May 12, 1942. F. W. FREY 2,282,859

BOX CONSTRUCTION

Original Filed Sept. 21, 1933 2 Sheets-Sheet 1

Fig. 1.

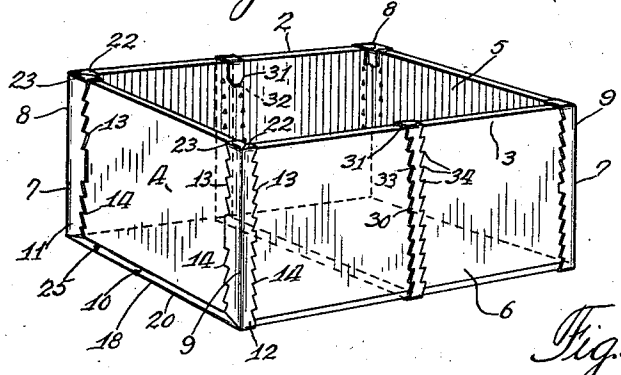


Fig. 6.

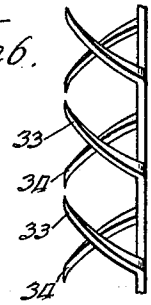


Fig. 5.

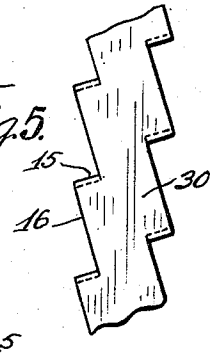


Fig. 2.

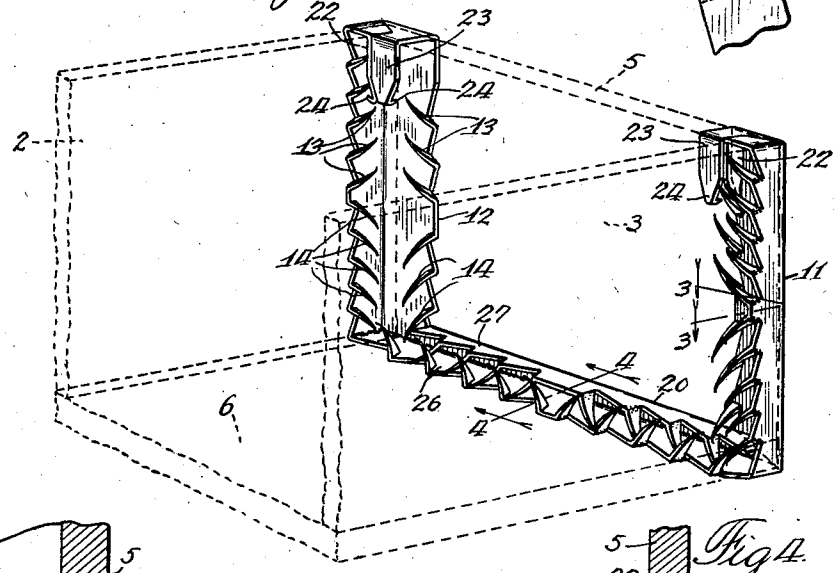


Fig. 3.

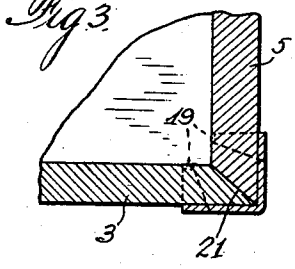
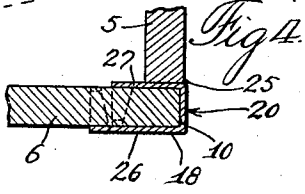


Fig. 4.



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BOX CONSTRUCTION

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Fig 9

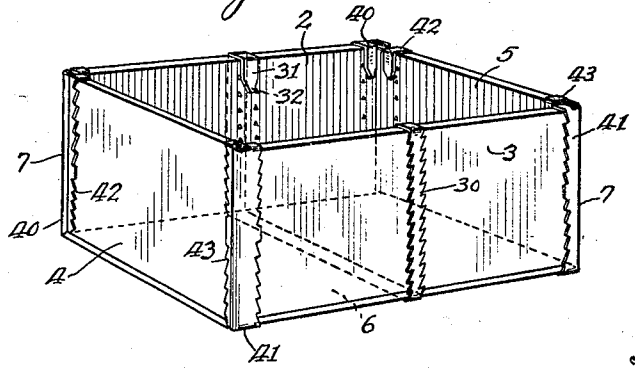


Fig 10.

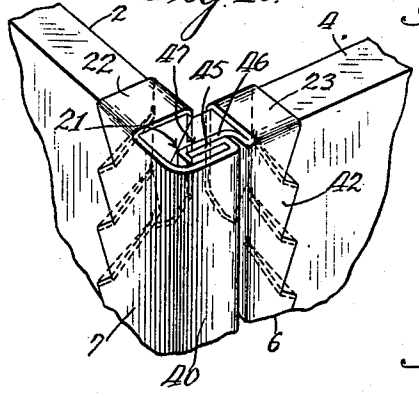


Fig 7.

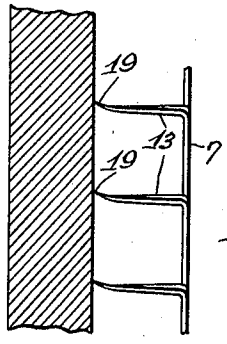


Fig 8

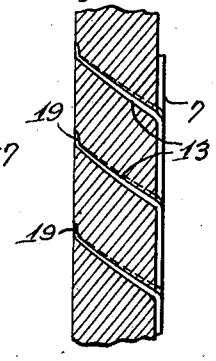


Fig 13.

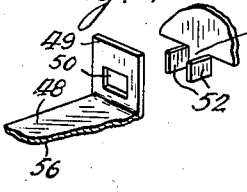


Fig 11.

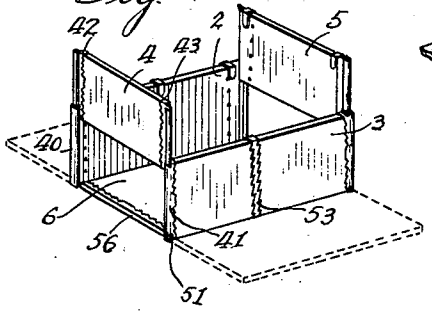
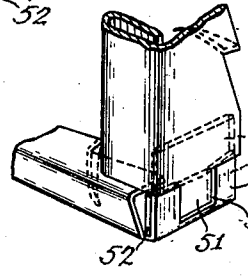


Fig 12.



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UNITED STATES PATENT OFFICE

2,282,859

BOX CONSTRUCTION

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Refiled for abandoned application Serial No. 690,393, filed September 21, 1933. This application January 5, 1940, Serial No. 312,545

10 Claims. (Cl. 217—5)

My invention relates to the construction of boxes. More particularly, my invention has reference to a box having its parts secured together by reinforcing means having for its general purpose not only the fastening of the parts together into a substantially rigid unit but also the preventing of buckling or warping and the use of lighter material without sacrifice of strength.

Briefly, my invention distinguishes from the prior art by an extremely simple and strong construction. It is commonly known that boxes having their parts secured together by nails or the like are of short life. The nails loosen and drop out of place and the parts shrink when not firmly secured together. If the boxes are to be used, say for the cartage of beverages where there is a return of the boxes with the empty bottles to the dispenser, cooperage warehouses must be maintained at great expense. Each time the boxes are brought back, the boxes are examined and the loose nails are driven into place or the lost nails replaced. Handling the boxes in this manner, as well as the rough usage given them under ordinary conditions, causes parts to be broken or split which must be renewed frequently. The maintenance expense of such boxes is relatively great and, therefore, their present construction has proved generally unsatisfactory.

Primarily, the object of my invention is to obviate the disadvantages and includes the provision of an improved form of box construction which is light and inexpensive. A further object is to provide the parts of the box of the same thickness without a sacrifice of strength and thereby eliminate the necessity of furnishing heavier end members. Another object of the invention is the provision of a novel form of reinforcing strip embracing the adjoining edges of the box parts, preferably at the ends of the box, and secured thereto to provide a neat, simple and rigid interlocking action between the parts. A further feature of the invention resides in the manner in which the reinforcing strip is secured to the parts of the box so as to obviate their buckling or shrinking and assure that the reinforcing strip is driven into position without wrinkling and without taking hold firmly.

The following advantages are the result of the invention:

(*a*) Elimination of nails, screws and rivets;
(*b*) Less lumber and lighter box;
(*c*) Assembly costs simplified and cheapened;
(*d*) Greater strength and longer life;
(*e*) All parts of the box are of same thickness without a sacrifice of strength;
(*f*) Preservation of the continuity of the edges and the prevention of irregular projections by eliminating buckling or shrinkage;
(*g*) Protection to the edges by the embracing relation of the reinforcing strip; and
(*h*) Detachable connections between the various parts of the box to permit complete dismantling for shipping purposes or replacement of one or more parts.

In order to apprise those skilled in the art how to practice my invention, I shall now describe several embodiments thereof when taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of a box embodying the invention broadly;

Fig. 2 is an enlarged detail view illustrating the members or parts of the box in dotted lines and the reinforcing strip in full lines so as to show the position of the prongs after driven into the parts of the box;

Fig. 3 is an enlarged detail view taken on the line 3—3 of Fig. 2;

Fig. 4 is a similar detail view taken on line 4—4 of Fig. 2;

Fig. 5 is an enlarged detail view of a portion of the interlocking strip—say the strip employed intermediate the ends of the box, to show the angle at which the edges are cut to form the prongs;

Fig. 6 is a detail view of one side of the interlocking strip shown in Fig. 5 to show the relative position of the prongs along both edges after driven into position;

Fig. 7 is an enlarged detail view illustrating the slight curvature of the tips of the prongs;

Fig. 8 is a similar view to illustrate the manner in which the prongs enter the box members at an angle by virtue of the tip curvature;

Fig. 9 is a perspective view similar to that shown in Fig. 1 illustrating another embodiment of the invention, this being the preferred embodiment;

Fig. 10 is an enlarged detail view of one of the corners of the box shown in Fig. 9 to illustrate in detail the detachable interlocking engagement employed between the adjoining edges of the end members and the side members;

Fig. 11 is a perspective view of another embodiment of the invention, this likewise being a preferred embodiment;

Fig. 12 is a detail perspective view of the corner between the bottom and the side members

of the box shown in Fig. 11, illustrating a detachable connection between these parts; and

Fig. 13 is a detail view illustrating the parts that form the connection.

It will be understood at the outset that the invention need not be limited to any particular type of box construction inasmuch as the invention may be applied to various forms of boxes and containers.

For purposes of illustration, however, I have shown in Fig. 1 a box comprising side members 2 and 3, end members 4 and 5, and a bottom member 6, made of any suitable penetrable material, such as, for example, wood, fibrous composition, or the like.

To secure these members together, a reinforcing strip designated generally as 7 may be provided along the corner or adjoining edges of the side members 2 and 3 and the end members 4 and 5, a similar reinforcing strip being provided to embrace the end edges of the bottom member 6 so as to protect them against wear if so desired, while any number of similar reinforcing strips may be provided intermediate the ends of the box. Reinforcing strip 7 is preferably formed of metal, although any other suitable type of material may be used. It may be shaped to embrace the corner or adjoining edges 8 and 9 so as to protect these corners and allow prongs formed along its sides to pierce the box members and be anchored therein. These prongs are preferably divided into two groups, the upper portion 13 and the lower portion 14.

To effect a substantially firm grip in the fibre of say the wood out of which the box members may be made, the prongs 13 and 14 may be cut at an angle, as illustrated at 15, in Fig. 5, so as to enter the fibre at an angle to the axis of its grain and so as to prevent slippage of the prongs and secure a firmer anchorage in the wood.

In forming the prongs, the sides of the strip 7 are cut inwardly to form the slanting edges 16 and the prongs are thereafter bent along the lines 15 which, it will be noted, are at right angles to the edges 16, to give such prongs a slightly tilted position with respect to the strip 7 itself. The tips 19 of the prongs 13 and 14 are curved slightly, it being noted in Fig. 2 that this tip curvature of the upper and lower prongs extend in opposite directions whereby to cause the prongs of each group to enter the wood in opposite directions.

Strip 7 at each end of the box may be applied to the edges in a number of different ways. For example, each strip 7 may be provided as individual strips 11 and 12 for the corners or adjoining edges 8 and 9, respectively. Then the edge 10 of bottom member 6 may be embraced by a strip 18 formed separately from the vertical side strips 11 and 12, this being shown in Fig. 11, and will be described more in detail later on. It will be apparent that many arrangements are possible for the application of the reinforcing strip 7 to the corners or edges of the box.

In the construction shown in Figs. 1 and 2, the strip 18 along the edge of bottom member 6 is integral with the vertical strips 11 and 12. Irrespective of the arrangement employed, vertical strips 11 and 12 are preferably formed as angle members to embrace the corners or adjoining edges 8 and 9. The vertical edges of reinforcing strips 11 and 12 are each provided with the prongs 13 and 14 formed preferably in the manner above described. The slightly curved tips 19 of the prongs compel the prongs to enter at an angle perpendicular to the face of the box members. The angle of entry for the upper prongs 13 is, as explained heretofore in an upward direction, while the angle of entry of the lower prongs 14 is in a lower direction. This opposed relation between the angles of entry of the upper and lower prongs has a two-fold advantage. The first advantage is that in driving the prongs into position, any tendency of the strips to flatten out is overcome. In this connection, it has been found that if all the prongs are in the same direction, there is a tendency for the prongs to bend at their juncture with the strip. The second advantage resides in the firmer gripping action of the prongs, providing, in effect, an opposed interlocking action between the prongs and the wood. A greater gripping action may be obtained because the prongs are firmly anchored and capable of resisting opposing forces tending to dislodge or cause the box members to be displaced. I have further found that the prongs entering the wood in angular directions, as described, tend very effectively to prevent warping or shrinking of the box members, and so strengthens the edges of these box members that they are less liable to be cracked or split during the life of the box.

The fact that the reinforcing strips may be applied evenly against the face surfaces of the box members without wrinkling or flattening out, eliminates undesirable projections from the box edges. A clean smooth edge is presented, accordingly, along the edges of each end of the box, which aids in the easy handling of the box during stacking and prevents objects from catching hold of the edges of the strips 7 and causing displacement of these strips.

The material of the box members 2 to 6, inclusive, may be of wood or other kind suitable for the use to which the box is intended to be put. Moreover, these parts may be of any construction, but it has been found that mitering the corners, as indicated at 21, will form a very substantial unit when the parts are assembled and provided with these reinforcing strips. Such mitering of the corners of the parts will be noted in Fig. 3.

In Figs. 2 and 3, the fashion in which the upper and lower prongs 13 and 14 grip the corners of the adjoining members will be noted. The prongs enter the penetrable material of the members, and being preferably provided longer than the thickness of the material, their tips are turned over to lie flush with the inside faces. A hooklike tip is thereby provided, which tends to increase the anchoring action of each prong. Again, it will be noted that the prongs entering the side members 2 and 3 of the box are at right angle positions with respect to the prongs entering the end members 4 and 5. Any force tending to displace the end members 4 and 5 will be counteracted by the prongs anchored in the side members 2 and 3 at right angles, of course, to the direction of the force. The prongs are so securely held or anchored in the box members that it is found that a box constructed in accordance with the disclosure herein, has an exceptionally long life. The tips or upper ends of the individual reinforcing strips 11 and 12 may be cut so as to be formed in downwardly extending lips 22 and 23. Each lip is provided with a prong 24, which pierces the inside of their respective members to hold the lips 22 and 23 securely in position. Furthermore, these lips 22 and 23 present a very neat, finished corner along the upper edge of the box

parts and protects these corners or edges against undue wear.

The individual reinforcing strip **20**, whether integral with the strips **11** and **12** or made separately, preferably embraces the edge **10** of the bottom member **6**. See Fig. 4. I find that it is this edge **10** of the bottom member **6** that experiences considerable wear and needs protection, while the lower edge **25** of the end members **4** and **5** does not require protection. Strip **20** is accordingly in the form of a channel, the bottom leg **26** of which is slightly longer than the top leg **27**, this being provided so that their prongs will enter the bottom member in offset relation so as not to interfere with each other. The bottom leg is preferably the longer leg so that it will prevent the tips of the prongs entering downwardly from projecting through the bottom member **6**.

In assembling the various box parts **2** to **6**, inclusive, the reinforcing strips are first applied to side members **2** and **3** and to the bottom member **6**. The end members **4** and **5** with their vertical side edges beveled are then placed in position against the vertical end edges of the side members **2** and **3**. The vertical end edges of the end members **4** and **5** are also beveled to form with the beveled vertical side edges of end members **4** and **5** the mitered joint shown in Fig. 3. Thereafter, the reinforcing strips **7** are bent into position against the end members **4** and **5** and the prongs thereof are pressed into said end members.

To reinforce the center of the box, I have shown a reinforcing strip **30** that extends about the outside of the box, each end thereof being provided with a lip **31** which extends over the top edge of the side members **2** and **3** and downwardly within and against the inside faces, there being prongs **32** which also pierce the side members **2** and **3** to hold these lips **32** in position. The edges of the reinforcing strip **30** are also provided with prongs formed in a slightly different manner than those heretofore described. Prongs **33** along the left-hand edge of strip **30**, as shown in Fig. 1, are cut so that they angularly extend upwardly when driven into position, while the prongs **34** along the edge on the right-hand side are cut so that they angularly extend downwardly, these prongs **33** and **34** preferably being arranged in staggered relation to effect a very secure interlocking action, this being shown in detail in Fig. 5.

Another preferred form of the invention is shown in Figs. 9 to 13, inclusive. I have found it advisable to be able to replace certain parts of the box in the event they are broken, and also to facilitate shipment thereof.

In Fig. 9, there is specifically shown a construction of box in which the end members **4** and **5** only are removable.

A construction in which all the members of the box are removable is shown in Fig. 11.

Referring particularly to Fig. 9, the reinforcing strip **7** is likewise divided into individual vertical strips **40** and **41**, these strips preferably being applied to the ends of the side members **2** and **3**; that is to say, one of the vertical edges only of these strips is provided with prongs of the same construction heretofore described, which prongs are anchored in the side members **2** and **3**. The end members **4** and **5** are also provided with reinforcing strips **42** and **43**, having one of their vertical edges only provided with prongs, the same as in the case of the reinforcing strips **40** and **41**. The prongs of strips **42** and **43** enter the end members **4** and **5**. The free edges of the strips **40** and **42** and the strips **41** and **43** are preferably formed into interlocking flanges **45** and **46**, adapted to fit into each other in slidable relation so that the end members **4** and **5** of the box may be removed at will.

By referring particularly to Fig. 10 showing an enlarged detail view of the strips **40** and **42**, it will be observed that their respective flanges **45** and **46** are formed to interlock with each other, while the end member is adapted to have its edge cut away, as indicated at **47**, so as to permit these flanges to be recessed in the cutaway portion **47**. Accordingly, the flanges are preferably flush with the outer face of the end member **4**.

In Fig. 11 the side members **2** and **3**, end members **4** and **5**, and the bottom member **6** may be readily dismantled for shipping purposes, or for replacement. The end members **4** and **5**, and their reinforcing strips **42** and **43**, together with the reinforcing strips **40** and **41** of the side members **2** and **3**, are of substantially the same construction as shown in Fig. 9. However, in this form, the reinforcing strips **56** embracing the edges of the bottom members **6** have their lower leg **48** of the channel, of which they are formed so as to embrace these end edges of the bottom member **6**, extend laterally outwardly and upwardly in the form of a lip **49** provided with an aperture **50**. The lower ends of the vertical reinforcing strips **40** and **41** applied to the end edges of the side members **2** and **3** are formed with a downwardly extending lip **51** provided with a pair of parallel spaced ears **52**, this being shown in detail in Fig. 13.

In the assembly of the side members **2** and **3** to the bottom member, the ears **52** are passed through aperture **50** and bent laterally outwardly, as shown in Fig. 12. The same form of detachable connection may be provided for reinforcing strips **53** passing about the box intermediate the ends. It will be remembered that the removable interlocking flanges **45** and **46** on the end reinforcing strips **40** to **42**, inclusive, provide a very secure fastening for the end members **4** and **5**, and, after the side members **2** and **3** are secured to the bottom member **6**, the insertion of the end members **4** and **5** results in a very rigid and strong box. When the end members **4** and **5** are in position, it is impossible for the box to collapse. Removal of these end members **4** and **5** will allow the side members **2** and **3** to be readily detached from the bottom member. A construction is provided which may be readily dismantled to facilitate shipping thereof.

Without further elaboration, the foregoing will so fully explain the gist of my invention that others may, by applying current knowledge, readily adopt the same for use under varying conditions of service, without eliminating certain features, which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to me by the following claims.

I claim:

1. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, a reinforcing strip at each end of the box bent to embrace the vertical adjoining edges between the side members and the end members and to extend integrally across and embrace the edge of the bottom member in face contact with the upper and lower faces thereof, and prongs projecting from each rein-

forcing strip for entering the penetrable material of said members whereby to interlock said members into a rigid unit and protect their edges against wear.

2. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, reinforcing strips for holding said members in position, and prongs on said reinforcing strips adapted to enter the penetrable material of said members, said prongs being bent to enter the penetrable material of each member at different angles to provide an interlocking grip resisting displacement of each member.

3. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, reinforcing strips for holding said members in position, and prongs on said reinforcing strips adapted to enter the penetrable material of said members, the angle of entry of the prongs for each member being arranged in opposing relation whereby to provide an opposing interlocking relation between said prongs and said members.

4. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, reinforcing strips for holding said members in position, and prongs projecting from along the edges of said reinforcing strips and entering the penetrable material of said members to interlock them into a substantially rigid unit, the prongs of each member being arranged in opposing groups, the prongs of said opposing group being arranged to enter in opposite directions in each member to provide an opposing interlocking action between said prongs and said members.

5. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, reinforcing strips bent to embrace the adjoining edges of said side and end members, and prongs along the edge of said strips engaging each member, the prongs at one end along each edge being driven into said members in opposite direction to that of the prongs at the other end to increase the interlocking action of said prongs.

6. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, reinforcing strips embracing the adjoining edges of said side and end members, said reinforcing strips continuing integrally across the edge of said bottom member, and interlocking elements on said reinforcing strips entering each of said members at different angles.

7. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, reinforcing strips embracing the adjoining edges of said side and end members, prongs along the edges of said reinforcing strips entering said members, and lips formed on said strips to extend over the upper edges and down against the inside faces of said side and end members and having interlocking prongs engaging said side and end members.

8. A metallic staple in strip form, prongs formed along its edges, said prongs along each edge being formed into groups, and the tips of the prongs of each group being slightly curved in the same direction to each other but in opposite direction to the prongs of the other group whereby to cause the prongs of each group to have an angle of entry in the direction of their tip curvature when driven into position.

9. In a box constructed of penetrable material, the combination of side members, end members, and a bottom member, the vertical ends of said side members and the vertical ends of said end members being beveled and cooperating to form mitered joints where they meet at the corners of the box, the horizontal bottom end of each end member having an end face parallel and adjacent to said bottom member and forming an unbeveled joint therewith, reinforcing strips bent about said mitered corners to engage both the side and the end members and about the ends of the bottom member, said reinforcing strip enclosing the end of the bottom member in face contacting relation with the upper and lower faces thereof, and prongs on said reinforcing strips engaging the penetrable material of said members whereby to interlock said members into a rigid unit and protect their edges against wear.

10. The method of forming a reinforced box of penetrable material having side, end and bottom members, the side and end members having cooperating beveled vertical end edges and beveled vertical side edges, respectively, to form mitered joints between said side and said end members where they meet at the corners of the box, which comprises forming a reinforcing strip with teeth along its edges, positioning the side and bottom members in assembled relation and driving the teeth of said reinforcing strip along one of its edges into said side members adjacent their said beveled vertical end edges, forming said reinforcing strip to fold about the end edges of said bottom and driving the teeth thereof along both edges of said reinforcing strip into said bottom member on opposite sides thereof, thereafter placing said end members in assembled position at the ends of said side members and said bottom member so that said beveled side edges of said side members form mitered corner joints with said beveled end edges of said side members, then bending said reinforcing strip over and upon said end members to cover said mitered corner joints, and finally driving the prongs along the edge of the bent over portion of said reinforcing strip into said end members.

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