold thereof in engagement with the inner surface of the first-mentioned section opposite to said spaced edges and having its edges extending outward radially and interlocked with the edges of the first-mentioned section, a third section disposed between the opposite edges of said second section and rigidly secured thereto, and separate bracing means entirely concealed within said structure and including two plates rigidly secured to said second section and each having an edge thereof adjacent the corresponding interlocking edge of the first section.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM P. LAWRENCE.

Witnesses:

MATTHEW KENNEDY,
O. D. DODGE.