A. M. WIGHT.

FOLDING CLOSED CORNER BOX OR CRATE.

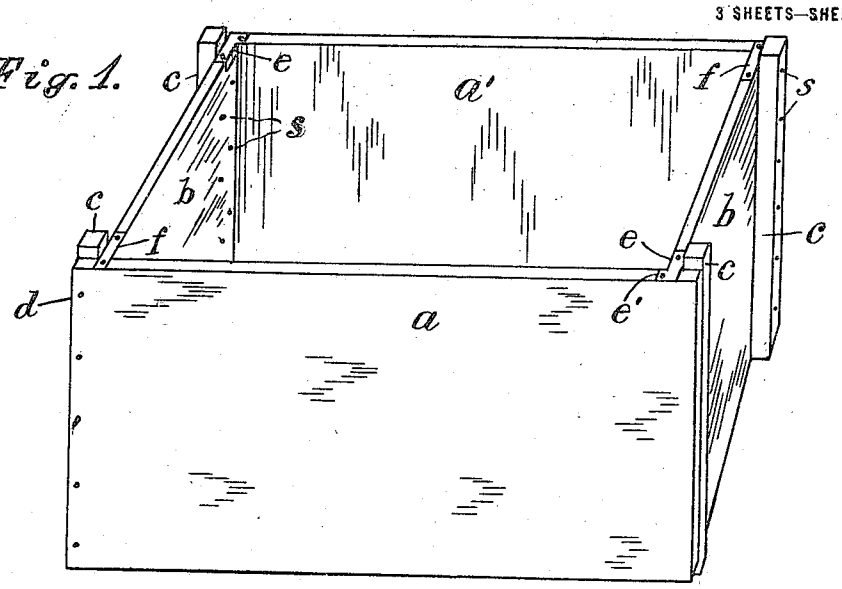
APPLICATION FILED AUG. 21, 1916.

1,295,403.

Patented Feb. 25, 1919.

3 SHEETS—SHEET 1.

Fig. 1.



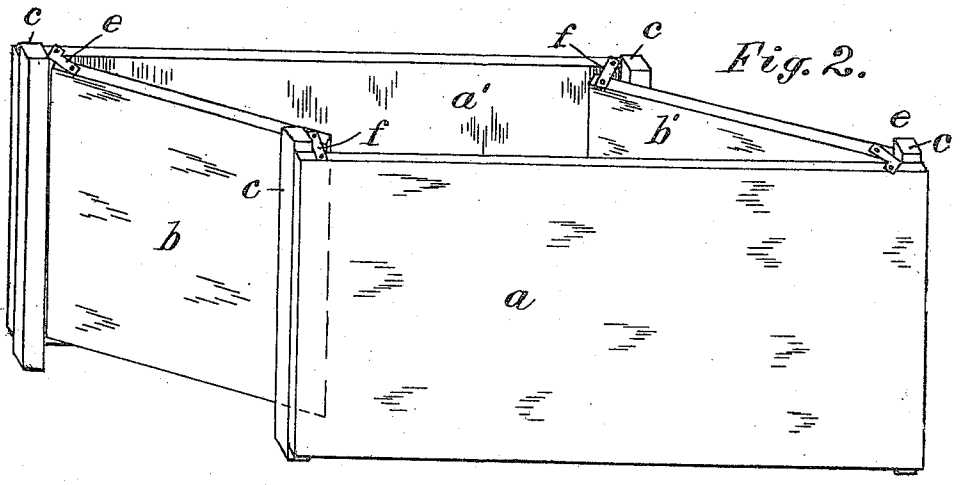
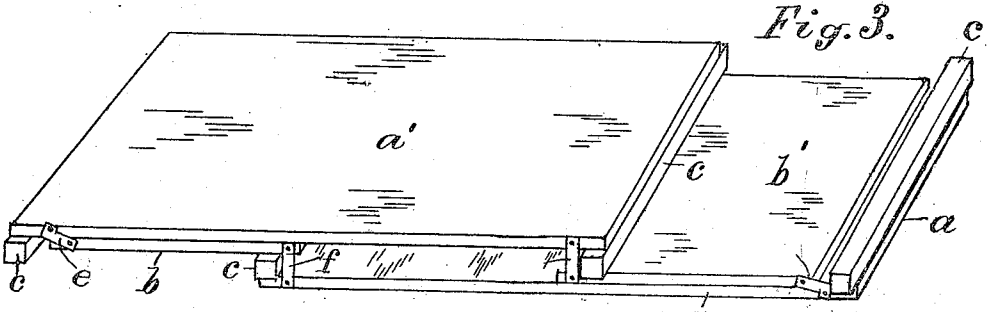


Fig. 2.

Fig. 3.



Inventor, Arthur M. Wight, per Thomas L. Craine, Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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3 SHEETS—SHEET 2.

Fig. 4.

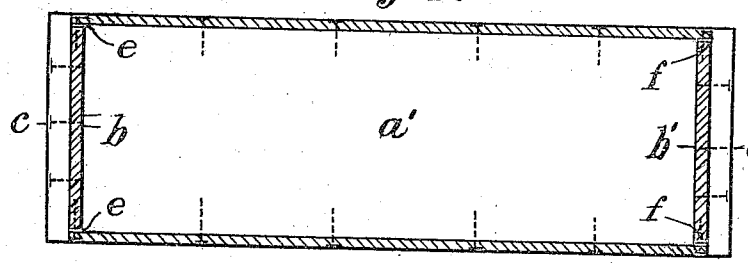


Fig. 8.

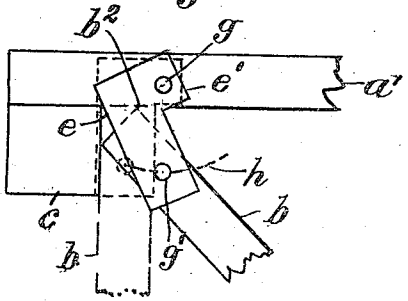


Fig. 7.

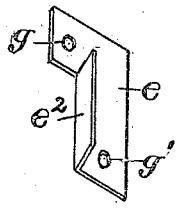


Fig. 6.

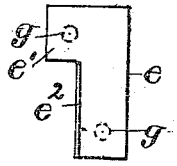


Fig. 5.

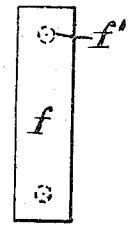


Fig. 10.

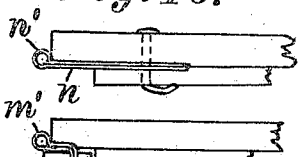
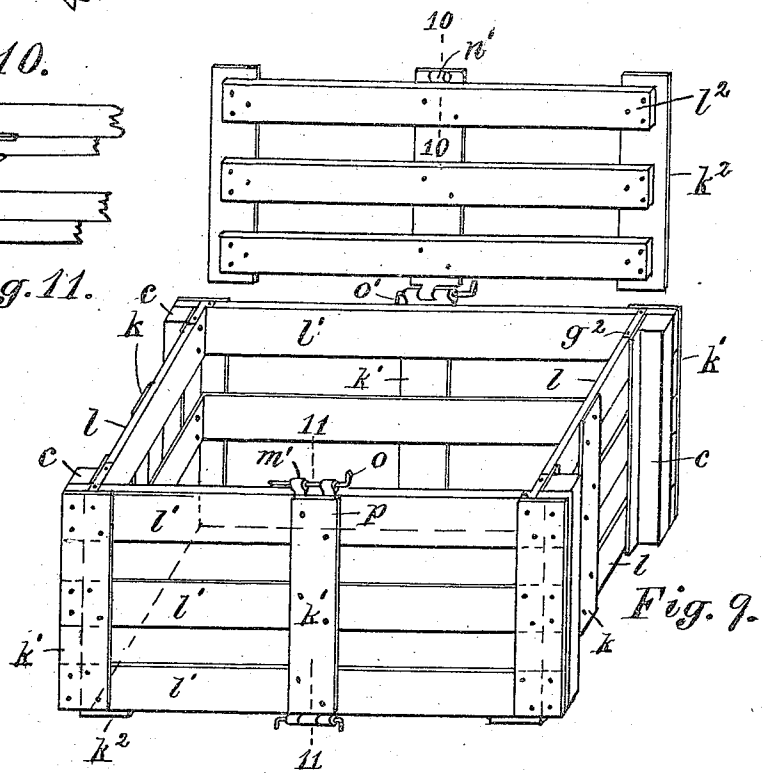


Fig. 11.

Fig. 9.



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3 SHEETS—SHEET 3.

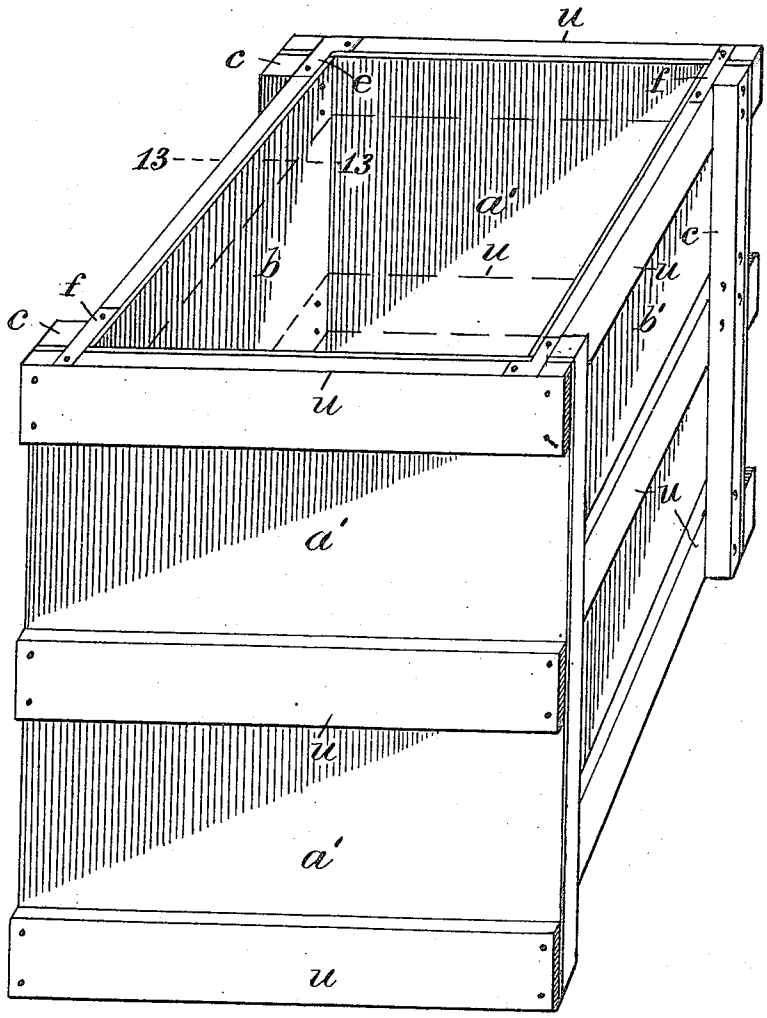


Fig. 12.

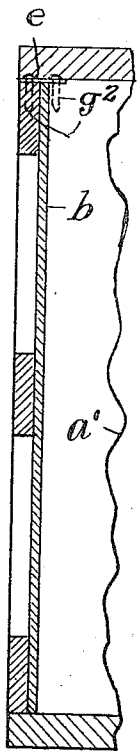


Fig. 13.

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UNITED STATES PATENT OFFICE.

ARTHUR M. WIGHT, OF NEW YORK, N. Y.

FOLDING CLOSED-CORNER BOX OR CRATE.

1,295,403. Specification of Letters Patent. Patented Feb. 25, 1919.

Application filed August 21, 1916. Serial No. 115,931.

To all whom it may concern:

Be it known that I, ARTHUR M. WIGHT, a citizen of the United States, residing at 2 St. Nicholas Place, New York, county of New York, and State of New York, have invented certain new and useful Improvements in Folding Closed-Corner Boxes or Crates, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to form a collapsible box or crate, the sides and ends of which are permanently hinged together so that they may be collapsed or folded upon one another, and packed for storage or transportation with the necessary top and bottom pieces, and the parts readily erected and secured together by the user.

One feature of the invention is that the hinges are applied to the extreme edges of the sides and ends and are formed of sheet-metal which lies flat thereon, with nails extended through their ends into the wood to form pivotal joints at both ends, such hinge-plates forming links of the cheapest possible construction, and not projecting above the surface of the wood sufficiently to interfere with the fitting or nailing of the cover and bottom upon the body of the box.

A second feature of the invention is the means for securing a tight or closed corner formed by securing posts or equivalent strips upon the inner portion of the sides at their ends, with the end-pieces of the box hinged to the sides next the inner sides of such posts, so that any pressure of the contents against the end-piece is transmitted wholly to the posts, and not imposed upon the hinges.

A third feature of the invention is the projection of the ends of the posts beyond the upper and lower edges of the box when desired, so that the cover and bottom fitted within such projecting ends operate to hold the box in rectangular form.

The formation of the hinge-plates of flat sheet-metal which can be perforated by the operation of nails in a nailing machine, affords an immense advantage in the assembling of the side and end-pieces, the connection of which parts together, when setting up the box, is the most difficult and laborious part of the work required, as the top and bottom are readily applied to the sides and ends after the latter are assembled and secured together.

A fourth feature of the invention, which is particularly applicable to the manufacture of crates, is the construction of the top and bottom to fit within the margin of the crate, and held flush with the edges of the crate by cleats secured upon the outer sides of the top and bottom, and projecting beyond the margin of the top and bottom, to rest upon the edges of the crate.

To facilitate the packing of such top and bottom with the collapsed body of the crate, they may be both jointed to the sides of the crate, by hinges having loose wire pintles formed to project beyond the ends of the hinge, so that they can be bent to retain them therein. The cover and bottom may thus be separate from the side and end-pieces until assembled.

These various features may be used in conjunction or separately, as may be required.

In the present invention, the assembling in the process of manufacture is greatly promoted by the provision of the posts attached to the side-pieces, which posts perform a special function in holding the end-pieces readily in position during the nailing of the hinge-plates to the side and end-pieces.

In practice, this is done by setting one of the side-pieces in a nailing machine, placing the two end-pieces against the inner sides of the posts, laying the hinge-plates upon the edges of these pieces in proper position, and then driving the nails through such hinge-plates into the wood to form the hinge-pivots.

The remaining side-piece is then placed in the nailing machine and the extremities of the end-piece fitted to the inner sides of the posts upon such side-piece, and hinge-plates secured across the joint of such pieces; thus hinging all of the upper corners.

The body of the box is then inverted and

the hinge-plates applied thereto and secured in a similar manner to hinge the four lower corners. This concludes the assembling of the parts in the manufactory, and the parts may then be collapsed and packed with suitable top and bottom pieces to form a bottom and cover for the box.

Flanges are preferably bent upon the inner edges of the offset plates to project downward within the end-pieces so that the hinge-plates may be pressed and held parallel with the end-pieces by the fingers during the nailing operation.

In the annexed drawing, Figure 1 is a view of the box-body formed of boards and provided with my improvement;

Fig. 2 shows the same body partly collapsed;

Fig. 3 shows the body entirely collapsed, these three views being shown in oblique projection;

Fig. 4 is a longitudinal section of a box similar to that shown in Fig. 1 with a cover and bottom applied thereto;

Fig. 5 is a view of the blank for one of the intermediate links or hinge-plates, with dotted lines indicating where holes would be formed in the same when nails are driven through the hinge-plate;

Fig. 6 shows the under side of an offset link with dotted lines indicating the location of nail-holes;

Fig. 7 is a perspective view of the same viewed from the same side as in Fig. 6;

Fig. 8 is a diagram showing the operation of offset links, during the collapsing of the end-piece;

Fig. 9 is a perspective view of a crate provided with the improvements, and having top and bottom adapted to fit within the sides and ends of the box;

Fig. 10 is a section on line 10—10 in Fig. 9;

Fig. 11 is a section on line 11—11 in Fig. 9;

Fig. 12 is a perspective view of a box with veneer casing; and,

Fig. 13 is a vertical section through one end of the box on line 13—13 in Fig. 12.

The invention is shown in Figs. 1 to 3 inclusive applied to a box made of boards of suitable width and of sufficient thickness to have hinges jointed by nails, upon the edges of the sides a, a' and ends b, b'.

Posts or cross-bars c are shown secured to the sides near their ends by nails d, and the ends b, b' are fitted between the sides inside such posts. The posts are shown projected beyond the edges of the sides and ends for a sufficient distance to engage the ends of the cover and bottom, which thereby hold the box extended.

The hinges are formed of flat plates of sheet-metal, and the alternate corners of the box or crate are hinged by links formed with a body e having an offset end e', shown in Fig. 6, while the intermediate corners are hinged by straight links f, shown in Fig. 5.

These hinge-plates do not even require perforations for the pivot-pins, as they are made of such consistency that a nailing machine will drive nails through them while they are gaged in the required positions, when the sides and ends are properly subjected to a nailing machine.

The offset link is shown in Fig. 6 with a straight body e to receive a nail-hole g', and a short lateral projection e' is formed upon one end of the link which receives a nail-hole g beyond the line of the adjacent edge of the link, to permit the swinging of the box-end b or b' upon its inner corner. marked b^2 in Fig. 8, when the box is collapsed, which offset also avoids the extending of the link diagonally across the inner corner of the box.

The hole g' in one end of the link body e is shown in the middle of its breadth, and the holes f' in the link f are also shown in the middle of its breadth. Such holes are produced by means of the nails g^2 employed as pivots, by driving them through the metal. (See Fig. 13.)

The necessity for the employment of the offset link is clear from the diagram of Fig. 8, where the offset-link and a portion of the end-piece b are shown in dotted lines, and the end-piece in full lines swung half way around to its collapsed position with a corresponding movement of the offset-link.

The inner corner of the end-piece b is marked b^2 in Fig. 8, and the location of the pivot-nail, which is inserted through the hole g, operates to swing the corner b^2 clear from the side-piece a when the box is collapsed.

This results from the fact that the pivot-hole g in the edge of the side-piece a is disposed within the line of the inner side of the end-piece b when such end-piece lies against the post c, and the swinging movement of the end-piece therefore carries the pivot-hole g' (which is connected with the end-piece b by a nail) around in the curved line h, to clear the corner b^2 from the side a'.

Offset hinge-links are disposed upon alternate corners of the box, and the hinge-links f upon the intermediate corners, the construction of such links permitting the end-pieces of the box to fold against the sides a and a', as shown in Fig. 3.

By this construction, the alternate offset-links have their outer pivots (which are the nails in the holes g) within the line of the inner side of each end of the box, which permit the folding of the ends upon the sides, as shown in Fig. 3.

This they could not do if both the nail-

holes for the offset link were both in a line with the middle of its width like those of the link *f*.

In the swinging movement of the end-piece, the body *e* of the link does not remain immovable upon the end-piece but takes an angular position in relation thereto, as shown in Fig. 8, which would obviously be impossible if the link were nailed rigidly to the end-piece by two nails instead of one which serves as a pivot.

It must be understood that the particular operation of the offset link is due to a particular disposition of the nail driven through the hole *g* and into the side-piece of the box by which the offset end of the link is pivoted thereto.

As stated above, if this hole *g* were on a line along the middle of the body of the link *e* it would not operate to move the hole *g'* away from the side-piece *a*, to let the corner of the end-piece turn as required, but by locating the hole on a line with the inner side of the end-piece or a little beyond that line, the hole *g'* of the link is swung away from the side-piece *a* as soon as the end-piece begins to turn.

It is not, therefore, the mere shape of the link which produces such result, nor even the disposition of the holes in the link, but the location of the nail-hole in the side-piece *a* adjacent to the inner side of the end-piece *b*.

The construction of the offset link permits the end-piece *b* to be swung flat against the adjacent side-piece *a*, as shown in Fig. 3; and the end-piece at only one end of the side *a* requires such an offset link, as the operation of the link at the other end of the side-piece is different, because the end-piece does not swing toward the side-piece when collapsed, but around upon the corner post of the opposite side-piece, as shown in Fig. 3. For this reason the alternate links are made offset and the intermediate links straight, and the holes *f'* of the straight links are spaced as far apart as the thickness of the post *c* plus half the thickness of the side and end-piece, as is obvious by inspection of the links *f* in Fig. 3.

The invention is applicable to boxes of composite material, as veneer stiffened by cleats, as shown in Figs. 12 and 13; or to slatted crates one of which is shown in Fig. 9 herein.

In such constructions, as in the other forms shown to embody the invention, one corner of each end-piece receives the pivot-nail of the offset link, and the opposite corner of such end-piece receives one of the pivot-nails of the straight link *f*.

The links are shown in Fig. 9 jointed by nails g^2 inserted in the slats or rails *l* upon the end-pieces. These rails in a crate are held spaced apart by stiles *k*, and the side-pieces of the crate are similarly formed of stiles *k'* and rails *l'*, and are provided at their ends with the posts *c* for the purpose already described.

It is obvious that such side-pieces and end-pieces may be collapsed precisely as those of the box shown in Figs. 2 and 3.

In Fig. 9, the ends of the posts are shown flush with the top and bottom edges of the crate, and the crate is held rectangular when assembled by making the rails l^2 of the cover short enough to fit between the end-pieces *l*, and spaced upon their stiles k^2, so that their outer edges fit within the sides of the crate.

The rails thus held rigidly in rectangular relation, by their stiles, are adapted to enter slightly within the crate and to hold its sides and ends right angles with one another, the stiles k^2 resting upon the upper or lower ends of the side and end-pieces, to which they may be secured by any means desired.

Where the crate is not intended for repeated use, the top and bottom may be nailed to the sides and ends as shown at b^3 in Fig. 4, but the top and bottom may be secured detachably by means of fastenings, so that the crate may be opened without injury, and collapsed after it is used, and repacked for transportation and further use.

Such a detachable fastening is shown in hinge-plates *m* upon the edges of the crate sides formed of folded sheet-metal, with the loop *m'*, as shown in Fig. 11, adapted to receive a wire pintle *o*. The hinge-plates *m* are readily secured to the side-pieces by insertion between the stiles and edge rails before the latter are secured together, as by the nails *p* in Fig. 11.

Hinge-plates *n* are shown upon the edges of the cover similarly secured between the stiles k^2 and rails l^2, and formed each with an eye *n'* adapted to fit between the eyes *m'* upon the hinge-plates of the body.

A wire pintle *o* when inserted through the joint of these hinges may be bent, as shown at *o'* upon the edge of the cover in Fig. 9, and thus be prevented from accidental displacement, while not preventing the straightening of the pintle and the separation of the parts, if desired.

It is immaterial how the hinges be formed and jointed to permit the hinging of the cover and bottom respectively to the edges of the side-pieces of the crate, so that all the parts of the crate are connected together for transportation and storage, in readiness to be set up at any time.

In my statement of invention, I have fully described the process of jointing the side and end-pieces of a box or crate together by driving nails through the hinge-blanks into the upper or lower edges of those pieces, and such assembling of the body of the box

greatly reduces the labor required by the user in setting up the box and applying the bottom thereto, to permit the filling of the box before it is closed.

Either before or after applying such bottom, nails shown at *s* in Fig. 1 may be driven through the end-pieces *b* into the posts *c*, and clenched upon the outer sides of the posts, thus securing as strong a corner for the box as if it were all nailed together in the factory.

This is a great advantage of my construction, and affords great stiffness to the finished box or crate, as it permits the driving of nails through the end-pieces into the corner posts *c* when the box-body is set up by the user to apply the bottom thereto.

A further illustration of the application of the invention is shown in Figs. 12 and 13, where a large and deep packing-box is represented, made of composite character by forming the sides a^4 and ends b^4 of veneer with rails or battens *u* secured to the outer sides of the same, as is usual in making veneer cases.

The side-pieces are shown provided with the posts *c* and the battens of the end-pieces bear against such posts when the end-pieces are set in place, and the nail-holes for the pivots are formed in the edges of the upper and lower battens of the box by nailing the hinge-links thereon as already described.

The box thus made is collapsed the same as if made of a shook of solid boards, as the relation of the holes *g* to the inner sides of the end-pieces permits such pieces to turn without any interference between their ends and the side-pieces of the box.

It will be understood that the ends of the links are all at right angles with the body of the same, which form is employed to utilize strips of thin band-iron in making the links in the cheapest possible manner, the bands being cut transversely to make the links, thus leaving square ends upon the links.

A wider band is employed for making the offset links than is required for the straight links *f*, and the flange e^2 is formed upon the offset link without any waste of material, as it is simply bent from the side for that portion of the length of the link which is not offset. The flange e^2 is not shown in Figs. 9, 12 and 13, on account of the smallness of the scale.

It will be understood that the flange is especially useful in gaging the position of the link upon the wood during the nailing operation which produces the pivots of the link.

In a box having the top and bottom nailed on it is evident that such parts to hold the hinge-links and hold their pivots firmly in place, as is shown at *e* and g^2 in Fig. 13, and it is evident that the whole strength of the sheet-metal then resists any strain upon the side-pieces *a*, and the use of hinge-links applied next to the top and bottom pieces thus adds very materially to the strength of the box-corners.

As the nails for securing the cover of a box are not inserted at the corners, the presence of the hinge-links at the junction of the side and end-pieces does not in the least interfere with the nailing of the top or bottom to the sides.

Having thus set forth the nature of the invention what is claimed herein is:

1. A folding crate or box having side-pieces with transverse posts at the ends thereof, end-pieces fitted to the inner sides of the said posts, and hinge-plates pivoted upon the edges of the side and end-pieces near their junction.

2. A folding crate or box having side-pieces with transverse posts at the ends thereof, end-pieces fitted to the inner sides of the said posts, hinge-plates pivoted upon the edges of the sides and end near their junctions, and covers applied to close the top and bottom of the box and covering the said hinge-plates to prevent access or injury thereto.

3. A folding closed-corner box having hinge-links pivoted at both ends upon the edges of the end-pieces and side-pieces thereof near their junctions, the alternate hinge-links having edge flanges to fit within the end-pieces of the box for the purpose set forth.

4. A folding box having hinge-links applied to the edges of the end-pieces and side-pieces and pivoted at both ends thereto, the alternate hinge-links having each an offset at one end and a flange upon one edge for the remainder of its length and nail-holes in such hinge-link, the flanged portion having a nail-hole at the middle of its width, and the offset portion having a nail-hole in the said offset adjacent to the line of the flange.

5. A folding box having side-pieces with transverse posts at the ends thereof and end-pieces fitted to the inner sides of the said posts, hinge-plates pivoted by nails upon the edges of the side and end-pieces near their junctions and the nail-holes in the intermediate plates spaced apart a distance equal to the thickness of a post plus one-half the combined thickness of the side-piece and end-piece.

6. A folding crate or box having side-pieces with transverse posts at the ends thereof, and end-pieces fitted to the inner sides of the said posts, hinge-plates pivoted upon the edges of the sides and ends near their junctions, and covers applied to the edges of the sides and ends and extended over the hinge-plates and nailed to said sides

and ends, thus wholly preventing access or injury to the hinge-plates.

7. A folding crate or box having side-pieces with transverse posts at the ends thereof, and projected beyond the edges of the side-pieces, end pieces fitted to the inner sides of the said posts, hinge-plates pivoted upon the edges of the side and end-pieces near their junctions, and covers applied to the edges of the side and end-pieces and fitted between the projecting ends of the posts to hold the box in shape.

8. A folding crate or box having side-pieces with transverse posts at the ends thereof, and end-pieces fitted to the inner sides of the said posts, hinge-plates pivoted upon the edges of the side and end-pieces near their junctions, and the alternate hinge-plates having their outer pivot-pins within the lines of the inner ends of the box, to permit the folding of the ends upon the sides.

In testimony whereof I have hereunto set my hand.

ARTHUR M. WIGHT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."