May 13, 1952 J. G. WITTE 2,596,320

CONTAINER AND CORNER LOCKING MEANS THEREFOR

Filed Jan. 23, 1948 2 SHEETS—SHEET 1

FIG. 1.

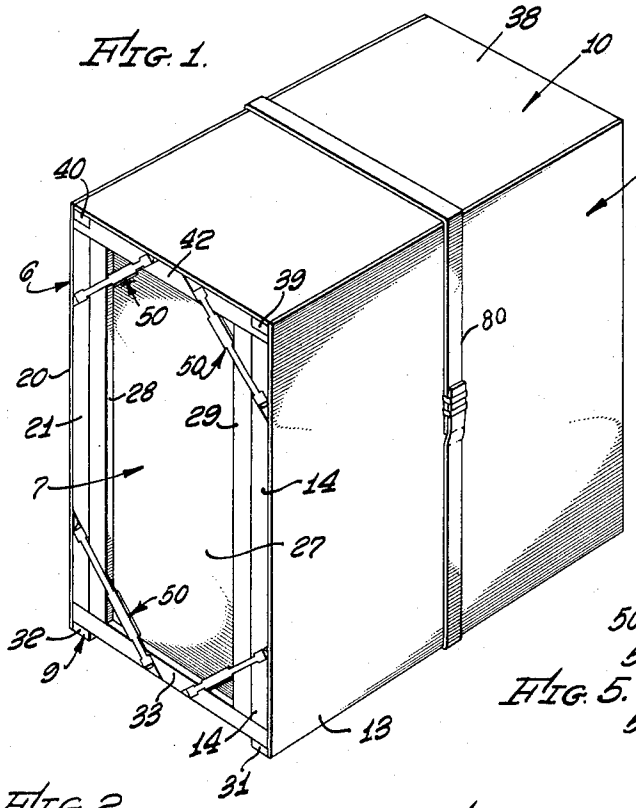
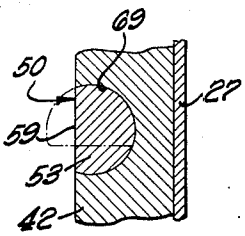


FIG. 4.



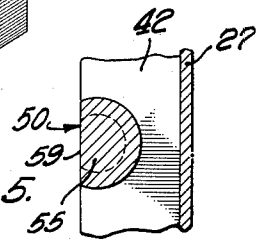


FIG. 5.

FIG. 2.

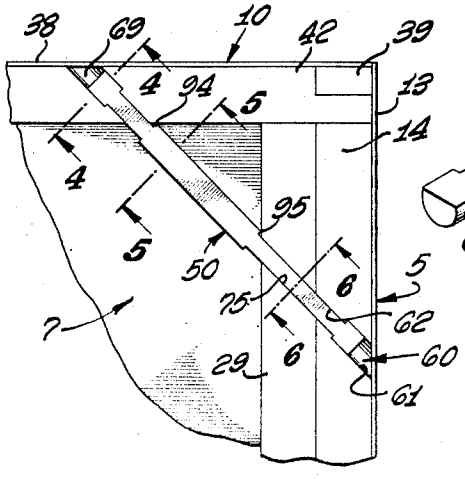


FIG. 3.

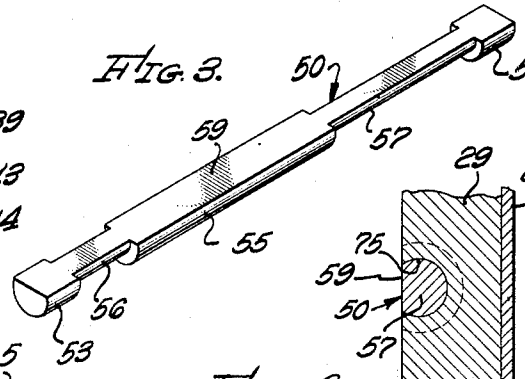


FIG. 6.

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CONTAINER AND CORNER LOCKING MEANS THEREFOR

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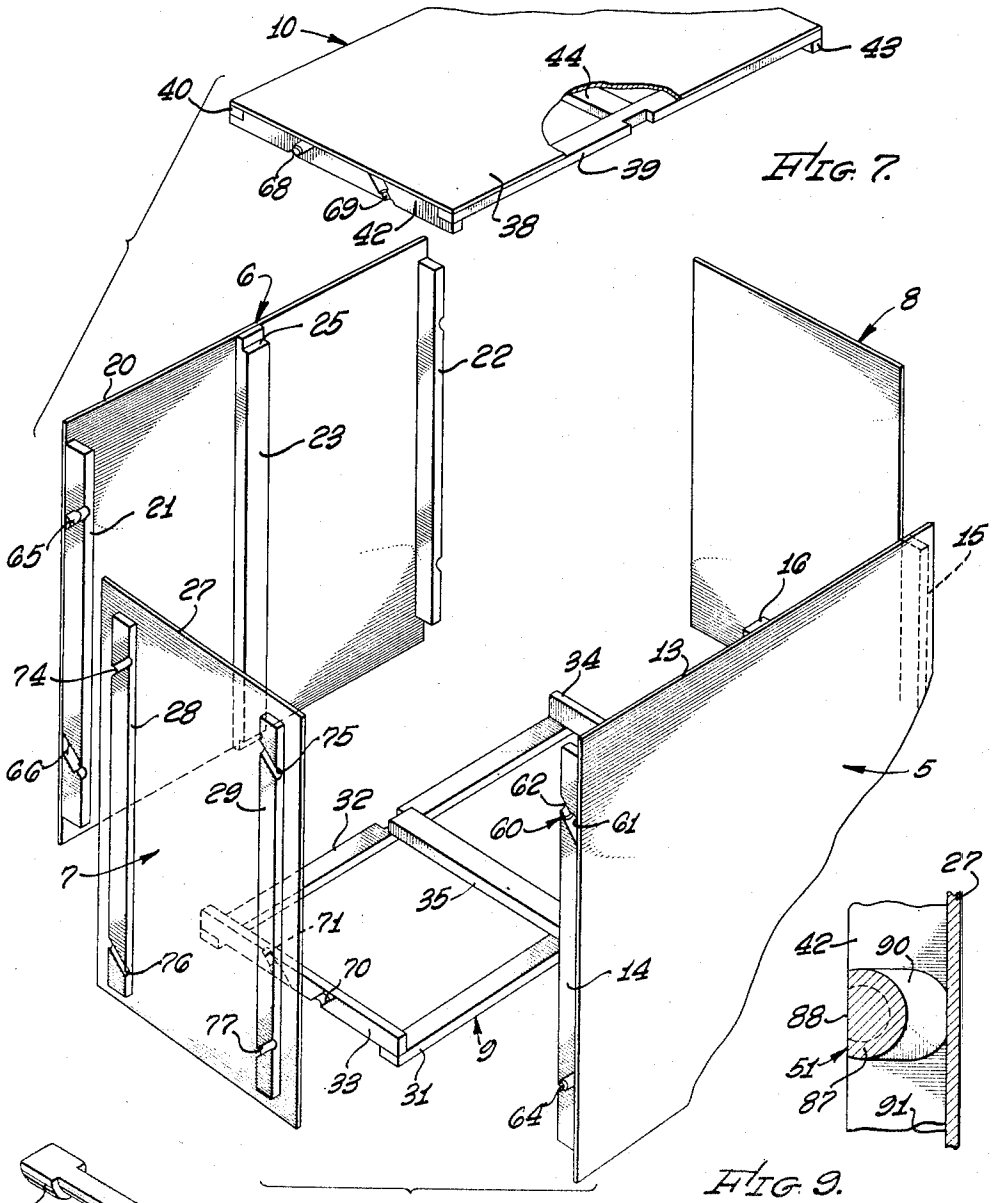


FIG. 7.

FIG. 9.

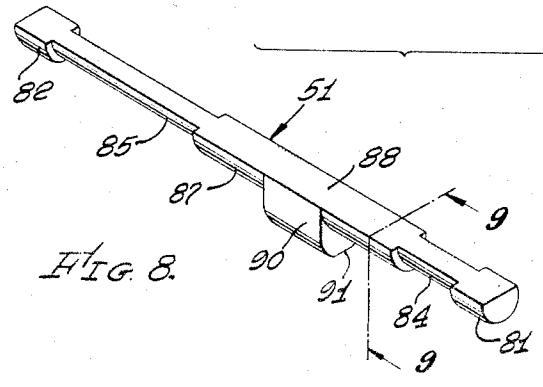


FIG. 8.

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CONTAINER AND CORNER LOCKING MEANS THEREFOR

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Application January 23, 1948, Serial No. 3,856

7 Claims. (Cl. 217—12)

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This invention relates to structures and the method of joining one or more elements, and particularly to the construction of articles such as boxes, crates, and furniture without the use of nails, screws, glue, or the other usual means of attaching portions or sections of a structure.

In Evans and Blanco copending application, Ser. No. 589,390, filed April 30, 1945, now U. S. Patent No. 2,464,743 of March 15, 1949, a method of joining two or more elements to construct a shelf or shelves is disclosed and claimed. The present invention utilizes the joint of this copending application in the construction and assembling of boxes, crates, and furniture. It is used to join two elements lying side by side or parallel and to join two elements having their axes at right angles to one another. Specifically, the joining elements are in the form of spindles having flat-sided cylindrical sections of different diameters or transverse dimensions. The cylindrical sections are inserted in holes having side openings or mouths, the spindles then being rotated approximately 90 degrees, which locks the elements having the holes therein in position. In boxes, crates, and furniture, the spindles may serve as braces or ties between vertical and horizontal stud and cross members. When the sides, top, and bottom of a box or crate are preformed, the spindles are all that are required to complete the assembly without nails, screws, glue, clamps, or the like. It is only necessary to insert the spindles and rotate them to position as disclosed and claimed in the above-mentioned copending application.

The principal object of the invention, therefore, is to facilitate the construction and assembling of articles such as boxes, crates, furniture, and the like.

Another object of the invention is to provide an improved method of and means for joining a plurality of elements to assemble boxes, crates, furniture, and similar articles.

A further object of the invention is to provide an improved crate, box, and similar article.

A still further object of the invention is to provide an improved knock-down crate or box.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the appended claims, the manner of its organization and the mode of its operation will be better understood by referring to the following description read in conjunction with the accompanying drawings, forming a part hereof, in which:

Fig. 1 is a perspective view of a crate or box embodying the invention.

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Fig. 2 is a veiw of a corner section of the box of Fig. 1.

Fig. 3 is a perspective view of one form of the spindle used in the invention.

Fig. 4 is a cross-sectional view taken along the line 4—4 of Fig. 2.

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 2.

Fig. 6 is a cross-sectional view taken along the line 6—6 of Fig. 2.

Fig. 7 is an exploded view of the box as shown in Fig. 1.

Fig. 8 is a perspective view of a modification of the spindle of Fig. 3, and

Fig. 9 is a cross-sectional view of the spindle of Fig. 8 taken along the line 9—9 of Fig. 8.

Referring now to the drawings, in which the same numerals identify like elements, the box or crate shown has six sections; namely, two side sections 5 and 6, two end sections 7 and 8, a bottom section 9, and a top section 10. The side section 5 has a wall 13, which may be of any material such as fiber board, card board, plywood, or the like, and attached to a plurality of uprights, such as end members 14 and 15 and a central member 16. If the crate is longer, more intermediate uprights may be used. The wall 13 and members 14, 15, and 16 are prefabricated in any suitable manner, such as by gluing or stapling. The side member 6 has a similar wall 20 and similar end members 21 and 22, and an intermediate member 23. A slight mortise is made at the ends of intermediate members 16 and 23, as shown at 25. The upright and cross members may be of wood, plastic, metal, or other material suitable for the construction of any desired article.

The end member 7 has a wall portion 27 and two upright members 28 and 29, the wall 27 being suitably attached to members 28 and 29. The other end section 8 is similarly fabricated. The bottom member 9 is in the form of a skid or platform on which any article to be boxed or crated is placed. It comprises two longitudinal runners 31 and 32, two end cross members 33 and 34, and an intermediate member 35 of which there may be several. The top member 10 is similarly constructed and has a wall 38, two longitudinal members 39 and 40, two cross members 42 and 43, and an intermediate cross member 44. The members 39, 40, 42, 43, and 44 are suitably prefabricated with nails, screws, or glue, and the wall 38 suitably attached thereto.

To attach the six sections 5, 6, 7, 8, 9, and 10 together or, in other words, assemble them into a crate or box, eight spindles, such as shown in

Fig. 3 at 50 or in Fig. 8 at 51, are all that are required. It will be noted that the spindle 50 has a plurality of cylindrical sections such as end sections 53 and 54 of one certain diameter, an intermediate section 55 of the same diameter, a short cylindrical section 56 of a smaller diameter, and a long cylindrical section 57 of the same small diameter. Although the diameters 56 and 57 have been shown the same, they may be different, which is also true of end sections 53 and 54, it being necessary, however, to have the diameters of the end sections 53 and 54 larger than the diameters of sections 56 and 57. All sections 53 to 57, inclusive, have a common flat side, the remaining annular surface, however, being greater than 180 degrees; that is, this flat surface may be any width, as long as it does not decrease the angle of the cylindrical surface below 180 degrees. A cylindrical surface of substantially 200 degrees to 225 degrees is preferred. These spindles may be of wood, plastic, metal, or other suitable material, and the flat side 59 may be corrugated, concave, or have a design thereon.

Referring now to upright members 14, 15, 21, and 22, these members have holes drilled at the edges thereof at approximately 45 degrees to the vertical, the holes having two diameters which correspond to the diameters of sections 53 and 56 of spindle 50. For instance, hole 60 has a large diameter section 61 and a small diameter section 62, the diameter of section 61 being the same as the diameter of section 54 or 53 of spindle 50 and the diameter of section 62 being the same as the diameter of sections 56 and 57. Since the same sized spindle is used throughout, the diameters of the two sections of holes 64, 65, and 66 are the same. This is also true of the four holes in members 15 and 22. Similar holes, such as shown at 68 and 69, are formed or drilled in end members 42 and 43 of the top section 10, and holes such as shown at 70 and 71 in end members 33 and 34 of bottom section 9. These holes are shown drilled at approximately 45 degrees to the vertical, but other angles are workable. It will be noted that the holes have side openings or mouths through the edges of the respective members, but the length or width of the mouths of the side openings is less than the diameter of the holes. In other words, the annular surface of the holes extends through an angle greater than 180 degrees, and corresponds to the respective annular surfaces of the various sections of the spindle 50. The dimension of the mouth, perpendicular to and between the edges of the mouths may be either the width or length of the side openings, depending upon the width of the members in which the holes are placed.

Referring now to the end sections 7 and 8, these sections have holes, such as shown at 74 to 77, inclusive, in section 7, of the same diameter drilled in their uprights and at the same angle as holes 60, 64, 65, and 66. Holes 74 to 77, inclusive, also have side openings or mouths, and their cylindrical surfaces correspond to that of section 57 of spindle 50.

To assemble the sections as shown in Fig. 7 to the box of Fig. 1, the side sections 5 and 6 are first placed on the bottom section 9. One of the end sections is then placed on section 9 and four spindles inserted as shown in Fig. 1. Each spindle is inserted as disclosed in the above mentioned copending application; that is, the axis of one of the spindles is made

parallel with the axis of holes 64, 77, and 70; for instance, the axes of these holes being in alignment when side 5, end 7, and bottom 10 are in position. The spindle is then moved into the holes, the smaller dimensions of the spindle sections passing through the side openings or mouths to the holes. This smaller dimension, of course, is perpendicular to the flat surface 59 and permits the spindle to pass into the holes until the axis of the spindle and the axes of the holes coincide. The spindle is then rotated substantially 90 degrees until the flat side 57 spans or is substantially flush with the face of members 14, 29, and 33. The spindle could be rotated in the other direction so that the flat surface is within the hole, but the first mentioned position is preferred.

By this operation, the member 14 is attached or fastened to member 29, both of which are attached to member 33. Since the diameters of the cylindrical sections are larger than the length or width of the corresponding side openings or mouths to the holes, the spindles are transversely locked in position until rotated approximately 90 degrees. Since the end sections 53 and 54 have larger diameters than sections 56 or 57, and these correspond to hole sections 61 and 62, for instance, the shoulders formed provide a longitudinal lock for the spindle and members 14, 29, and 33. Thus, one corner is fastened or attached, and the same procedure is followed for the lower left-hand corner to lock members 21, 28, and 33. The end section 8 is then put in position, and the bottom section and lower corners of the side sections and the end sections are fastened with two spindles in the same manner.

To complete the crate, the top section 10 is placed in position and four more spindles are used to attach it to the side and end sections which also attaches the end sections 7 and 8 at their top ends to the side sections. Thus, the crate is completely assembled, and when so assembled, has been found by test to be stronger than when assembled by nails or screws in the usual manner. Not only is strength provided, but the crate or box may be assembled in a shorter time period, and it may be knocked down or dis-assembled very quickly without injury to the prefabricated wall sections. The crate may, thus, be used many times, no damage being done in the assembling and unassembling thereof. These operations may be very quickly made, thus saving much time in the crating of manufactured articles to be shipped. When used for shipping, the well-known metal strap band 80 may encircle the crate, the band not only preventing easy opening, but maintaining the intermediate elements 16 and 23 in fixed position. The edges may also be sealed or covered with adhesive paper or cloth tape.

Although the invention has been disclosed as embodied in a crate or box, it is to be understood that it may also be used in the construction of furniture whereby the spindles may be covered by an outer side wall of veneer. When the joint is to be permanent, a drop of glue in the holes will provide a lock joint which will not loosen or separate.

Referring now to Figs. 8 and 9, the spindle 51 may have the same dimensions as the spindle 50; that is, ends 81 and 82 correspond to ends 53 and 54, respectively, portions 84 and 85, to portions 56 and 57, respectively, portion 87 to portion 55, and surface 88 to surface 59. The

difference between the two spindles is in the expanded portion or extension 90 on the portion 87. As shown in Fig. 9, this extension has a flat side 91 which is used for locking the spindle in position to prevent rotation thereof during use of the box or crate. The flat side 91 lies against the wall of the section such as wall 27 and may be so positioned by a slight extra effort in the rotation of the spindle. Normally, the friction of the cylindrical surfaces will maintain the spindles in fixed position so that spindle 50 is satisfactory, but in case of much use, the locking spindle 51 is preferred.

Another feature of the spindles is that the length of sections 55 and 87 just span the distance between the members as shown at 94 and 95 in Fig. 2. This aids the spindles to resist forces which tend to decrease or increase the right angle position of the members such as 14 and 42. In tests, the strength of the corners is much superior to corners fastened by nails, screws, or glue, thus providing a particularly strong shipping crate or box for breakable or fragile articles.

It is also to be understood that, although the spindles have been shown as diagonal braces or ties, they may also extend as ties between side members, such as 14 and 21, parallel to members 33 and 42, or extend between members 33 and 42 parallel to members 14 and 21. The small stepped hole sections 61 and 62 to correspond to spindle sections 53 and 56 would be used except the holes would be at right angles to the edge surfaces of the respective members.

I claim:

1. A frame construction comprising a horizontal member having a hole therethrough, said hole having sections of two diameters and side openings through the edge of said member, the perpendicular distances between the edges of said openings being less than the diameters of said sections, respectively, and the cylindrical surfaces of said holes extending through an angle greater than 180 degrees, a vertical member having a hole therethrough, said hole having sections of two diameters and side openings through the edge of said member, the perpendicular distances between the edges of said openings being less than the diameters of said sections and the cylindrical surfaces of said holes extending through an angle greater than 180 degrees, the axes of the sections of the holes in both of said members being in alignment, and a spindle in said holes joining said members, said spindle having cylindrical end sections corresponding to the cylindrical sections of said holes having the larger diameters, intermediate cylindrical sections corresponding to the cylindrical sections of said holes having the smaller diameters, and a substantially flat side of a width approximately corresponding to the perpendicular distance between the edges of said side openings.

2. A frame construction in accordance with claim 1, in which a third member is provided between said first mentioned members and having a hole therein with its axis in alignment with said other holes, said hole having a side opening with a perpendicular distance between the edges of said opening less than the diameter of said hole and in which another diameter section of said spindle is positioned.

3. A frame construction in accordance with claim 1, in which a wall is attached to at least one of said members and said spindle is provided with an extension having a flat side in contact with said wall.

4. A container construction comprising top, bottom, and side sections having inter-engaging parts for positioning the sections with respect to each other, and corner locking means between the adjacent sections including edge members on the sections having holes therein provided with side openings, said holes and openings having enlarged portions, the perpendicular distance between the edges of said side openings being less than the diameter of said holes and the cylindrical surfaces of said holes extending through an angle greater than 180 degrees, the axes of the holes in the edge members of adjacent sections being in alignment, and a spindle receivable in the aligned holes for locking the adjacent sections, the parts of the spindle receivable in said holes being substantially cylindrical and corresponding to the cylindrical surfaces of said holes and having flat sides of a width approximately corresponding to the perpendicular distance between the edges of said side openings and having enlarged portions receivable in the enlarged portions of said holes.

5. A container construction comprising top, bottom, side, and end sections having inter-engaging parts for positioning the sections with respect to each other, and corner locking means between the adjacent top, bottom, and side sections and the end sections including edge members on the sections having holes therein provided with side openings, the holes and openings in the edge members of said top, bottom, and side sections having enlarged portions, the perpendicular distance between the edges of said side openings being less than the diameter of said holes and the cylindrical surfaces of said holes extending through an angle greater than 180 degrees, the axes of the holes in the edge members of the adjacent top, bottom, and side sections and the end sections being in alignment, and a spindle receivable in the aligned holes for locking the adjacent top, bottom, and side sections and the end sections, the parts of the spindle receivable in said aligned holes being substantially cylindrical and corresponding to the cylindrical surfaces of said holes and having flat sides of a width approximately corresponding to the perpendicular distance between the edges of said side openings and having enlarged portions receivable in the enlarged portions of said holes.

6. A frame construction comprising a first member having a hole therein provided with a side opening through the edge of said member, said hole and opening having an enlarged portion, the perpendicular distance between the edges of said side opening being less than the diameter of said hole and the cylindrical surface of said hole extending through an angle greater than 180 degrees, a second member having a hole therein provided with a side opening through the edge of said member, said hole and opening having an enlarged portion, the perpendicular distance between the edges of said side opening being less than the diameter of said hole and the cylindrical surface of said hole extending through an angle greater than 180 degrees, the axes of the holes in said members being in alignment, and a spindle receivable in said holes for joining said members, the parts of the spindle receivable in said holes being substantially cylindrical and corresponding to the cylindrical surfaces of said holes and having flat sides of a width approximately corresponding to the per-

pendicular distance between the edges of said side openings and having enlarged portions receivable in the enlarged portions of said holes.

7. A frame construction in accordance with claim 6, in which a third member is provided between said first and second members and having a hole therein with its axis in alignment with the axes of said other holes, said hole having a side opening with a perpendicular distance between the edges of said side opening less than the diameter of said hole and in which another part of said spindle is receivable.

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