Sept. 29, 1942. L. BURKHARDT 2,297,133

STRUCTURAL DEVICE

Filed Dec. 1, 1939

Fig. 1

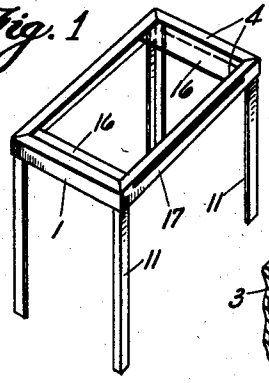


Fig. 2

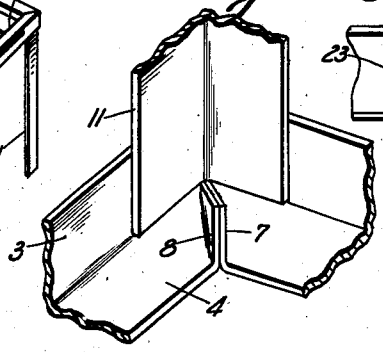


Fig. 12



Fig. 4

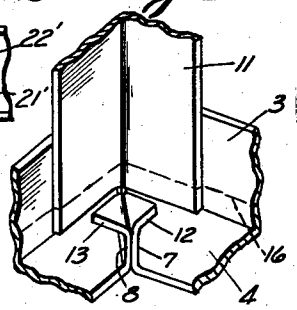


Fig. 3

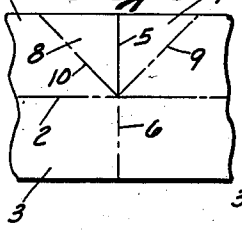


Fig. 5

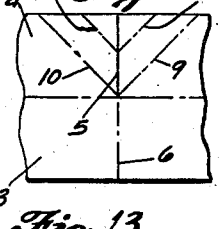


Fig. 7

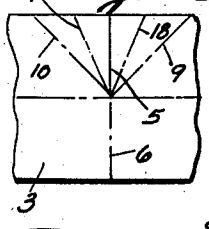


Fig. 6

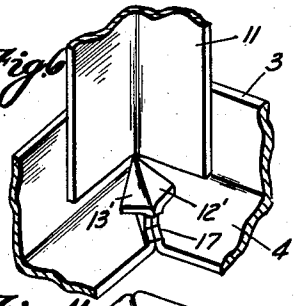


Fig. 13

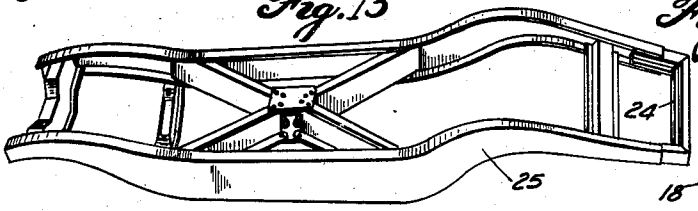


Fig. 11

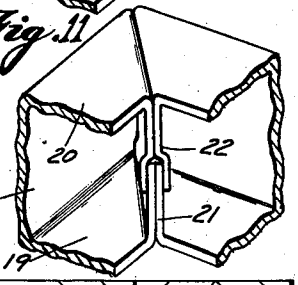


Fig. 14

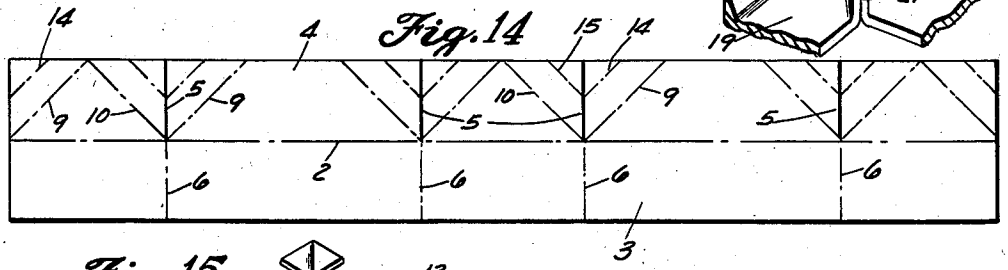


Fig. 15

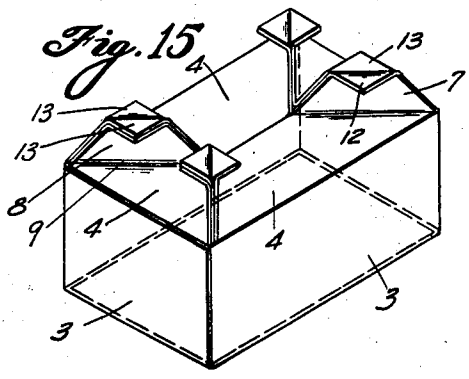


Fig. 8

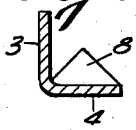


Fig. 9

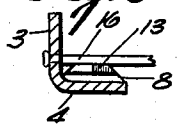
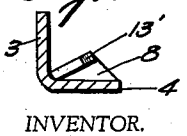


Fig. 10



INVENTOR.

LOUIS BURKHARDT

BY Louis W. Schmidt

ATTORNEY.

Patented Sept. 29, 1942 2,297,133

UNITED STATES PATENT OFFICE

2,297,133

STRUCTURAL DEVICE

Louis Burkhardt, Cleveland, Ohio, assignor to The Midland Steel Products Company, Cleveland, Ohio, a corporation of Ohio

Application December 1, 1939, Serial No. 307,149

4 Claims. (Cl. 229—16)

This invention relates to new and useful improvements in structural devices.

An important object is to provide for the disposition of portions of the same channel or angle member at a predetermined angle and fastening such portions in rigid angular relationship without causing overlapping of the exterior flange portions thereof, or wrinkling of the stock.

Another object of the invention is to provide in the disposition of such members, means which also serve for fastening another member thereto.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawing forming a part of the description and wherein like numerals are employed to designate like parts throughout the several views;

Fig. 1 is a perspective view of a table frame embodying the invention,

Fig. 2 is an enlarged fragmentary perspective view of the inner side of one corner of such table or other structural corner,

Fig. 3 is a fragmentary elevation of a portion of a flat strip with slit and fold lines indicated thereon to produce the angular disposition of portions of an angle member as shown at Fig. 2.

Fig. 4 is an enlarged fragmentary perspective view of a corner construction with a slight modification of the fastening means which serve as means for attaching a member thereto in spaced parallel relationship with one of the flanges of said member,

Fig. 5 is a view corresponding to Fig. 3 showing the fold lines productive of the joint shown in Fig. 4.

Fig. 6 is a view similar to Fig. 4 showing a slightly different treatment of the joint rendering it applicable to such products as picture frames and the like,

Fig. 7 is a view similar to Fig. 5 showing the fold lines for producing a supporting portion of the fastening means disposed at an acute angle to the flange of the member.

Fig. 8 is a reduced transverse section of the form of device shown in Fig. 2,

Fig. 9 is a similar transverse section of the device shown in Fig. 4,

Fig. 10 is a transverse section of the form shown in Fig. 6,

Fig. 11 is an enlarged fragmentary perspective view of a modified form of fastening means including the use of extensions of both flanges so that they can be connected together for additional reinforcement,

Fig. 12 is an elevation of this joint shown in Fig. 11,

Fig. 13 is a perspective view of an automobile frame making use of the construction herein described for a transverse cross member,

Fig. 14 is a blank embodying the invention laid out to produce a receptacle with integrally formed legs, shown in perspective in Fig. 15.

Referring now in detail to the drawing and to Figs. 1 to 4 inclusive, the frame of a table is shown in Fig. 1 as possessing a table top frame 1 constructed from a single strip of metal folded lengthwise at its longitudinal center on the dotted line 2 in order to provide a flange 3 arranged at right angles to a second flange 4. This single length of angle iron strip forms the two sides and the two ends of the frame 1. The strip is bent into rectangular form illustrated by providing the horizontal flange 4 with a slit 5 extending transversely thereof from the free longitudinal edge of the flange to the fold line 2 or angle of the angle iron. The vertical flange 3 is provided with a transverse fold line 6 in longitudinal alignment with the slit 5 to extend from fold line 2 to the free longitudinal edge of flange 3. Thus, by folding the angle strip along the line 6 extending transversely of the flange, the angle strip is bent to form one corner of the table top frame. The portions of the horizontal flange 4 on opposite sides of the slit 5 are folded along the dotted lines 9 and 10 respectively which converge from the free longitudinal edge of flange 4 and meet the inner end of the slit 5 where it meets the fold line 2. When the portions 7 and 8 are folded along the lines 9 and 10 to be disposed in a plane perpendicular to the horizontal flange 4, the angle iron is bent along the fold line 6 and the triangular portions 7 and 8 are juxtaposed with their adjacent sides in contact so that they may be riveted, welded or secured together with any other suitable means. Thus, the exterior faces of the joint or corner are perfectly smooth and free from overlapped portions which result from corner constructions formed in the customary way. In addition, the bending and fastening of the portions 7 and 8 provide the corner structure with an additional flange adding to the strength of the structure. This single length of angle iron is thus bent at three spaced points to provide the two sides and ends for the frame. The flange portion 4 of the two ends of the strip is bent at right angles along a fold line drawn at an angle of 45 degrees to the longitudinal fold line 2 to the free longitudinal edge of the flange so that the resulting tab or angular portion of

each end of the strip can be bent and abutted with its corresponding angular portion as shown in Fig. 2 to be suitably fastened together. Any form of table leg 11 can be provided, but as here shown each of the four legs is of a length of angle iron secured in each corner to the vertical flanges 3 by riveting, welding or otherwise.

Figs. 4 and 5 illustrate a slight variation of the table construction shown in Fig. 2 wherein the apices 12 and 13 of the triangular portions 7 and 8 are bent outwardly to extend in opposite directions along the fold lines 14 and 15 shown in Fig. 5. These fold lines are parallel to the fold lines 9 and 10 to provide the triangular portions with a platform arranged parallel to the horizontal flanges 4. A drawer slide 16 shown in dotted lines in Fig. 4 and full lines in Fig. 1, parallel with each end of the table top is secured to the portions 12 and 13 while the free edges of the guide may be notched as best seen in Fig. 4 to fit around the legs and be secured to the vertical flanges of the table top for holding the guide in spaced parallel relation with the upper horizontal flange 4. The vertical flange 3 constituting the front of the table is provided with a slot or opening 17 through which a drawer, not shown, may be inserted to slide along the guides 16. A table top, not shown, of any suitable construction can be attached to the frame of the table. Such top may be provided with a marginal flange around three of its sides to fit down over the vertical flanges of the table frame or may be merely a sheet of metal of appropriate size welded or otherwise suitably secured to the same. If desired, the drawer guides 16 may form supports for a slab of any suitable material closely fitting the opening in the top of the table defined by the horizontal flanges 4, to find support upon the drawer guides 16. In this event, the drawer feature would be eliminated in favor of the flat top fitted down within the opening defined by the table top frame.

In Figs. 6 and 7 is shown a slight variation of the form shown in Fig. 4, the difference being in the angularity of the wing portion 12' and 13' relative to the horizontal plane of flanges 4. In addition, the vertical stems 7 and 8 are notched as at 17 for the reception of the edges of a plate, not shown, which may form the top of the table or which may be the edges of a sheet of glass and a picture when the construction is used as a metallic picture frame. In this event, the metal from which the joint is formed may be relatively thin, so that the wings 12' and 13' can be bent by hand to press against the margins of the picture or sheet placed in the notches 17 for holding it in place. These wings 12' and 13' are provided by holding the portions 7 and 8 along fold lines 18 and 19 converging to a point where the fold lines 9 and 10 meet the ends of the slit 5. In heavier structural work, the wings 12' and 13' can be employed for fastening a strut member at an angle to the horizontal flange portions for bracing purposes.

In Figs. 11 and 12, a further modification of the corner construction is illustrated wherein a channel member is used in forming the corner construction, so that each flange portion may be provided with right angular extensions which can be inter-connected to further brace the structure. Referring to Fig. 11, a channel member is provided with a relatively narrow web 18 and a pair of parallel horizontal flanges 19 and 20 which are much wider than the web. Both of these flanges are slit as in the preceding forms and the portions 21 at opposite sides of the slit are bent normal and inwardly of its respective flange to provide juxtaposed flanges 21 secured together in any suitable manner. The wing portions 22 of flange 20 are bent inwardly of the channels and are offset as shown to straddle the flange portions 21 to be secured thereto in any suitable way. Due to the flanges 19 and 20 being much wider than the web, more material is provided for the flanges 21 and 22 so that they will be extensive enough to be overlapped and secured together to further brace and reinforce the spaced flanges 19 and 20. Any desired angle can be formed in any of the channels for angle members by varying the angularity of the fold lines 9 and 10, as will be obvious.

In Fig. 12 a modification of the form shown in Fig. 11 is illustrated wherein the innermost ends of the double flanges 21' and 22' are bent outwardly into horizontal wings 23 which are secured together as illustrated, in any suitable manner. A U-shaped channel member formed as in Figs. 11 and 12 may be employed as the front or rear cross member 24 of an automobile frame 25 as shown in Fig. 13. In some instances, instead of the channel sections, the angle iron section shown in Figs. 2 to 6 may be employed for the cross member of the automobile frame. The cross member 24 for the automobile frame may have its corners provided with gusset plates which may be installed by providing the flanges 21 and 22 with notches or openings 17 as in Fig. 6, in which the apices of triangular gusset plates, not shown, can be inserted and secured to the inner surfaces of the upper and lower flanges 19 and 20.

This corner construction shown in Fig. 4 may be applied to the construction of rectangular receptacles with legs constructed from metal, cardboard or paper as shown in Figs. 14 and 15. The legged receptacle of Fig. 15 is formed from a single strip of material provided at proper intervals to provide all sides and ends of the receptacle, with transverse slits 5 and fold lines 2, 6, 9, 10, 14 and 15 as in Fig. 4. The width of the strip is sufficient to provide an integral bottom for the receptacle from the width of the flange 4. To form the receptacle, the blank is folded longitudinally along the fold line 2 to form the strip into angle formation with flanges 3 and 4, after which the strip is folded transversely along the fold line 6 to form a corner of the receptacle. The triangular portions 7 and 8, formed by each slit 5 are then folded normal to the flange 4 and are juxtaposed at each corner of the receptacle to form a diagonally arranged leg which may have the wings 12 and 13 bent in opposite directions to form feet upon which the receptacle may stand. The strip is provided with four of these corner constructions to form the rectangular receptacle, and the ends of the five section strips are provided with fold lines 9 and 14 to correspond with the leg fold lines, when one end of the receptacle is provided with a double thickness of material. However, when a double thickness end is not provided, the strip has only four sections as will be readily understood. This folding of the strip to provide a four sided receptacle discloses the flange 4 as illustrated in Fig. 15 to form the bottom of the receptacle; the longitudinal edges of oppositely disposed flange portions 4 being welded or secured together with

an overlying strip to completely close the bottom of the receptacle. In this modification of the invention, it will of course be understood that the triangular portions 7 and 8 are bent outwardly of the angle strip to form the legs of the receptacle, rather than being folded inwardly of the angle strip as shown in Fig. 4 in which case it is desired to maintain the exterior surfaces of the strip in place without any overlapped portions fastening the corner constructions. In this manner, the interior surfaces of the receptacle are free from projections and are perfectly smooth.

It will of course be understood that various other applications of the structures may be made and that various changes in the shape and relationship of parts may be restored to without departing from the scope of the appended claims.

I claim:

1. A structural joint comprising an angle member having one flange slit transversely thereof from its free longitudinal margin across and up to the point of intersection of said flanges, said flange also being bent along lines extending from said free margin to the end of the slit at said point of intersection to provide a pair of triangular portions arranged normal to said flange and secured together to hold portions of the other flange in angular relationship, and the ends of said triangular portions being extended in opposite directions and arranged in a plane to provide a support spaced from the plane of said other flange.

2. A structural joint comprising an angle member having one flange slit transversely thereof from its free longitudinal margin across and up to the point of intersection of said flanges, said flange also being bent along lines extending from said free margin to the end of the slit at said point of intersection to provide a pair of triangular portions normal to said flange and secured together to hold portions of the other flange in angular relationship, and the ends of said triangular portions being extended in opposite directions and arranged in a plane to provide a support spaced from the plane of said other flange, and a member secured upon said support.

3. A structural joint comprising an angle member having one flange slit transversely thereof from its free longitudinal margin across and up to the point of intersection of said flanges, said flange also being bent along lines extending from said free margin to the end of the slit at said point of intersection to provide a pair of triangular portions normal to said flange and secured together to hold portions of the other flange in angular relationship, and the ends of said triangular portion being extended in opposite directions and arranged in a plane to provide a support parallel to the plane of the said other flange.

4. A receptacle with legs formed from a single elongated piece of material folded lengthwise thereof to define angularly disposed side and bottom flanges, the bottom flange being slit transversely from its longitudinal margin across to the point of intersection of said flanges and at intervals, the portions of the bottom flange at opposite sides of each slit being bent in the same direction normal to the bottom flange along lines converging from the free longitudinal margin thereof to the inner end of said slit, and the side flange being folded at the same intervals as said slits and along lines in alignment with said slit to juxtapose the aforesaid portions in pairs which are secured together to form legs at the corners of the receptacle and to hold the sections of said bottom flange substantially coplanar to form a closed bottom for the receptacle.

LOUIS BURKHARDT.