

Dec. 28, 1965

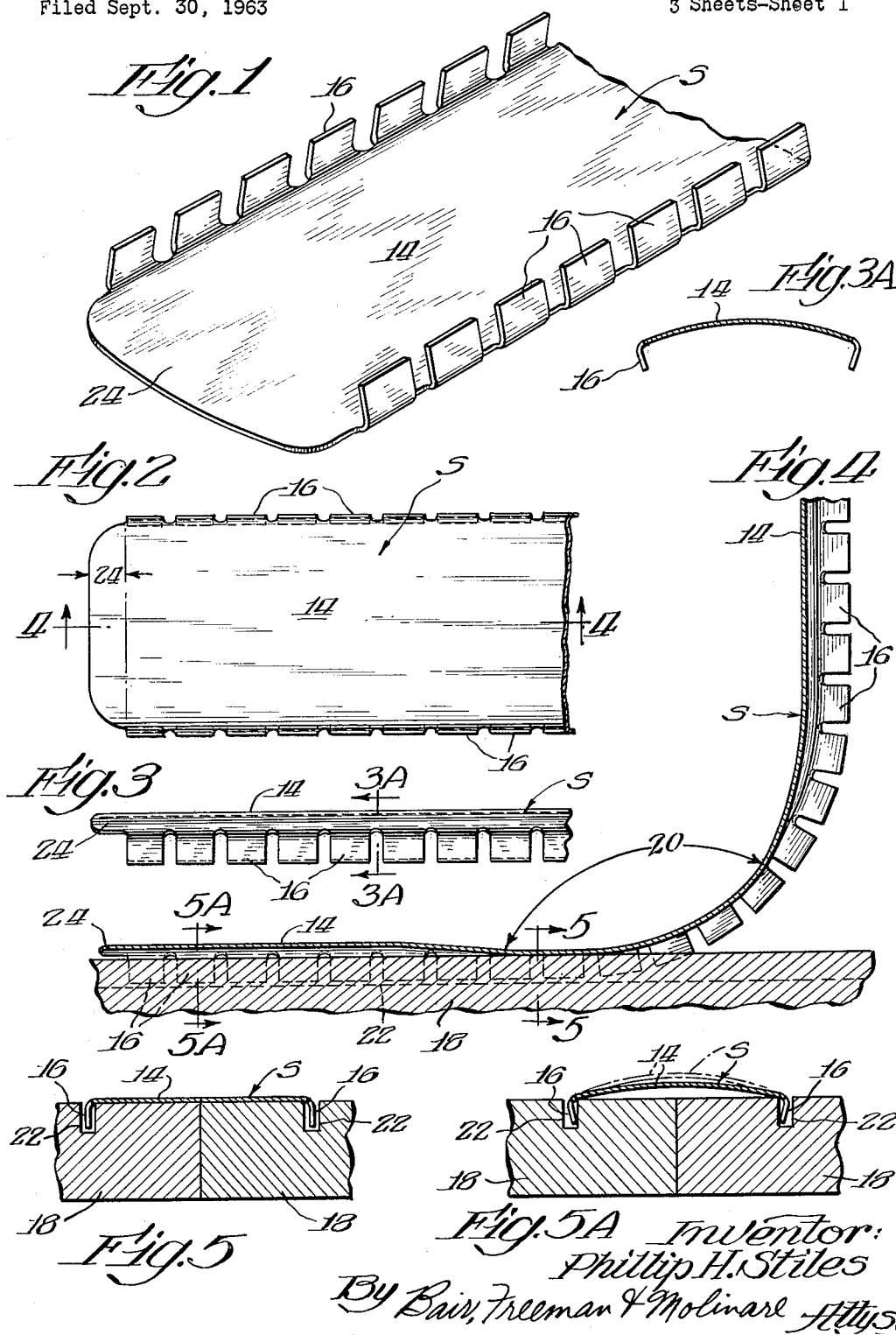
P. H. STILES

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LOCKING STRIP

Filed Sept. 30, 1963

3 Sheets-Sheet 1



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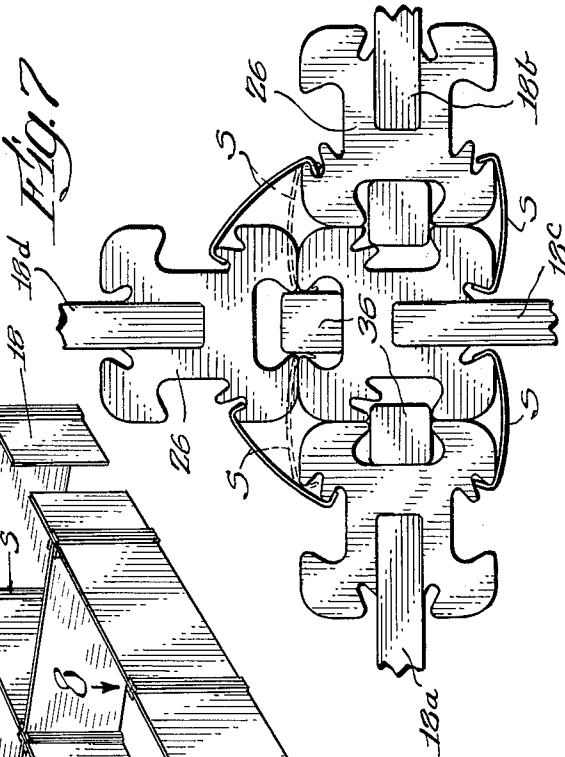
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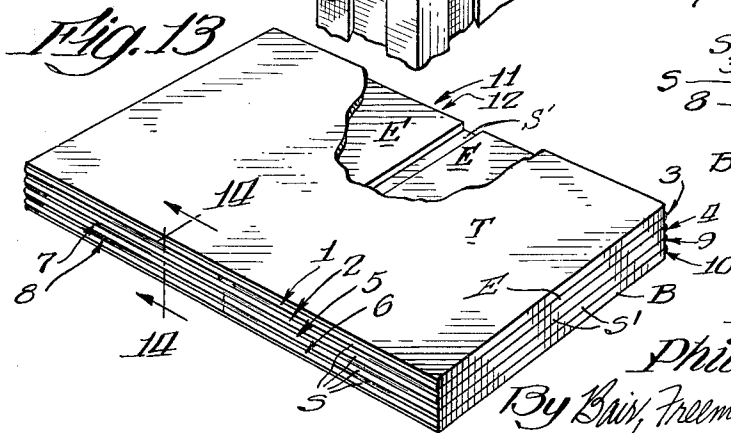
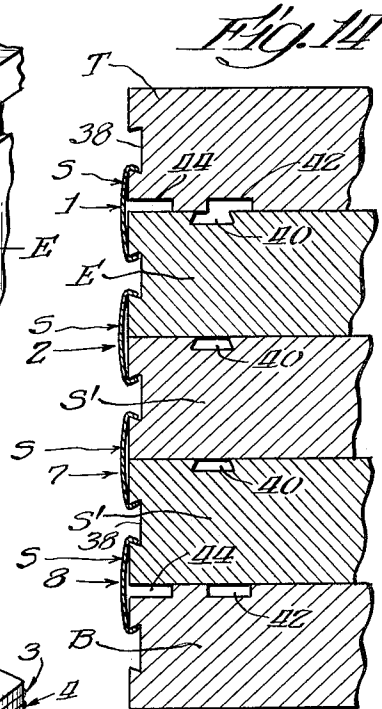
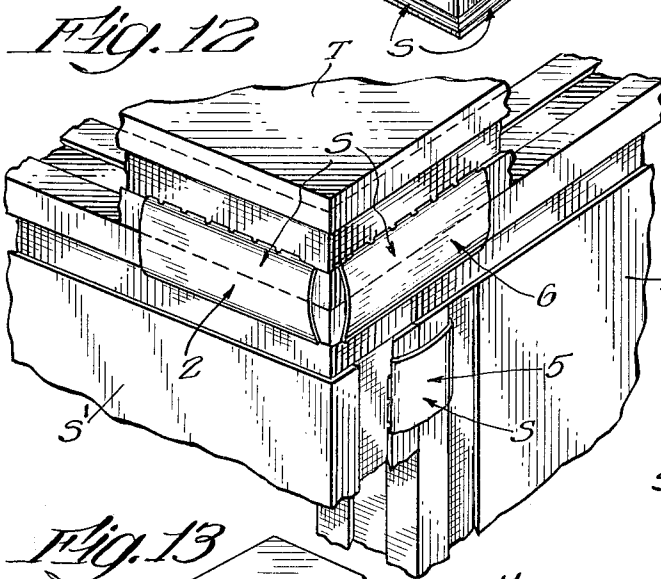
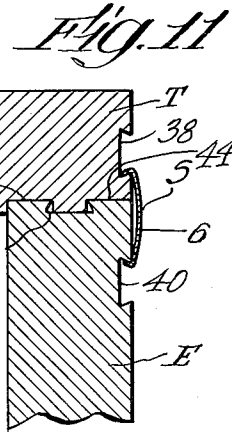
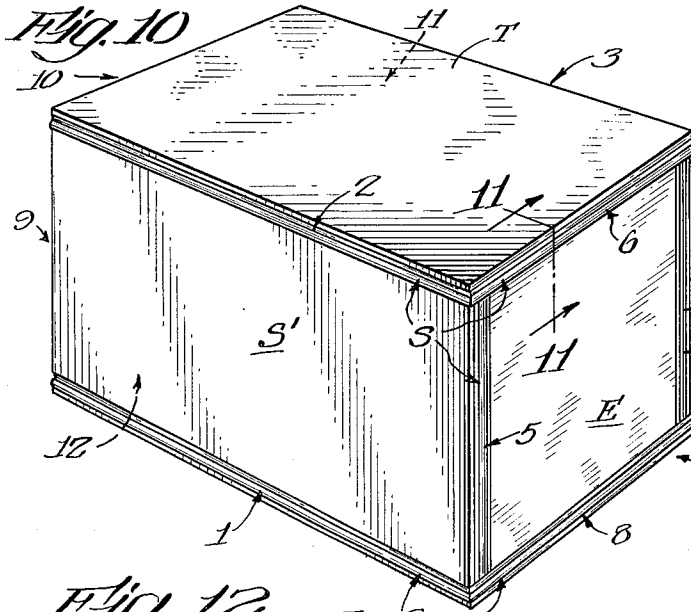
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3 Sheets-Sheet 3



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3,225,952

LOCKING STRIP

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This invention relates to a locking device in the form of a locking strip coactable with grooves formed in two adjacent elements that are to be locked together.

One object of the invention is to provide a locking strip which can be quickly applied and removed without tools, yet when in applied position forms a rugged fastening device with respect to the two adjacent elements and is not readily removed therefrom during ordinary service of the elements when so locked together, but can be quickly removed by proper but simple manipulation.

Another object is to provide locking means in the form of an elongated strip of resilient material which is substantially straight longitudinally and bowed transversely, and has a plurality of spaced fingers along its side edges extending at substantially right angles therefrom, the fingers being adapted to be spread apart for progressively entering into grooves of two elements that are to be connected together, and the spreading-apart operation being performed by curving the strip longitudinally which flattens it transversely thereby changing the angle of the fingers for entry into the grooves.

Still another object is to provide the combination of two elements having elongated edges adjacent each other and means for locking said elements together comprising a groove in each element spaced from their adjacent edges and substantially parallel to each other, and an elongated locking strip of the character set forth in the previous object associated with the grooves.

A further object is to provide the combination of two panels and locking strips for locking them together where in substantially square reinforcing posts are provided for the adjacent edges of the panels and each has a groove in each of the four sides thereof, one of which has the edge of the panel secured therein and the locking strip coacting with certain other grooves thereof in adjacent posts.

Still a further object is to provide means for keying the posts together to prevent displacement of one relative to the other.

An additional object is to provide a knock-down container comprising top, bottom, end and side elements provided with grooves in certain edges and faces thereof adapted for our locking strip to coact therewith in the set-up condition of the container or in the knocked-down flat package form of the container for retaining the container in erected position or knocked-down position as desired.

With these and other objects in view, my invention consist in the construction, arrangement and combination of the various parts of my locking strip, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawings, wherein:

FIG. 1 is a perspective view of a portion of a locking strip embodying my present invention;

FIG. 2 is a plan view thereof;

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FIG. 3 is a side elevation thereof;

FIG. 3A is a vertical sectional view on the line 3A—3A of FIG. 3;

FIG. 4 is a vertical sectional view thereof on the line 4—4 of FIG. 2 showing the strip being installed for locking the adjacent edges of two panels together;

FIGS. 5 and 5A are vertical sectional views on the lines 5—5 and 5A—5A, respectively, of FIG. 4;

FIG. 6 is a perspective view of a plurality of movable partitions, the joints of which are connected together by my locking strips;

FIGS. 7, 8 and 9 are plan views of portions of FIG. 6 as indicated by the arrows 7, 8 and 9 thereon, respectively;

FIG. 10 is a perspective view of a knock-down container using my locking strips along all corners thereof;

FIG. 11 is an enlarged sectional view on the line 11—11 of FIG. 10 showing how the locking strip connects the edge of one element of the container with a groove in the face of an adjacent element;

FIG. 12 is an enlarged perspective view of the near corner of the container shown in FIG. 10;

FIG. 13 is a perspective view of the container knocked down and its top, bottom, side and end elements stacked in a flat package and connected together by means of the locking strips used to hold the container assembled in FIG. 10, and

FIG. 14 is an enlarged sectional view on the line 14—14 of FIG. 13.

On the accompanying drawings I have used the reference character S to indicate in general a locking strip embodying my invention. The strip S comprises a strip-like portion or back 14 which is elongated and formed of resilient material such as stainless steel. The back 14 is of longitudinally straight but transversely bowed shape shown in FIGS. 3 and 3A, and has a plurality of spaced fingers 16 formed along its side edges and extending at substantially right angles therefrom as evident in FIG. 3A. The strip S may be made in any suitable width and length and has fingers 16 of any suitable length and, of course, may be made of proportionally thicker or thinner material as required for a particular installation. It may even be formed of plastic material where the holding power required is not great. As an example, it may be formed of stainless steel .008" or .010" thick, 1" to 1½" wide, and in lengths of four feet for movable partition installations wherein the partitions are 8' high. The strips can also be made 8' long and short strips of a foot or two used for making up desirable odd lengths as required.

The strips S are adapted for holding two elements such as panels 18 shown in FIGS. 5 and 5A in edge-to-edge locked relation. Installation without tools is readily performed as illustrated in FIG. 4 wherein the part 20 of the strip S has been curved longitudinally of the strip to thereby flatten its transverse curve as shown in FIG. 5. This operation also spreads the opposite fingers 16 apart from the position shown in FIG. 3A to the position shown in FIG. 5 so that they may readily enter grooves 22 formed in the panels in a position spaced from the adjacent edges thereof and substantially parallel to those edges whereby the grooves are a predetermined distance apart throughout their lengths. This distance is dimensioned so that when pressure on the back 14 of the strip is relieved, the strip will tend to again assume the trans-

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verse curvature shown in FIG. 3A but will not be able to completely do so because of such dimension. Instead the back will curve only to the shape shown, for instance, in FIG. 5A. Thus the back 14 is under tension and each of the fingers 16 is also under tension in the grooves 22 thereby tending to hold the adjacent edges of the panels 18 tightly in contact with each other. By contrast, the original curvature of FIG. 3A is shown by dot-and-dash lines.

The installation of the locking strip S as depicted in FIG. 4 started at the left-hand end thereof where the initial pressure downwardly against the back 14 flattened the transverse curvature of the back as in FIG. 5 to permit entry of the fingers 16 in the grooves 22. This flattening of the back has progressed to the area 20 so that the area to the left thereof has sprung back as in FIG. 5A for pulling the panels 18 toward each other.

It is now obvious that the longitudinal curvature in the area 20 may be made to progress along the rest of the back 14 so that the fingers 16 are successively entered into the grooves 22 and portions of the back 14 successively permitted to assume their locking position as shown in FIG. 5A until the strip has been completely installed with respect to the grooves of the panels. The strips are readily curved by hand as in the area 20 without the use of any tools and the strip can be quickly installed or "zipped" into position.

Likewise it can be quickly removed by starting the longitudinal curving action at one end which has a lip 24 as shown in FIG. 2 beyond the fingers 16 to facilitate initial grasping of the end of the strip whereupon it may be pulled upwardly away from the panels 18 and the curvature thereby produced may be caused to quickly progress along the strip throughout its length for removal in the manner of operating a zipper.

My disclosed locking strip may be used for locking any two elements together that have elongated edges adjacent each other. Panels 18 are shown in FIGS. 4, 5 and 5A, and these may be movable partitions such as illustrated in FIG. 6 for dividing a large room into several small rooms. The locking strip arrangement shown in FIG. 5A may be used for connecting the partition panels 18 together edge-to-edge, and obviously both sides of the panels may be so connected by providing another set of grooves 22 on the opposite side of the panel from the grooves shown.

FIG. 6 shows a plurality of panels 18 connected together with the strips S by associating the strips with reinforcing posts 26 as shown in FIGS. 7, 8 and 9.

Referring first to FIG. 8 each post 26 has grooves 28, 30, 32 and 34 in its four sides, the post being substantially square in cross section. The grooves 28 are adapted for having the panels 18 secured therein as by cementing or the like while the grooves 30, 32 and 34 are adapted to receive keys 36 for holding the adjacent posts in alignment. The grooves 32 are adapted for receiving the fingers 16 of a first locking strip S and the grooves 34 for receiving the fingers of a second locking strip S. Thus the two panels 18 shown in FIG. 8 are connected vertical edge-to-vertical-edge by the association of the locking strips S with the posts 26 secured to the adjacent edges of the panels.

Where two partitions meet in the form of a cross, the post, locking strip and key arrangement may be as shown in FIG. 7, four different panels 18a, 18b, 18c and 18d being shown. Where they meet in the form of a T as at 7A on FIG. 6, the same arrangement as shown in FIG. 7 is used except the panel 18d and its post 26 are omitted, the upper two locking strips S being installed as shown by dotted lines.

Where two panels meet at right angles as shown in FIG. 9, the two posts are arranged with the end of the post of one panel (18e) contacting the side of the post of the other panel (18f) and the locking strips S and key 36 applied as illustrated.

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My locking strip may also be applied to a knock-down container such as shown in FIGS. 10 to 14 wherein there are top, bottom, two end and two side elements indicated T, B, E and S'. These are in the form of panels having certain edge grooves 38 and face grooves 40 for receiving the fingers 16 of the locking strips S which may be of dove-tail shape instead of straight-sided as shown in FIG. 5. Grooves 42 and rabbets 44 may also be provided for interlocking the ends and sides with the marginal edges of the top and bottom as shown in FIG. 11 wherein the lands between the grooves 42 and rabbets 44 enter the end grooves 38 of the ends E and sides S, FIG. 11 being also applicable to the bottom in relation to the ends and to the top and bottom in relation to the sides. The container shown in FIG. 10 is held assembled by the locking strips S as shown more clearly in FIG. 12, there being 12 strips altogether numbered 1 to 12. The strips 1, 2, 3 and 4 are the length of the top, bottom and sides and connect these four elements together. At one end, shorter strips 5, 6, 7 and 8 connect the end to the top, sides and bottom and at the other end the strips 9, 10, 11 and 12 do likewise (sides S').

The top, bottom and sides are of unit width but double that unit in length, and the ends are of unit height so that all six of the elements forming the knock-down container may be stacked in a flat package as shown in FIG. 13 and the edges connected together by using the strips 1 to 12 as indicated along the longitudinal edges of the elements, the two end elements being in one layer and each of the top, bottom and side elements in a single layer. Thus the container may be knocked down for return to the shipping point, for instance when used as a shipping container, or for storage purposes until its use is required. Obviously the container can be quickly assembled and as quickly knocked down and its panels connected together as in FIG. 13 for return or storage. As to the width of the ends, this is unity less twice the panel thickness as obvious in FIG. 10.

From the foregoing specification it will be obvious that I have provided a mechanical locking strip which has many uses and which can function in the manner of a zipper in fastening together two elements and with the possibility of quickly unfastening them in relation to each other when desired. A locking strip of this character is suitable for prefabricated buildings, movable partitions and the like. In a building it can be used for locking partitions to the floor and for locking a roof to the tops of the partitions in a manner similar to locking the partitions together as shown in FIGS. 7, 8 and 9.

By providing the strip in elongated form with a transversely curved back, when the back is flattened out the fingers which have been previously pointed inward extend approximately parallel to each other as at FIG. 5 and the distance between them is greater than it was when the strip was in its normal position. Accordingly, the fingers can be entered into spaced-apart grooves and when the locking strip is permitted to partially return to its original curvature, it draws the grooves toward each other and thereby the panels in which the grooves are formed into edgewise engagement with each other. The locking strip is applied one small segment at a time at the points where the fingers are expanded to fit into the grooves and requires very little force to do this at the localized spots so that it is easy to apply. However, after it has been applied all of the fingers are operable and thereby offer considerably greater strength to the assembly acting on the basis that where there is a multiplicity there is strength.

To enable the strip S to be bent as illustrated at 20 in FIG. 4, the notches which form the fingers 16 extend slightly into the edges of the back 14 as shown particularly in FIG. 2. Thus the right angle bends between the back and the fingers do not resist the bending action.

In the containerization field there is a great need for containers which can be readily assembled for use as pack-

ing containers and after they have completed their mission they may be knocked down into a relatively small flat package with the parts neatly stacked and locked together for return to the original shipping point. My locking strip, in addition to being used for the assembly of the container, is also thus readily used to lock the panels together for the return shipment.

Some changes may be made in the construction and arrangement of the parts of my locking strip without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may reasonably be included within their scope.

I claim as my invention:

1. The combination of two elements having elongated edges adjacent each other and means for locking said elements together comprising an elongated groove in each of said elements spaced from their adjacent edges and substantially parallel to each other when said edges are together, said grooves extending throughout the lengths of said elongated edges, and an elongated strip of resilient material extending throughout the length of said adjacent edges and which is substantially straight longitudinally and bowed transversely, said strip having a plurality of spaced fingers along its side edges extending at substantially right angles from said side edges, said fingers being in the form of notched flanges wherein the notches thereof extend into said side edges of said strip so that said fingers are adapted to be spread apart for progressively entering into said two grooves by curving said strip longitudinally to thereby flatten its transverse curvature.

2. The combination of two panels and means for locking said panels together in edge-to-edge relationship comprising grooves in the faces of said panels spaced from the edges thereof which are edge to edge and extending throughout the length of said edges, said grooves extending substantially parallel to each other, and an elongated strip of resilient material which also extends throughout the length of said edges and is substantially straight longitudinally and bowed transversely, said strip having a plurality of spaced fingers along its side edges extending at substantially right angles from said side edges, said fingers being in the form of notched flanges wherein the notches thereof extend into said side edges of said strip so that said fingers are adapted to be spread apart for progressively entering into said two grooves by curving said strip longitudinally to thereby flatten its transverse curvature.

3. The combination of two panels having substantially square reinforcing posts along the edges thereof which are adapted to assume positions side by side, each post having a locking strip finger receiving groove in each of the four sides thereof, one of which also has the edge of the panel secured therein, and means for locking said posts together comprising elongated strips of resilient material which are substantially straight longitudinally and bowed transversely, said strips each having a plurality of spaced fingers along its side edges extending at substantially right angles from said side edges, said fingers being in the form of notched flanges wherein the notches thereof extend into said side edges of said strip so that said fingers are adapted to be spread apart for progressively entering into two side-by-side grooves of adjacent posts by curving said strip longitudinally to thereby flatten its transverse curvature.

4. The combination set forth in claim 3 wherein a key is provided in the two grooves of said posts which face each other when said posts are assembled side by side.

5. A knock-down box comprising top, bottom, two end and two side elements, and means for locking all twelve corners of said box together with the ends of some elements abutting the adjacent marginal faces of other elements, said means comprising grooves in the adjacent edge and face of each element arranged substantially parallel to each other, and an elongated strip of resilient

material which is substantially straight longitudinally and bowed transversely, said strip having a plurality of spaced fingers along its side edges extending at substantially right angles from said side edges, said fingers being in the form of notched flanges wherein the notches thereof extend into said side edges of said strip so that said fingers are adapted to be spread apart for progressive entry into said two grooves by curving said strip longitudinally to thereby flatten its transverse curvature.

6. A knock-down box as called for in claim 5 wherein said top, bottom, end and side elements may be knocked down and stacked together with all of said edge grooves adjacent and parallel to each other to receive the fingers of said locking strips whereby the strips retain said elements in flat package formation, said top, bottom and side elements being of unit width and double unit length, and said end elements being of substantially unit height to permit of such stacking together with their edges aligned to receive said locking strips.

7. A fastening device comprising an elongated channel-shaped strip of resilient material which is substantially straight longitudinally, said strip having a web that is bowed transversely and having a plurality of spaced fingers along its side edges extending at substantially right angles from said side edges, said fingers being in the form of notched flanges wherein the notches thereof extend across the width of said flanges and into the side edges of said web so that said fingers are adapted to be spread apart by flexing the strip to curve longitudinally backwards with the notched flanges located outwardly of the web relative to the center of curvature of the flexed strip, and the curving of said strip longitudinally backwards operating to thereby flatten the transverse curvature of its web, so as to cause the pair of notched flanges to move apart transversely.

8. A fastening device in accordance with claim 7 including gripping means at one end of said strip for facilitating initial grasping of the web of said channel-shaped strip for effecting longitudinal backward flexing of the strip.

9. The combination of two elements having elongated edge surfaces abutting each other and means for releasably fastening said elements together comprising an elongated shoulder on each of said elements spaced from their adjacent edge surfaces and substantially parallel to each other when said edge surfaces are abutting, and an elongated strip of resilient material extending along said shoulders and being substantially straight longitudinally but bowed transversely, said strip having a series of spaced fingers along its longitudinal side edges extending at substantially right angles from said edges, said fingers being in the form of notched flanges wherein the notches thereof extend across said flanges and into the side edges of said elongated strip so that said fingers may be spread apart for progressively encompassing said two shoulders by the curving of said strip backward longitudinally thereof to thereby flatten its transverse curvature.

10. In the combination of two elements having elongated edge surfaces abutting each other and means for releasably securing said elements together, the improvement comprising, in combination, an elongated shoulder defined on each of said elements and spaced from the respective edge surface of said element and being substantially parallel to a similar shoulder on another element when said edge surfaces of a pair of said elements are in abutting relation, and an elongated manually releasable connector for embracing longitudinally thereof a pair of said shoulders on a pair of said abutting elements to secure said elements together, said connector being an elongated strip of resilient material that is substantially straight longitudinally but is normally bowed transversely, and shoulder embracing elements defined along the longitudinal edges of said strip and extending at substantially right angles from the edges of said strip, said shoulder embracing elements being in the form of

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flanges each with a series of spaced notches therein that extend across the flange and into the side edge of said elongated strip so that the flange segments between the notches may be spread apart as the strip is curved backward longitudinally, and the bowed elongated strip being adapted to be flexed by a releasing pressure applied to the strip in a direction opposite to said bowing, so as to spread apart the shoulder-embracing elements to a distance greater than the spacing of the shoulders on the pair of abutting elements, thereby preparing said shoulder embracing elements for embracing or releasing said shoulders, while the inherent resiliency of the bowed strip with said releasing pressure removed tends to move said shoulder embracing elements, that are on opposite longitudinal edges of said elongated strip, inwardly and toward each other, and thereby toward a position adapted to engage and grip the shoulders defined on said abutting elements.

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