

Feb. 10, 1942.

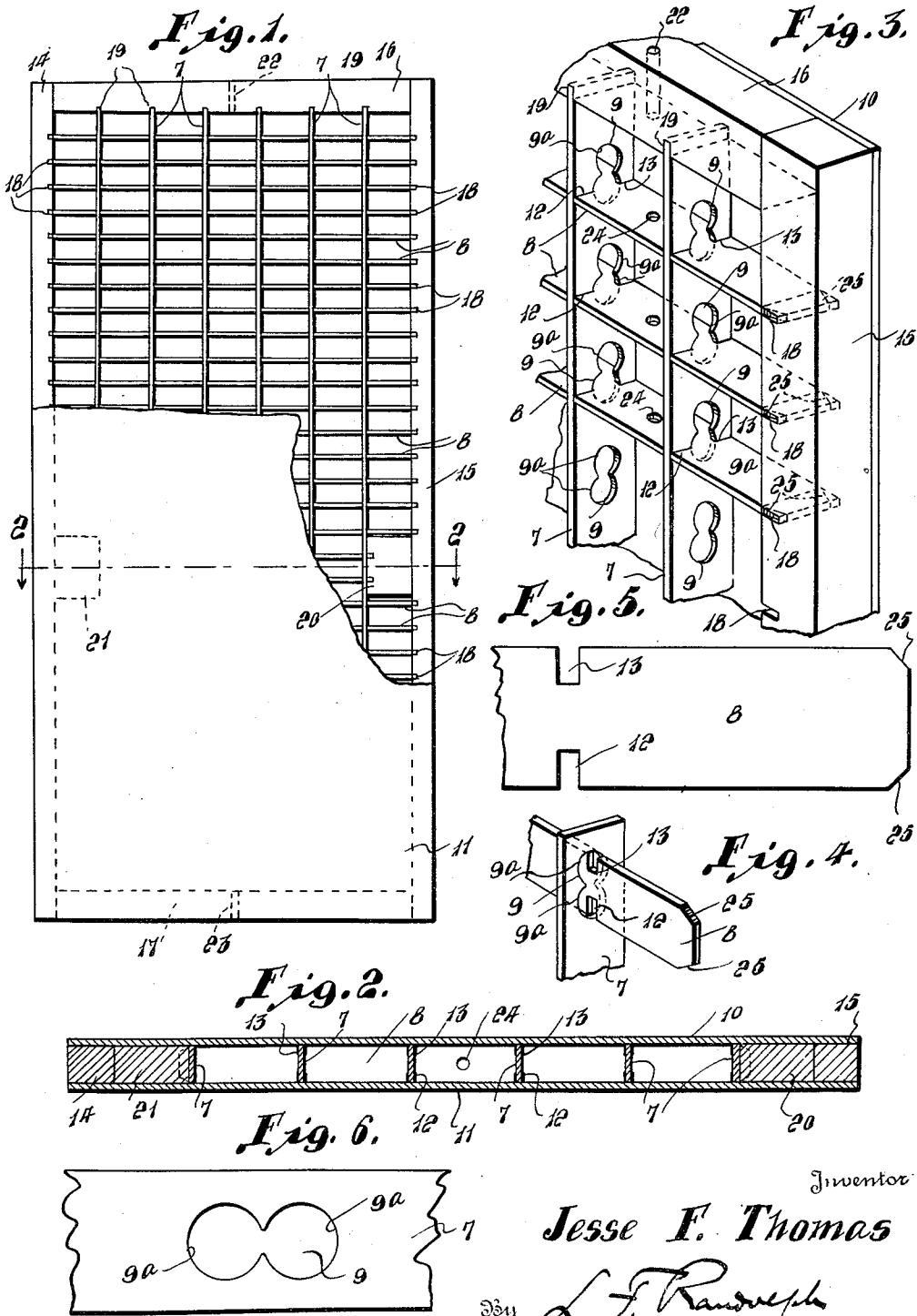
J. F. THOMAS

2,272,227

HOLLOW PANEL

Filed Nov. 16, 1939

2 Sheets-Sheet 1



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2,272,227

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Fig. 7.

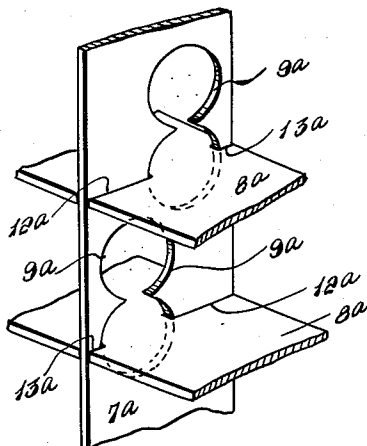


Fig. 12.

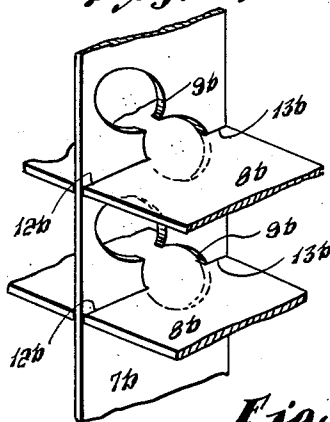


Fig. 8.

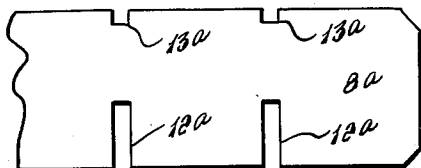


Fig. 13.

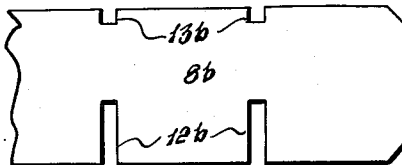


Fig. 14.

Fig. 9.

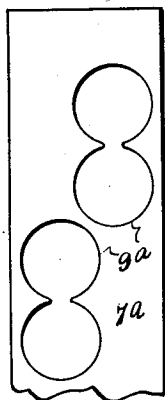


Fig. 10.

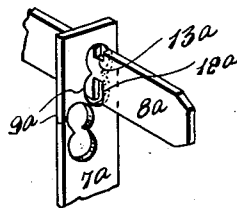
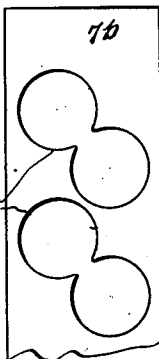
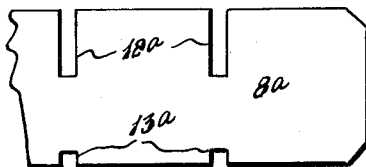


Fig. 11

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2,272,227

HOLLOW PANEL

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Application November 16, 1939, Serial No. 304,841

6 Claims. (Cl. 20—91)

The present invention relates to certain new and useful and improved hollow wooden panels for doors, furniture, partition panels and for other similar uses, and to the joint for the core pieces of such panels and it relates more particularly to hollow wooden panels formed of a pair of juxtaposed and spaced parallel laminated ply-wood boards separated from each other and adhesively united by a cellular core of intersecting strips of wood, which cellular core may be bounded by a frame also disposed between the two laminated ply-wood boards.

I especially aim to provide a core made from strips, one set being unbroken along both longitudinal edges and the other set being unbroken throughout at the central portion so that the core will have equal strength at its opposite sides, have unbroken and greater gluing area along the edges of the strips and be more proof against warpage, with the strip joints affording communication between the cells for efficient drying of the glue employed.

One of the objects of the present invention is to provide a hollow wooden panel of stronger and more rigid construction, which may be more expeditiously made, and one which is also of light construction.

This application is a continuation in part of my application Serial No. 186,073 for Hollow core door, filed January 21, 1938.

With the above and other objects in view which will appear more fully from the following detailed description, the present invention consists of a hollow wooden panel including a cellular core intermediate the two outer ply-wood boards, wherein the intersecting strips are inter-fitted with each other so that one set of wooden strips of the core completely embraces the other set of strips, so that the entire core becomes a unitary structure which will not in and of itself come apart.

The present invention also consists of other novel features and details of construction all of which will appear more fully from the following detailed description.

In the accompanying drawings, in which like reference characters indicate like parts:

Figure 1 represents a front elevational view of a hollow wooden panel embodying the present invention, shown with one of the outer ply-wood boards partly broken away so as to expose to view the internal core;

Figure 2 represents a section on line 2—2 of Figure 1;

Figure 3 represents a fragmentary perspec-

tive view, on a much enlarged scale, of the core and the surrounding frame;

Figure 4 represents a fragmentary perspective view of one of the joints of two intersecting strips of the core shown as the strips are interlaced and before the inserted strips are turned into the final position shown in Figure 3;

Figure 5 represents a fragment of one of the core strips in plan;

Figure 6 represents a fragment of one of the other type of core strips in plan;

Figure 7 represents a fragmentary perspective view of a modified form of joint for the core;

Figure 8 is a fragmentary view of a portion of one of the core strips of the joint shown in Figure 7;

Figure 9 is a similar view of a portion of one of the other type core strips of said joint;

Figure 10 is a view similar to Figure 8 showing the core strip inverted;

Figure 11 is a fragmentary perspective view showing one of the core joints of Figure 7, partly assembled;

Figure 12 is a view similar to Figure 7 of another form of the core joint;

Figure 13 is a view similar to Figure 8 of a portion of one of the strips of the joint of Figure 12; and

Figure 14 is a view similar to Figure 9 of a part of one of the other type of strips of the joint shown in Figure 12.

The core of the hollow wooden panel is formed of two series of thin wooden strips 7 and 8, respectively; the strips of each series being parallel. One set of strips is provided with central elongated apertures 9 each formed by drilling two intersecting holes so that the major dimension of said apertures is disposed longitudinally of the strip and being generally equal to the transverse width of the strip, that is, equal to the distance at which the outer plywood boards 10 and 11 are to be spaced from each other. The major dimension of these elongated apertures may be slightly in excess of the transverse width of the strip, by an amount just sufficient to give working clearance for the insertion of the other set of strips in the manner indicated in Figure 4.

The other set of strips are in turn notched at points 12 and 13 where they are to intersect the apertured strips. The opposed notches 12 and 13 enter the edges of the strips to such a depth that the width of the intervening portion of the notched strip will be equal to the diameter of either of the arcuate walls 9a of the apertures 9. Both the apertures 9 in the apertured strips, as

well as the notches 12 and 13 in the notched strips are arranged symmetrically with respect to the strips. While the apertures as well as the notches may be placed in either set of strips of the core work in the preferred embodiment of the present invention, the apertures are provided in the strips which extend the greater length of the furnished hollow panel while the notches are placed in that set of strips which extends the lesser dimension of the finished hollow wooden panel.

Particular attention is called to the fact that great strength is provided by reason of the particular structure and co-action of the strips 7 and 8, such strength being the same on opposite sides of the neutral axis of the core and strips. Thus it will be noted that although the strips 8 are notched at each edge as at 12 and 13, they have portions between such notches which are unbroken longitudinally throughout the length of the strips 8, any vent openings provided through said strips of course being negligible. As to the strips 7, they have both longitudinal edge portions unbroken on opposite sides of the openings 9, and extending throughout their length. The notches 12 and 13 are of a width just sufficient to snugly receive the strips 7 therein. The elongated apertures of the form shown have the advantage that when the strips are interwoven and turned into the final positions, the notched strips are better centered and engaged with the adjacent arcuate walls 9a in the elongated apertures and are held more firmly. This also facilitates the handling of the lattice work or core in the assembly of the hollow wooden panel and thereby tends to reduce the cost of manufacture and the cost of the ultimate product.

The cellular core composed of the series of apertured strips and the series of notched strips, interfitted with each other, are bounded by a frame formed of frame members 14, 15, 16 and 17 which are notched at 18 and 19 to receive the ends of the strips 8 and 7. The frequency or spacing of the strips 7 and the frequency and spacing of the strips 8 may be varied according to the thickness of the finished panel and according to the size of the finished panel and other factors, as for instance, the thickness of the ply-wood boards 10 and 11 and the strength desired or needed in the finished product. The strips 7 and 8 may be of any suitable thickness. A thickness of $\frac{3}{8}$ " has been found to be satisfactory although this may be varied. The width of the notches 12 and 13 is in turn made equal to the thickness of the strip. Thus for a $\frac{3}{8}$ " strip the notches 12 and 13 will be $\frac{3}{8}$ " in width. The spacing of the strips of one set may be different from the spacing of the strips in the other set. Thus, the shorter strips may be spaced more closely than the longer strips, as for instance as indicated in Figure 1. For most uses, such as door panels, furniture panels, partition panels, etc., the notched strips may be spaced on centers anywhere from one inch to four inches, while the apertured strips may be spaced on centers anywhere from two to four inches, more or less. The spacing of the ply-wood boards 10 and 11, that is, the width of the strips 12 and 13, may vary from $\frac{1}{2}$ " to 2", more or less, depending on the size and thickness of the finished panel. Likewise, the rails and stiles 14, 15, 16 and 17 may vary in depth (their transverse dimension parallel to the ply-wood boards), from 1" to $2\frac{1}{2}$ ", according to the size of the panel.

It will be understood that these dimensions are

generally increased or decreased together and some of the dimensions may be dependent upon each other. Thus, when the apertures in each strip are aligned, the width of the strips should be less than the spacing of the notched strips from each other, for otherwise the elongated apertures 9 would run into each other and form a continuous separation in the strips 7. Otherwise stated, the spacing of the notched strips should be somewhat greater than the spacing between the ply-wood boards 10 and 11.

As seen in Figures 7 to 11, inclusive, strips 8a may be spaced a distance from each other less than their width by providing strips 7a having staggeredly arranged apertures 9a. The notches 12a of the strips 8a are substantially longer than notches 13a so that when applied, strips 8a will be centered relatively to the strips 7a. The alternate strips 8a are inverted, as seen in Figure 10, so that the shorter notches 13a will always be contiguous with the longitudinal edge of the strips 7a adjacent which the apertures 9a, which engage said strips 7a, are located. The central portions of these apertures 9a may thus be brought together until the spacing between them is less than the widths of the strips 8a, and yet not run into each other to cause the longitudinal separation of the aperture-bearing strips 7a.

The same result is accomplished by the modification illustrated in Figures 12 to 14, wherein strips 7b are provided with apertures 9b, the axes of which are inclined relatively to the longitudinal edges of the strips 7b so that strips 8b can be spaced apart at distances less than the widths of these strips. As seen in Figure 14, the ends of these apertures 9b overlap each other in a longitudinal direction and yet not run into each other, although the distances between their centers is less than their length, because they are inclined in the same direction and are in a straight row. The strips 8b, as seen in Figure 13, are identical to the strips 8a, as the length of the notches 12b is greater than that of the notches 13b. However, alternate strips 8b do not have to be inverted as the lower end of each aperture 9b is adjacent the same longitudinal edge of its strip 7b. It is to be understood that when the apertures are thus staggered, the transverse portions disposed between each pair of notches in the notched strips 8, 8 will not be centered along the width of these strips, but will all be off center to a greater or lesser degree depending upon the extent to which the apertures are staggered.

The outer ply-wood boards are preferably laminated ply-wood boards of two, three or more laminations with any suitable aggregate thickness depending on the size, strength and stiffness desired. Laminated ply-wood boards each having an aggregate thickness of anywhere from an eighth of an inch to a quarter of an inch are quite suitable, although these thicknesses may be varied. In the formation of the hollow wooden panels of the present invention, the set of apertured strips and the set of notched strips are interfitted with each other in the manner shown in Figure 4, and then the notched strips are turned until they assume their positions shown in Figure 3. In this position, the strips firmly interlock with each other. With the strips so engaged, the notched rails and stiles 14, 15, 16 and 17 are placed around the same with the ends of the strips entering the notches 18 and 19 on the rails and stiles. It is not necessary to glue the strips 7 and 8 together at the interfitted joints at openings 9 and notches 12 and 13.

The rails and stiles may be merely abutted against each other in the manner shown in Figures 1 and 2 or they may be rabbeted or mortised with respect to each other. In either event their meeting surfaces are also preferably glued or adhesively secured to each other.

The ply-wood boards 10 and 11 are then applied with glue or other adhesive to the side faces of the frame members 14, 15, 16 and 17, and to the flat edge surfaces of the lattice strips 7 and 8 and pressed thereagainst until the adhesive has completely set so as to form a firmly bound hollow panel unit. For door panels, solid latch blocks 20 and 21 may be inserted and glued between the outer ply-wood boards 10 and 11 and immediately adjacent to the corresponding frame members so as to form a solid wooden structure within which a lock or latch may be mortised.

If desired, a small ventilating hole 22 and another small ventilating hole 23 may be drilled through the top and bottom frame members 16 and 17, preferably in generally vertical alignment with each other, that is, between the same pair of vertical core strips. The two sets of strips forming the lattice work, form, in conjunction with the outer frame members and the ply-wood panels 10 and 11, individual cells within the hollow wooden panel. The elongated apertures 9 function secondly to form ventilating passageways between the cells adjacent to each other in a direction parallel to the notched strips while the apertures 24 form ventilating passageways between adjacent rows of the last mentioned rows of cells so that all the enclosed cells may be in ventilated communication with each other, thereby tending to eliminate any unevennesses which may otherwise be caused by differences in humidity or moisture content of the air in the cells. Similar ventilating apertures 24 are then also provided in the horizontal strips between the same pair of vertical core strips.

The ends of strips 8 are preferably tapered at their ends as shown at 25 to permit facilitating assembly with strips 7 as hereinbefore described.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim as my invention:

1. A hollow wooden panel comprising a wooden frame, notches along the inner periphery of said frame, a cellular core formed of two intersecting sets of wooden core strips with the lines of intersection in alignment with said notches along the inner periphery of said frame; the width of each core strip being generally the same as the thickness of said frame, elongated apertures in one set of strips at the zones of intersection and extending longitudinally of the strips and longitudinally along the neutral axis thereof, each aperture being formed by intersecting circular openings of the same size described from centers disposed on lines parallel to the longitudinal edges of the strips, whereby the apertures are provided solely by the boring of two holes on axes perpendicular to the faces of the strips, and pairs of opposed and inwardly extending transversely aligned notches in the other set of strips at the lines of intersection with the width of the latter strips intermediate the notches being the same as the diameter of the circular openings, the

longitudinal dimension of said apertures being sufficient to accommodate the width of the intersecting set of strips, and the transverse dimension of said apertures being sufficient to accommodate the narrowed portions of the intersecting set of strips intermediate the juxtaposed pairs of notches thereof, and said notches in said intersecting set of strips being of a width generally the same as the thickness of the strips of the other intersecting set, the ends of said two sets of intersecting strips extending into said peripheral notches in said frame and being supported thereby.

2. A hollow wooden panel comprising a wooden frame, notches along the inner periphery of said frame, a cellular core formed of two intersecting sets of wooden core strips with the lines of intersection in alignment with said notches along the inner periphery of said frame; the width of each core strip being generally the same as the thickness of said frame, elongated apertures in one set of strips at the zones of intersection and extending longitudinally of the strips and longitudinally along the neutral axis thereof, each aperture being formed by intersecting circular openings of the same size described from centers disposed on lines parallel to the longitudinal edges of the strips, whereby the apertures are provided solely by the boring of two holes on axes perpendicular to the faces of the strips, and pairs of opposed and inwardly extending transversely aligned notches in the other set of strips at the lines of intersection with the width of the latter strips intermediate the notches being the same as the diameter of the circular openings, the longitudinal dimension of said apertures being sufficient to accommodate the width of the intersecting set of strips, and the transverse dimension of said apertures being sufficient to accommodate the narrowed portions of the intersecting set of strips intermediate the juxtaposed pairs of notches thereof, and said notches in said intersecting set of strips being of a width generally the same as the thickness of the strips of the other intersecting set, the ends of said two sets of intersecting strips extending into said peripheral notches in said frame and being supported thereby, and a wooden board adhesively and generally continuously secured to the edges of both sets of strips of said cellular core and to said frame on each side of the combined frame and cellular core to form a substantially completely enclosed panel; said core forming cells within said hollow wooden panel, and said elongated apertures forming communicating passageways between cells adjacent to each other in a direction parallel with the notched strips.

3. A hollow wooden panel comprising a wooden frame, notches along the inner periphery of said frame, a cellular core formed of two intersecting sets of wooden core strips with the lines of intersection in alignment with said notches along the inner periphery of said frame; the width of each core strip being generally the same as the thickness of said frame, elongated apertures in one set of strips at the zones of intersection and extending longitudinally of the strips and longitudinally along the neutral axis thereof, each aperture being formed by intersecting circular openings of the same size described from centers disposed on lines parallel to the longitudinal edges of the strips, whereby the apertures are provided solely by the boring of two holes on axes perpendicular to the faces of the strips, and pairs of opposed and inwardly ex-

tending transversely aligned notches in the other set of strips at the lines of intersection with the width of the latter strips intermediate the notches being the same as the diameter of the circular openings, and the diameter of said openings being sufficient to accommodate the narrowed portions of the intersecting set of strips intermediate the juxtaposed pairs of notches thereof, and said notches in said intersecting set of strips being of a width generally the same as the thickness of the strips of the other intersecting set, the ends of said two sets of intersecting strips extending into said peripheral notches in said frame and being supported thereby.

4. A hollow wooden panel comprising a wooden frame, notches along the inner periphery of said frame, a cellular core formed of two intersecting sets of wooden core strips with the lines of intersection in alignment with said notches along the inner periphery of said frame; the width of each core strip being generally the same as the thickness of said frame, elongated apertures in one set of strips at the zones of intersection and extending longitudinally of the strips and longitudinally along the neutral axis thereof, each aperture being formed by intersecting circular openings of the same size described from centers disposed on lines parallel to the longitudinal edges of the strips, whereby the apertures are provided solely by the boring of two holes on axes perpendicular to the faces of the strips, and pairs of opposed and inwardly extending transversely aligned notches in the other set of strips at the lines of intersection with the width of the latter strips intermediate the notches being the same as the diameter of the circular openings the longitudinal dimension of said apertures being sufficient to accommodate the width of the intersecting set of strips, and the transverse dimension of said apertures being sufficient to accommodate the narrowed portions of the intersecting set of strips intermediate the juxtaposed pairs of notches thereof, and said notches in said intersecting set of strips being of a width generally the same as the thickness of the strips

of the other intersecting set, the ends of said two sets of intersecting strips extending into said peripheral notches in said frame and being supported thereby, and a wooden board adhesively and generally continuously secured to the edges of both sets of strips of said cellular core and to said frame on each side of the combined frame and cellular core to form a substantially completely enclosed panel: said cellular core forming cells within said hollow wooden panel, and said elongated apertures forming communicating passageways between cells adjacent to each other in a direction parallel with the notched strips, and apertures extending through said notched strips and forming communication between adjacent rows of said last-mentioned cells.

5. In a joint of the class described, two strips, one of said strips having a slot formed by intersecting circular openings of the same size described from centers disposed on a line parallel to the longitudinal edges of the latter strips, whereby the slot is provided solely by the boring of two holes on axes perpendicular to the face of the strip, the other strip having transversely aligned notches in its opposed edges, said other strip having the portion between the notches of a width equal to the diameter of the circular openings whereby it may enter the slot and then be turned so that the said portion between the notches will occupy either opening snugly.

6. A cellular core for the purpose specified consisting of wooden strips, certain of said strips having slots therethrough, each slot consisting of intersecting circular openings of the same size described from centers disposed on a line parallel to the longitudinal edges of the strips, whereby the slots are provided solely by the boring of two openings on axes perpendicular to the faces of the strips, the other strips having transversely aligned notches in opposite edges thereof, the second mentioned strips being insertable in the slots and then turned to dispose the portions between the notches in certain of the holes, such portions being of a width equal to the diameter of the circular openings.

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