United States Patent

Nordgren

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[54] DEVICE IN FOLDABLE ENCLOSURES

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March 20, 1970 Sweden 3825/70

[52] **U.S. Cl.** ..... **24/19**, 16/159, 217/12 A
[51] **Int. Cl.** **E05d 5/02**, B65d 9/12
[58] **Field of Search** ..... 217/12 A; 229/44 M; 16/159; 24/19

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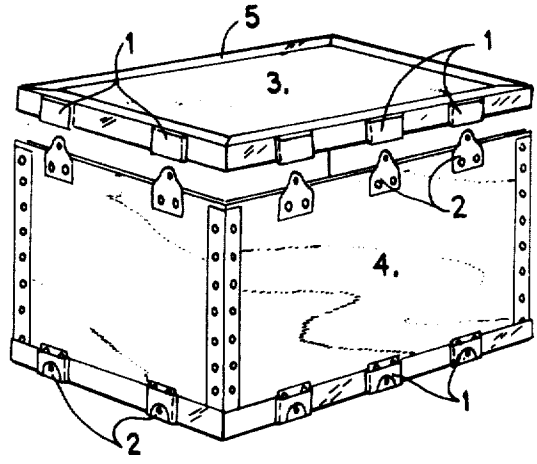
[57] **ABSTRACT**

This disclosure relates to a locking device for foldable enclosures to interlock parts thereof together, at least one part of the enclosure being provided with female members and another part being provided with male members which interlock with the female members, and at least one set of the members being carried by a band which has integrally struck therefrom tabs which are of a self-reinforced construction for ease of penetrating relatively hard fibrous material including wood.

10 Claims, 14 Drawing Figures



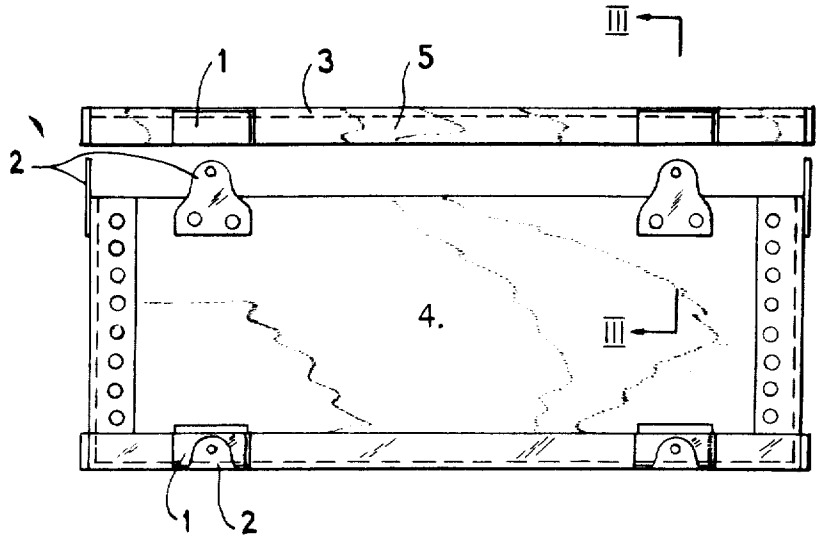


Fig 1

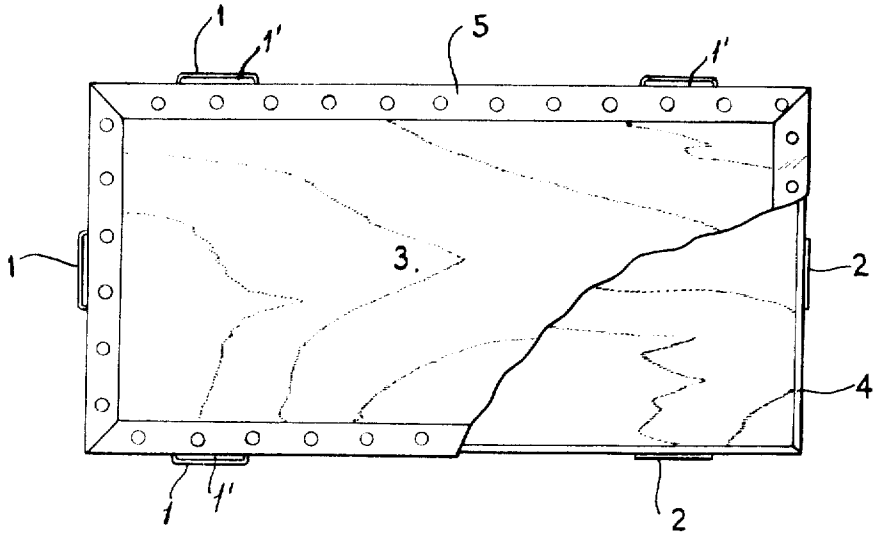


Fig 2

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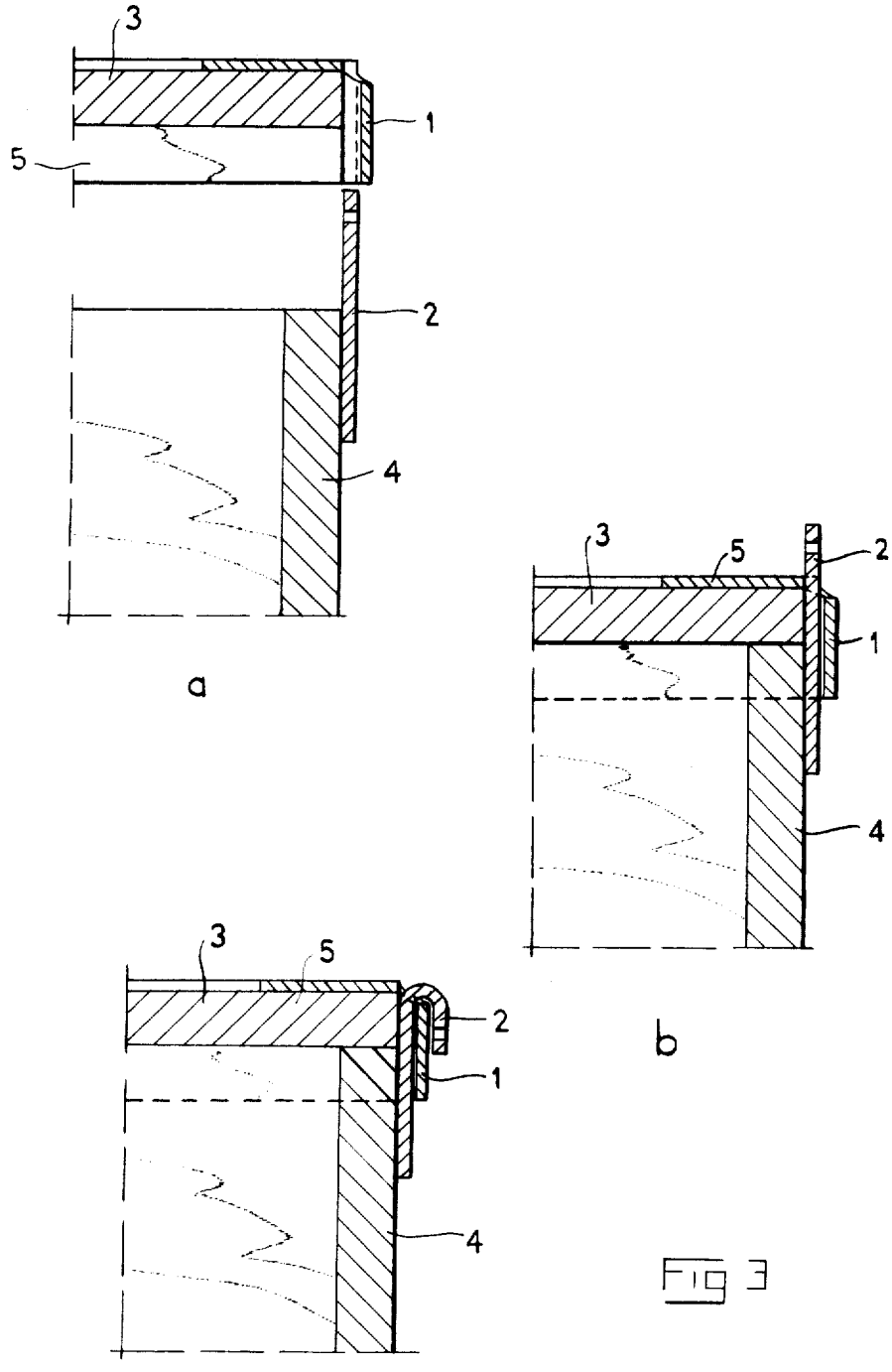

Fig 3

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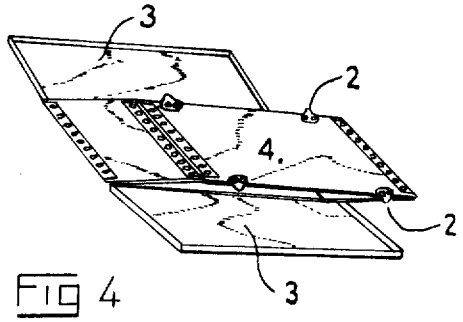


Fig 4

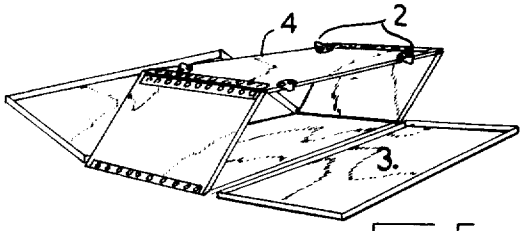
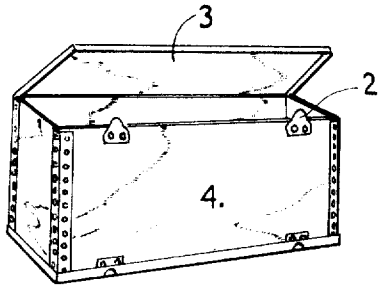


Fig 5



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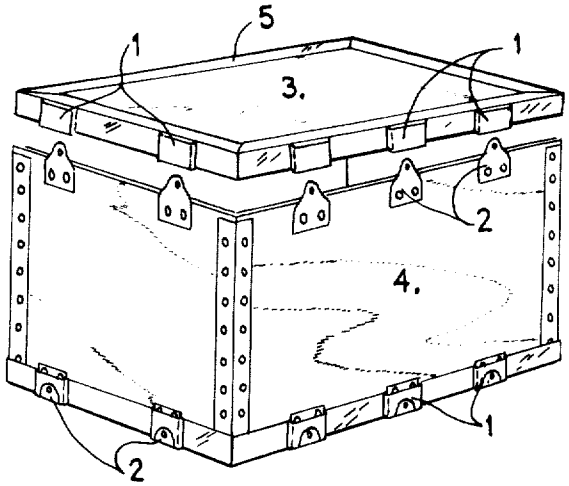

Fig 7

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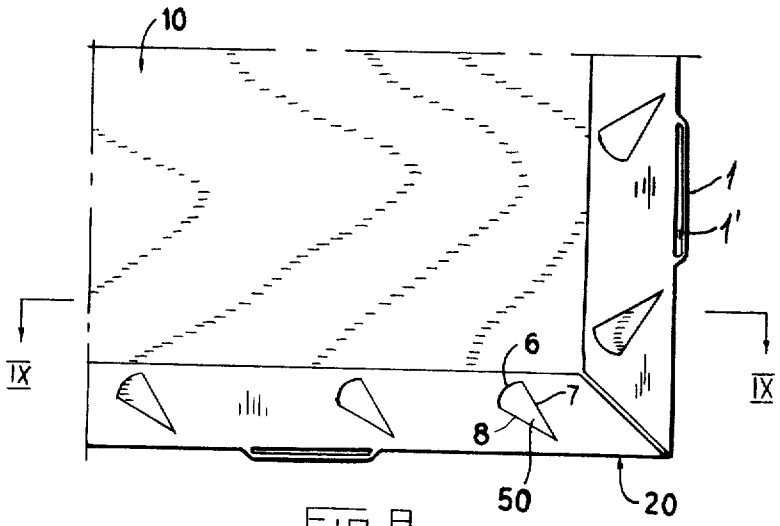

Fig 8

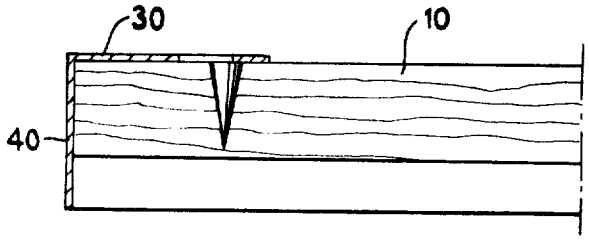

Fig 9

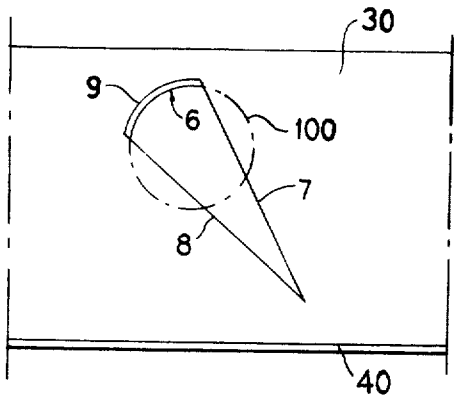

Fig 10

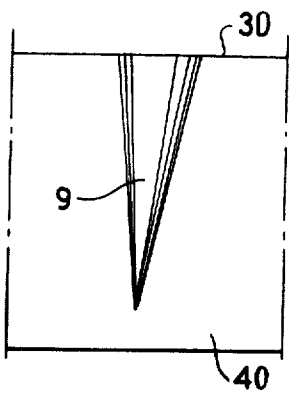

Fig 11

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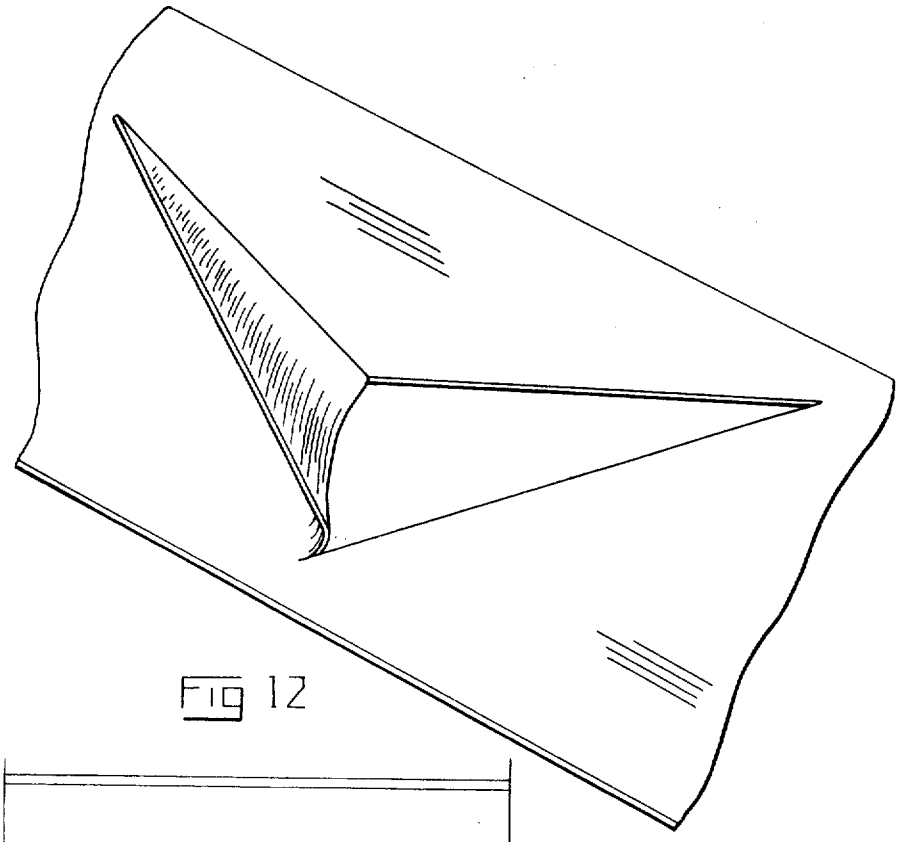

Fig 12

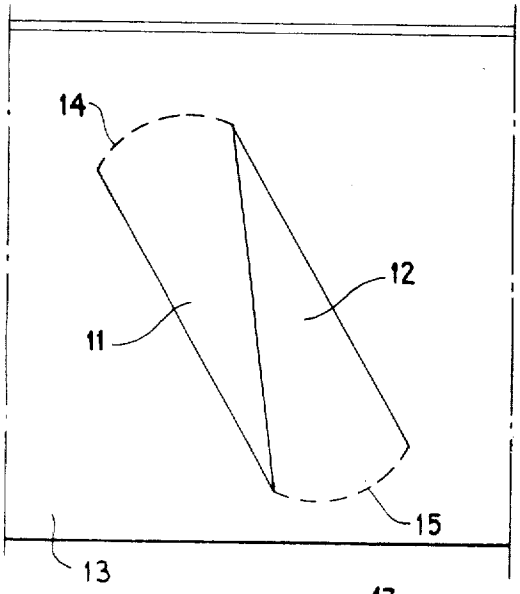

Fig 13

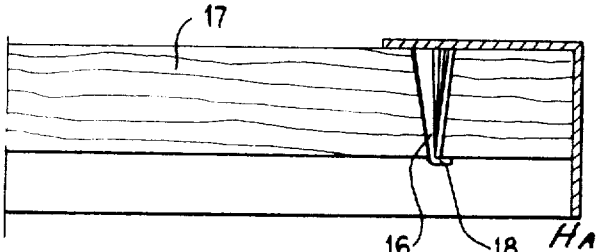

Fig 14

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DEVICE IN FOLDABLE ENCLOSURES

The present invention relates to a device in foldable enclosures to interlock parts of the enclosure, at least one part of the enclosure being provided with female members, and at least one other part of the enclosure, to which the first part shall be fastened, being provided with male members adapted to fit into the female members in order to interlock the parts to each other.

There is a great need for nonexpensive and light enclosures or embales of this type, and it is an object of the invention to enable a much faster and safter fastening of the female and male members to the parts of the enclosure or embale and to guarantee in an easier way the correct positioning mutually of the members than what has been hitherto possible. Further, an object of the invention is also to obtain a full and unreduced space within the enclosure through positioning the members at the outside of the enclosure parts.

The present invention is mainly characterized in that the female members and/or the male members are forming portions of fitting bands fastened to the walls of the enclosure parts, preferably at the outside thereof.

An embodiment of the invention will now be described as a nonlimiting example, reference being made to the accompanying drawings.

In the drawings:

FIG. 1 is an elevational view of an enclosure provided with a fastening device according to the invention, a lid or cover thereof being shown spaced above the enclosure, ready to be fastened thereto by means of the locking members,

FIG. 2 is a top plan view of the enclosure shown in FIG. 1 with parts broken away and shown in section,

FIG. 3*a* is a fragmentary transverse vertical sectional view taken along the line III—III in FIG. 1,

FIG. 3*b* is a view similar to FIG. 3*a* wherein the lid has been mounted on the enclosure but not locked in position,

FIG. 3*c* is a view similar to FIG. 3*a* wherein the lid has been locked in its mounted position of FIG. 3*b*,

FIGS. 4, 5 and 6 are perspective views showing different stages of unfolding of an enclosure having a fastening device according to the invention,

FIG. 7 an exploded perspective view and shows the fastening device mounted on a partly unfolded enclosure having a removable lid and a likewise removable bottom,

FIG. 8 is a fragmentary plan view of a wooden part with a fastening device fastened to the wooden part,

FIG. 9 is a sectional view along the line IX—IX in FIG. 8,

FIG. 10 is a bottom plan view of the fastening device of FIG. 8 on a larger scale,

FIG. 11 is a fragmentary side elevation of the fastening device shown in FIG. 10,

FIG. 12 is a fragmentary perspective view of the fastening device and shows the details of a fastening lug thereof,

FIG. 13 is a bottom plan view similar to FIG. 10 and shows another embodiment of lugs according to the present invention, and

FIG. 14 is a sectional view similar to FIG. 9 through a still further embodiment of the lug arrangement according to the invention.

Reference is first made to FIGS. 1–7 wherein a metal band 5, which is of a right-angled sectional form and thus strongly reinforcing, is fastened around the edges on one side of a lid or cover 3 of the enclosure or embale. In the band 5 holes or recesses have been punched, whereby female members or fittings 1 have been formed. Another part 4 of the enclosure or embale has male members or fittings 2 which are adapted to fit into corresponding female members 1 when the enclosure is being assembled as is shown in FIGS. 3*a* and 3*b*. The male member 2 is manufactured of a material which is capable of being bent back over a part of the female member 1 in order to provide a strong and simple interlocking means, as shown in FIG. 3*c*. The male member 2 is provided with a hole at the projecting end thereof so as to be able to be locked or secured by means of a key, a pin or the like.

The male members 2 may, like the female members, be arranged as portions of a band.

After punching the holes of the female members 1, portions of the members are punched or bent in an outward direction from the enclosure, as will be best seen in FIG. 2. The male members 2 may then be fully straight or plane. Thus the male and female members in any way may reduce the available space within the enclosure or its material.

The feature of arranging series of members, such as the members 1 and 2, shown in the drawings, integrally with a common fitting band 5 and accurately spaced from each other, simplifies the mounting of the various members and positively eliminates the risk of a faulty mounting thereof, while also the manufacture of the enclosure or embales will be greatly simplified and much more economical.

It is, of course, not necessary to bend the band 5 into a right-angled form, since the band 5 may, provided that the side of the lid 3 has a sufficient thickness, be fastened to the edge or rim thereof.

Securing of plates, as for instance the fitting bands 5 mentioned above, by means of tabs formed by stamping holes in the plate is known in art. As known, each of the holes stamped in the plate is associated with a plurality of tabs primarily due to the fact that the holes are made circular or quadrangular, the suitable number of tabs amounting to where four or more. In the case four or more tabs are obtained on stamping a hole — say a circular or quadrangular hole — the tabs will become rather obtuse. In quadrangular holes for instance the tab length will be only one half of the base width. The fact that the tabs become obtuse involves considerable drawbacks, e.g. in that the tabs may be able to enter only imperfectly into the wood part causing an unsatisfactory connection between the plate and the wood portion. Also when the tabs may be caused to penetrate into full depth, a considerable risk of crackings in the wood part will arise as a consequence of the great base width of the tabs. This is particularly true when the plane or width extension of the tabs is parallel to or at right angles to, respectively, the fiber direction of the wood part.

An object of the invention is to remove these disadvantages. This is accomplished in a surprisingly simple and efficient way in that with a single hole in the plate one or at most two tabs are associated, the length of which is greater than their base width.

In FIGS. 8 and 9, the numeral 10 designates a wooden part, e.g. a part of the enclosure or embale, onto which a plate 20 is secured. The wooden part 10 in this case may consist of a plywood sheet, e.g. a lid or cover of the enclosure. The edge fitting or plate includes two wings 30 and 40 which form an angle of 90° to each other.

The holes 50 are stamped in the wing 30 bearing against the major face of the sheet 20, which holes have a wedge or sector formed or otherwise acute character. At a base 6 of each of the holes 50 the plate material located between the border lines 7 and 8 prior to stamping is bent down, whereby a tab 9 is formed directed transversely of the plane of the wing 30. This tab has in accordance with the principle of the invention a length that is considerably greater than the base width 6. Thereby is achieved that the tab will enter with the utmost facility into the sheet 20 and assure a permanent connection between the plate fitting and the sheet. Experiments carried out have shown that the tab length for obtaining the best result should be at least double the base width, primarily at least 2.5 the size of the width.

The tab 9 has a round or curved cross section form. At least a cross section in the proximity of the tab base is arcuate, the cross sectional form being in conformity with an imaginary circle 100.

If the tab would be stamped out with a linear cross section, it would easily become folded or otherwise deformed on being driven into the sheet or wood part 10, whereby any further insertion would be impossible. This would cause forming of elevations where the tab could not be driven in completely. The connection between the fitting and the sheet could also be

weakened. If the tab, however, has a round or curved cross section the tab will be stiffened considerably and the risk of inadvertent bending or folding thereof eliminated.

The diameter of the imaginary circle **100** may preferably be less than the length of the tab **9**, see FIG. **3**.

The plane or width extension of the tab **9** is preferably set at an angle with respect to the longitudinal direction of the plate or band. In that manner the tab will automatically be set at an angle with respect to the fiber direction of the wood part, since the fiber direction of wooden parts is usually parallel to their edges. This eliminates crack formation in the wood part which is more apt to crack or split in case the mounting member is driven in parallel to the fiber direction.

The skew angle may be between 30° and 60°, suitably about 45°. FIG. **13** shows two tabs punched or bent out of one and the same hole with their bases spaced from each other, the acute ends of the tabs being directed in opposite directions before the completed bending out operation.

The bases **14** and **15** as well as the cross sections of these tabs may be curved or planar.

FIG. **14** shows a tab **16** of a length to penetrate all through the wooden part **17** and even project therefrom. The projecting length **18** is bent or folded back. By means of a tab bent in this manner a strong connection of the tab is perfectly assured with the wood part. This advantage is in practice only obtainable by an elongated tab i.e. its length should preferably be substantially greater than its base. Otherwise the stamped out hole would be too large.

The invention is not limited to the embodiments described above and shown in the drawings, a variety of modifications being possible within the scope of the claims.

What is claimed is:

1. In an enclosure construction having parts releaseably secured together, a fastening device, said fastening device comprising a first fastening member secured to an exterior surface of one enclosure part and having female portions disposed along an edge of said one enclosure part, and a second fastening member secured to the exterior surface of another enclosure part and having a male portion receiveable in said female portion, said first fastening member abutting said edge with said female portion being outwardly deformed relative to said edge and defining a slot parallel to and immediately adjacent said edge, and each of said fastening members having tabs projecting into respective enclosure parts and securing said fastening members to said enclosure parts.

2. A fastener device according to claim **1** wherein said first fastening member is angular in cross section and includes one flange having said female member formed therein and one flange having said tabs thereon.

3. A fastener device according to claim **1** wherein said tabs are in the form of prongs struck from said fastening members with the ratio between the length and base of each prong being on the order of 2.5 to 1 with each prong being of an arcuate cross section at least adjacent said base, the radius of said arcuate section being less than said prong length.

4. A fastening device according to claim **1** wherein each prong base is at an acute angle to the longitudinal extent of the respective fastening member.

5. A fastening device according to claim **1** wherein said enclosure parts are formed of wood having a prearranged fiber orientation and each prong is also at an acute angle to said fiber orientation.

6. The fastening device of claim **4** wherein said acute angle is generally between 30° and 60°.

7. The fastening device of claim **4** wherein said acute angle is generally on the order of 45°.

8. The fastening device of claim **4** wherein said prongs extend all of the way through said enclosure part and has an end bent over onto the enclosure part.

9. The fastening device of claim **4** wherein two of said prongs are stamped and bent out in the formation of one aperture with their bases being oppositely and remotely disposed and ends thereof initially extending in opposite directions.

10. The fastening device of claim **1** wherein said male member has an aperture positioned for the reception of a pin-like retaining member to retain the same in said female member.

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