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[21] Appl. No. **857,476**

[22] Filed **Sept. 12, 1969**

[45] Patented **Aug. 3, 1971**

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[54] **SECUREMENT APPARATUS**
 12 Claims, 9 Drawing Figs.

[52] U.S. Cl. **287/20.924,**
 108/111, 211/148, 211/177, 312/264

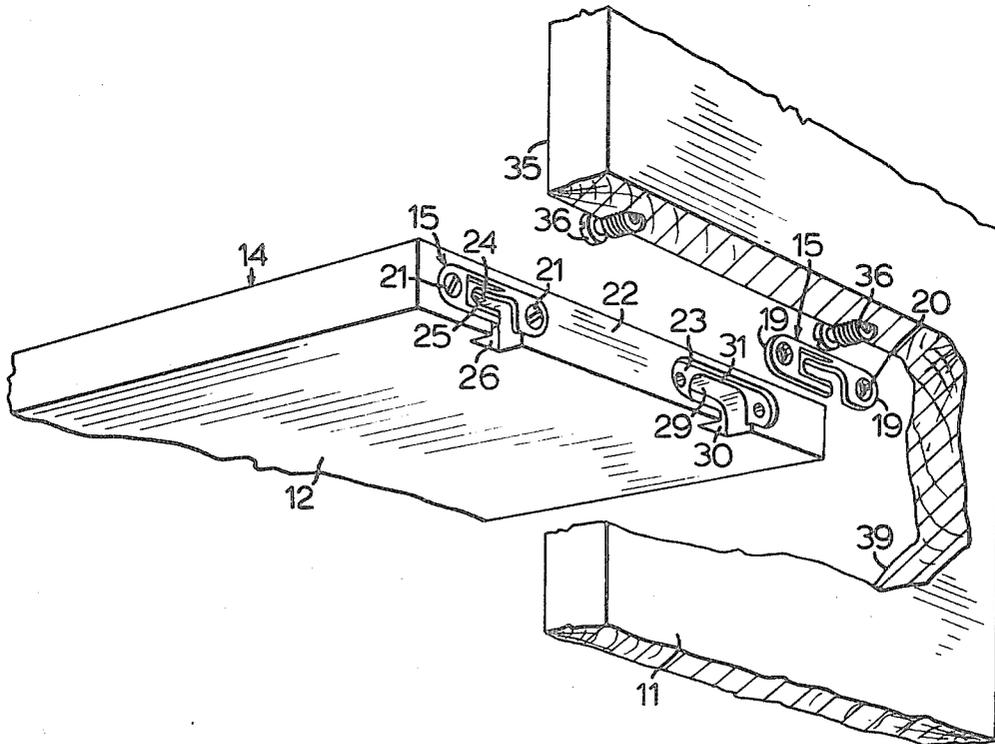
[51] Int. Cl. **F16b 9/00**

[50] Field of Search **287/20.924,**
 20.925, 20.926, 20.92, 20.92 C, 54 A; 108/111,
 101; 312/245, 264; 211/90, 148, 177

[56] **References Cited**
UNITED STATES PATENTS

465,472	12/1891	Goodin.....	287/20.924 UX
834,462	10/1906	Faught	287/20.926
962,939	6/1910	Call	287/20.926

ABSTRACT: Two detachably securable structural members, such as a shelf and end wall of a bookcase, the shelf having securement plates mounted on an end face thereof with an L-shaped slot being formed through each plate and into the associated end face of the shelf. One end of each slot is closed, and the other end thereof is open at an edge of the plate and shelf, the slot being of undercut form at least adjacent to its closed end and being of such dimensions that a securement member which projects from the end wall of the bookcase may be slidably moved through the slot from its open end to its closed end. Each securement member has a head and a shank, the head, when the member is at the closed end of the associated slot, being disposed within the wider part of the undercut portion of the slot with the shank projecting through the part of the slot formed through the plate. This latter part of the slot is at least at the undercut portion of the slot of less width than the head. In passing from the open end to the closed end of the slot the head moves over an inclined portion and on to a portion parallel to the end face of the shelf whereby this face of the shelf and the end wall of the bookcase are urged together during this movement.



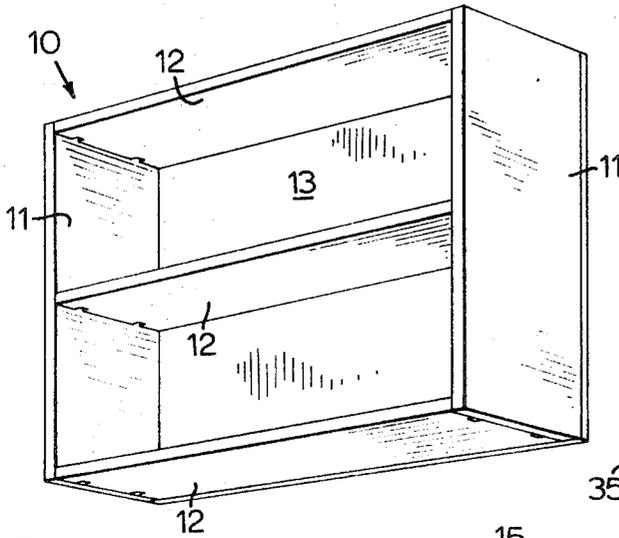


FIG. 1

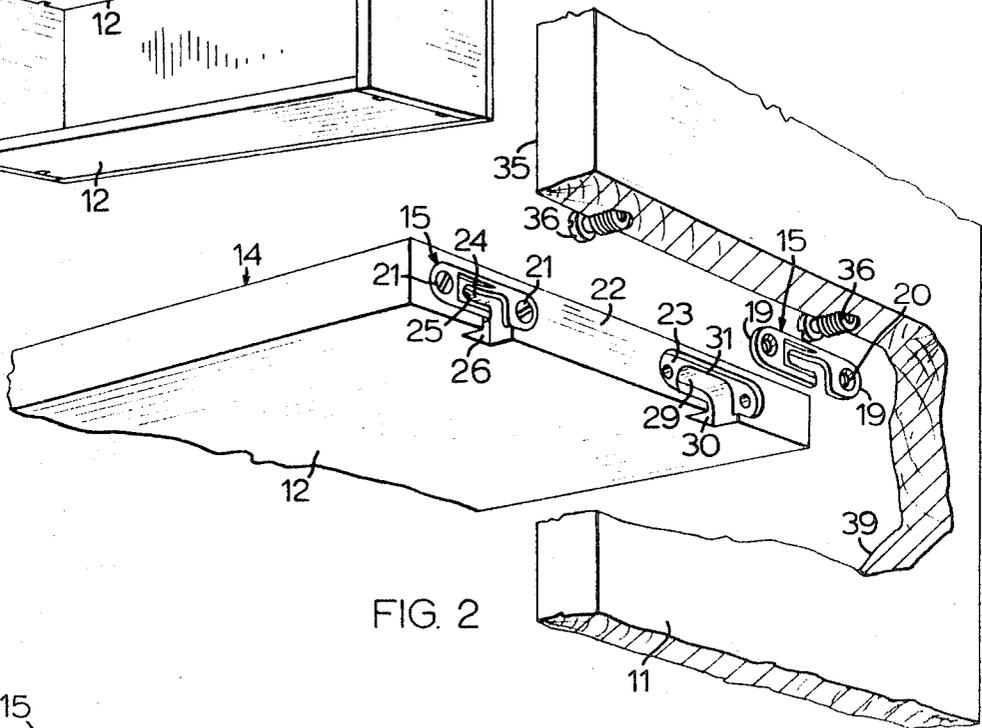


FIG. 2

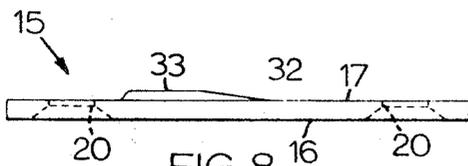


FIG. 8

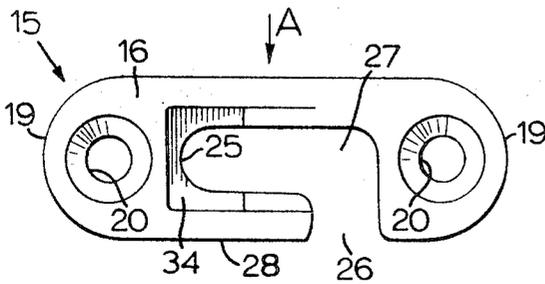


FIG. 7

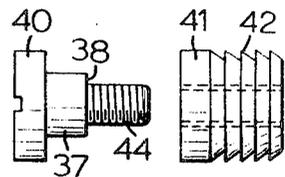


FIG. 9

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SECUREMENT APPARATUS

This invention is concerned with securement apparatus which is adapted to be so incorporated in a structural arrangement that the structures may be detachably secured together. The structures may comprise, for example, the members of pieces of furniture of the type which is intended to be stored and shipped in a dismantled condition and to be assembled only when received at the location at which the furniture is intended to be used, such as the home of the purchaser. Thus, the pieces of furniture may be constituted by bookcases of the above-mentioned type, the shelves and end walls of each bookcase being intended to be stored and shipped in a dismantled condition in order to reduce the bulk of the bookcase during such storage and shipping. It is, however, to be understood that the present invention is not restricted in scope to securement apparatus which is adapted to be incorporated in a structural arrangement constituting a bookcase or even in structural arrangements constituting more generally furniture of the above-mentioned type, but includes such apparatus which is adapted to be incorporated in any structural arrangements, such as, for example, structural arrangements constituting prefabricated buildings.

Various forms of securement apparatus which are so incorporated in structural arrangements that the structures may be detachably secured together have hitherto been proposed and used, one of the most common forms of such apparatus being that in which a slot of "keyhole" configuration is provided in a securement member. A projecting head portion of a further securement member may be inserted through the circular part of the "keyhole" slot in the first-mentioned securement member, the further securement member then being slidably moved relative to the first-mentioned securement member to position the head portion of the further securement member behind the elongated limb part of the "keyhole" slot in the first-mentioned securement member and thereby detachably secure the two members together. Examples of such securement apparatus in which a slot, which is formed in the appropriate securement member, is of the above-mentioned "keyhole" configuration are those disclosed in U.S. Pat. Nos. 2,692,689 issued on Oct. 26, 1954 to Wynne Sr., 1,722,529 issued on July 30, 1929 to MacDonald, 541,144 issued on June 18, 1895 to Nolan 2,603,167 issued on July 15, 1952 to Webster et al. and 2,936,146 issued on May 10, 1960 to Wunder, the elongated limb portion of the "keyhole" slot in the apparatus disclosed in the latter patent differing from the more conventional form in that it is constituted by two parts disposed at right angles to one another.

All the hitherto proposed and used forms of securement apparatus, including the constructions disclosed in the above-numbered United States patents which represent the most relevant prior art of which the inventor is aware, suffer, however, from a disadvantage which is a primary object of the present invention to overcome. This disadvantage is that if, with particular reference to, for example, a bookcase, the structural members constituting the end walls of the bookcase are erected in their required final positions, and a structural member constituted by a shelf of the bookcase is then detachably to be secured between the end walls it is necessary for the end walls to be sprung apart to permit the head portions of the appropriate securement members which are secured to, and project inwardly from, the end walls to be inserted through the circular parts of the "keyhole" slots formed in the appropriate securement members mounted on the end faces of the shelf. Clearly, such springing apart of the end walls of the bookcase is undesirable since, for example, it may result in excessive stressing of the end walls or of other securement apparatus which detachably secures the end walls to other structural members of the bookcase.

According to the present invention there is provided a securement member having a front main face and an opposed rear main face, with a slot being formed through the member between the opposed main faces thereof. The slot has a closed

end, and an open end which communicates with an edge of the member, the axis of the slot between the closed and open ends thereof being nonlinear. The rear main face of the securement member includes a portion which is inclined, in the direction from the open end towards the closed end of the slot, away from the plane containing the front main face of the member, the distance between the rear main face of the member and the plane containing the front main face of the member thereby being greater at the closed end of the slot than at the open end thereof.

Thus, with the securement member included in a first structure by being so secured to a face of the remainder of the structure that it does not protrude from said face, the slot which is formed through said member including a part formed in said face of the remainder of the structure, a second securement member comprising a shank portion and a head portion which is provided at one end of the shank portion the other end of which is secured to the remainder of a second structure is slidable through the slot from the open end to the closed end thereof with the shank portion disposed through the part of the slot which is formed in the first securement member, and with the head portion disposed in the part of the slot which is formed in said remainder of the first structure. The head portion has a width which is greater than the width of the part of the slot which is formed in the first securement member at least adjacent to the closed end of the slot, and the length of the shank portion of the second securement member is substantially equal to the distance between the plane containing said face of the remainder of the first structure and the rear main face of the first securement member adjacent to the closed end of the slot, thereby to secure together the first and second structures.

The slot formed in the first structure is therefore, at least adjacent to the closed end thereof, of undercut form so that at the above-mentioned face of the first structure the width of the slot, at least adjacent to the closed end thereof, is less than the width of the head portion of the second securement member, while at a spaced distance below the above-mentioned face of the first structure the width of the slot from the open to the closed ends thereof is greater than the width of the head portion of the second securement member.

It should be emphasized that the scope of the present invention embraces constructions in which the securement member through which the slot is formed is integral with the remainder of the first structure. In such cases in which the securement member through which the slot is formed is integral with the remainder of the structure in which it is included the above inclined portion is, of course, included in the surface of the undercut portion of the slot, which is opposed to the above-mentioned face of the structure.

For a purpose which is hereinafter more fully explained, a portion of the rear main face of the first securement member, or as the case may be a part of said surface of the undercut portion of the slot may, between the inclined portion and the closed end of the slot, be disposed substantially parallel to the plane containing the above-mentioned face of the first structure.

In order that the invention may be more clearly understood and more readily carried into effect the same will now, by way of example, be more fully described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view showing, in assembled condition, a bookcase incorporating securement apparatus according to the present invention;

FIG. 2 is a view, partially broken away for clarity, showing securement apparatus according to a preferred embodiment of the invention;

FIGS. 3, 4 and 5 show, in somewhat diagrammatic form, progressive steps in the detachable securement of the two structures shown in FIG. 2;

FIG. 6 is a sectional view on the line 6-6 of FIG. 5;

FIG. 7 is a front view of a first securement member which is included in the securement apparatus shown in FIGS. 2 to 6;

FIG. 8 is a view in the direction of the arrow A in FIG. 7; and

FIG. 9 is a side view of a second securement member which is included in the securement apparatus shown in FIGS. 2 to 6.

With reference to the drawings, 10 denotes generally a bookcase comprising two end walls 11 which are interconnected by three horizontal shelves 12, a backwall 13 being secured in position after the end walls 11 and the shelves 12 have been assembled in the manner shown.

With particular reference to FIG. 2, 14 denotes generally a first structure comprising a structural member constituted by one of the shelves 12, and two first securement members each of which is denoted generally by the reference numeral 15. It is to be understood, however, that in alternative embodiments (not shown) of the invention, the first structure 14 may comprise only one, or more than two, first securement members 15, together with a structural member.

Each of the first securement members 15 is in the form of a substantially rectangular metal plate which has a front main face 16 and an opposed rear main face 17 (see FIG. 8), the member 15 having rounded ends 19 with countersunk holes 20 being formed one in each end portion of the member 15 so that the member 15 may be secured, for example by screws 21 passing through the holes 20, to the face 22 of the shelf 12. The front member 15 i.e. the member 15 to the right-hand side in FIG. 2 is shown prior to the securement thereof to the face 22 of the shelf 12 and, as will be noted, the face 22 is formed with a recess 23, the shape and depth of which correspond to the shape and thickness, respectively, of the associated member 15 so that, when the member 15 is secured to the face 22, as shown in FIG. 2 in relation to the rear member 15 i.e. the member 15 to the left-hand side in FIG. 2 the member 15 does not project beyond the plane containing the face 22, the plane containing the front main face 16 of the member 15 preferably being flush with said plane containing the face 22. The face 22 of the shelf 12 is also, of course, a face of the first structure 14 which is constituted by the shelf 12 and the first securement members 15.

With reference to each securement member 15, the face 22 of the first structure 14 has a slot 24 which is formed through the member 15 between the opposed main faces 16, 17 thereof. The slot 24 has a closed end 25, and an open end 26 which communicates with an edge of the structure 14, the axis of the slot 24 between the closed and open ends 25, 26 thereof being nonlinear, and being preferably, as in the embodiment illustrated in the accompanying drawings, of substantially L-shape.

As will be appreciated, a part of the slot 24 is formed in the member 15 between the opposed main faces 16, 17 thereof, this part being denoted by the reference numeral 27 and being most clearly shown in FIG. 7. The open end 26 of this part 27 of the slot 24 communicates with an edge 28 of the member 15. The remaining part of the slot 24 is formed in the shelf 12 and is denoted by the reference numeral 29.

The slot 24 comprises a first limb 30 which is disposed substantially perpendicular to the edge 28 and a second limb 31 which is disposed substantially parallel to the edge 28.

As shown in FIG. 8, the rear main face 17 of each member 15 includes a portion 32 which is inclined, in the direction from the open end 26 towards the closed end 25 of the slot 24, away from the plane containing the front main face 16 of the member 15, and hence away from the plane containing the face 22 of the shelf 12 when the member 15 is secured to this face 22 as shown in FIG. 2. A portion 33 of the rear main face 17 of each member 15, which is substantially parallel to the plane containing the front main face 16 of the member 15, is disposed between the inclined portion 32 and the closed end 25 of the slot 24. The distance between the rear main face 17 of each member 15 and the plane containing the front main face 16 thereof is thus greater at the closed end 25 than at the open end 26 of the slot 24, and is more specifically a maximum at the closed end 25 of the slot 24.

The portions 32, 33 may be formed by, for example, a die-stamping operation which produces a recess 34 in the front main face 16 of each member 15, the location and dimensions of this recess 34 corresponding, of course, to those of the portions 32 and 33. The thickness of each member 15 is thus substantially uniform.

It will be noted, particularly from FIG. 2, that the width of the part 29 of each slot 24 is, from the open to the closed ends of the slot 24, greater than a predetermined value, while the width of the part 27 of the slot 24 is, at least adjacent to the closed end 25 of the slot 24 and preferably for a considerable length of the slot 24 from this closed end 25 towards the open end 26 thereof, less than this predetermined value, so that at least adjacent to the closed end 25 of each slot 24 the part 29 of the slot is of greater width than the part 27 of the slot. Thus, each slot 24 is of undercut form at least, adjacent to the closed end 25 thereof, and preferably for a considerable distance from the closed end 25 towards the open end 26, the width of the slot 24 at the face 22 of the first structure 14 being, at least adjacent to the closed end 25 of the slot, less than the above predetermined value, while at a spaced distance below the face 22 of the first structure 14 the width of the slot from the open to the closed ends 26, 25 thereof is greater than said predetermined value. As will be appreciated, the portions 32 and 33 are presented by the surface, of the undercut portion of the slot, which is opposed to the face 22 of the first structure 14.

Referring again to FIG. 2 of the drawings, 35 denotes generally a second structure comprising a structural member constituted by one of the end walls 11, and two second securement members each of which is denoted generally by the reference numeral 36. As will be appreciated, however, the number of second securement members 36 included in the second structure 35 corresponds to the number of first securement members 15 included in the first structure 14 so that there may be only one, or more than two, second securement members 36 included in the second structure 35. Each of the second securement members 36 comprises, as is most clearly shown in FIG. 9, a shank portion 37 one end 38 of which is secured to the end wall 11 whereby to project from the face 39 thereof, the other end of the shank portion 37 being provided with a head portion 40. The width of the head portion 40 i.e. the diameter thereof with reference to the preferred embodiment illustrated in the drawings in which the head portion 40 is of circular form, is of the above predetermined value and is thus less than the width of the part 29 of the slot 24 thereby permitting the head portion 40 to be slidably moved through the portion 29 from the open end 26 to the closed end 25 of the slot 24. The width of the head portion 40 is, of course, greater than the width of the portion 27 of the slot 24, which is formed in the associated member 15, at least adjacent to the closed end 25 thereof so that when the second securement member 36 is located at the closed end 25 of the slot 24 the first and second structures 14, 35 are secured together with the first and second securement members 15 and 36, respectively, interconnectably engaged.

The length of the shank portion 37 of each second securement member 36 is substantially equal to the distance between the plane containing the face 22 of the structure 14 and the portion 33 of the rear main face 17 of the first securement member 15 so that, with the structures 14 and 35 secured together, the faces 22 and 39 of the first and second structures 14 and 35, respectively are in abutting contact.

41 denotes an internally screw-threaded plug the outer cylindrical surface of which is formed with a plurality of annular ribs 42 which are each of sawtooth form in cross section so that, as is most clearly shown in FIG. 6, the plug 41 when urged, as by hammering, into a blind hole 43 formed in the face 39 of the end wall 11 is substantially fixedly retained therein by means of the ribs 42. The end 38 of the shank portion 37 of each second securement member 36 presents a screw-threaded pin 44 which, when in use, is screw-threadedly engaged within the plug 41 as shown in FIG. 6. When, how-

ever, the structural arrangement constituted by the end walls 11 and the shelves 12 is in a dismantled condition the pin 44 may be disengaged from the plug 41 thereby to facilitate stacking of the end walls 11 and the shelves 12.

FIGS. 3, 4 and 5 show the progressive steps in detachably securing together the first and second structures 14 and 35, respectively. FIG. 3 shows the initial step in which the first structure 14 constituted by the shelf 12 and the associated first securement members 15 is positioned with the open end 26 of each slot 24 in vertical alignment above the associated second securement member 36. As shown in FIG. 4, the first structure 14 is then moved vertically relative to the second structure in the direction of the arrow B thereby to cause the head portion 40 of each second securement member 36 to enter the part 29 of the first limb 30 of the associated slot 24, the shank portion 37 of the member 36 slidably moving through the part 27 of the first limb 30 of this slot 24 during this movement. Finally the first structure 14 is moved in the direction of the arrow C, shown in FIG. 5 thereby to locate each member 36 at the closed end 25 of the associated slot 24, with the shank portion 37 of the member 36 passing through the part 27 of the slot 24, which is formed in the member 15. The first and second structures 14, 35 are thus detachably secured together. As will be appreciated, the head portion 40 of each second securement member 35 is moved, during this movement in the direction of the arrow C, over the inclined portion 32 and on to the portion 33 thereby tightly to urge the faces 22 and 39 together. Since in its final position the head portion 40 of each second securement member 35 bears against the portion 33, rather than against the inclined portion 32, of the associated first securement member 15 there is no tendency, during use, for each head portion 40 to be urged by the associated inclined portion 32 back towards the first limb 30 of the slot 24. In any event, any such movement would, with reference to the embodiment illustrated in the accompanying drawings, be prevented by the backwall 13 which is finally secured in position.

While in the invention as hereinbefore described with reference to the accompanying drawings the structural arrangement is constituted by a bookcase, it is to be understood that, as previously stated, the scope of the invention includes securement apparatus which is adapted to be incorporated in any structural arrangements such as, for example, structural arrangements constituting prefabricated buildings.

I claim:

1. A securement member having a front main face and an opposed rear main face, and a slot which is formed through the member between the opposed main faces thereof, the slot having a closed end, and an open end which communicates with an edge of the member, the axis of the slot between the closed and open ends thereof being nonlinear, and the rear main face of the member including a portion which is inclined, in the direction from the open end towards the closed end of the slot, away from the plane containing the front main face of the member, the distance between the rear main face of the member and the plane containing the front main face of the member thereby being greater at the closed end of the slot than at the open end thereof.

2. A securement member according to claim 1, wherein a portion of the rear main face of the member, which is substantially parallel to the plane containing the front main face of the member, is disposed between the inclined portion of the rear main face and the closed end of the slot.

3. A securement member according to claim 1, wherein the thickness of the member, between the front and rear main faces thereof, is substantially uniform, so that the front main face of the member is formed with a recess the location and dimensions of which substantially correspond with those of the inclined portion of the rear main face of the member.

4. A securement member according to claim 1, wherein the slot is of substantially L-shape and comprises a first limb which is disposed substantially perpendicular to said edge of the member, and a second limb which is disposed substantially parallel to said edge of the member.

5. In combination, a first securement member and a second securement member which is interconnectably engageable with the first securement member; the first securement member having a front main face and an opposed rear main face, and a slot which is formed through said member between the opposed main faces thereof, the slot having a closed end, and an open end which communicates with an edge of said member, the axis of the slot between the closed and open ends thereof being nonlinear, and the rear main face of the first securement member including a portion which is inclined, in the direction from the open end towards the closed end of the slot, away from the plane containing the front main face of the first securement member, so that the distance between the rear main face of the first securement member and the plane containing the front main face of the first securement member is greater at the closed end of the slot than at the open end thereof; and the second securement member comprising a shank portion and a head portion which is provided at one end of the shank portion, the shank portion being slidably through the slot in the first securement member from the open end to the closed end thereof, and the head portion having a width which is greater than the width of the slot in the first securement member at least adjacent to the closed end of the slot.

6. A combination according to claim 5, wherein a portion of the rear main face of the first securement member, which is substantially parallel to the plane containing the front main face of said member, is disposed between the inclined portion of the rear main face of said member and the closed end of the slot.

7. A combination according to claim 5, wherein the slot is of substantially L-shape and comprises a first limb which is disposed substantially perpendicular to said edge of the first securement member, and a second limb which is disposed substantially parallel to said edge of the first securement member.

8. A first structure which is detachably securable to a second structure, the first structure presenting a face formed with a slot having a closed end and an open end which communicates with an edge of said face of the structure, the axis of the slot between the closed and open ends thereof being nonlinear, the slot at least adjacent to the closed end thereof being of undercut form so that at said face of the first structure the width of the slot at least adjacent to the closed end thereof is less than a predetermined value, while at a spaced distance below said face of the first structure the width of the slot from the open to the closed ends thereof is greater than said predetermined value, the surface of the undercut portion of the slot which is opposed to said face of the first structure including a portion which is inclined, in the direction from the open end towards the closed end of the slot, away from the plane containing said face of the structure, so that the distance between said surface of the undercut portion of the slot and the plane containing said face of the first structure is a maximum at the closed end of the slot, and a part of said surface of the undercut portion of the slot, which part is substantially parallel to the plane containing said face of the first structure, being disposed between the closed end of the slot and the inclined portion of said surface of the undercut portion of the slot.

9. In combination, a first structure and a second structure to which the first structure is detachably securable, the first structure including a first securement member which has a front main face and an opposed rear main face and which is so secured to a face of the remainder of the first structure that it does not protrude from said face, a slot being so provided that a part of the slot is formed through said member between the opposed main faces thereof and a further part of the slot is formed in said remainder of the first structure, the slot, which has a closed end and an open end communicating with an edge of the first structure, being of substantially L-shape and comprising a first limb which is disposed substantially perpendicular to said edge of the first structure and a second limb which is disposed substantially parallel to said edge of the first structure, and the rear main face of the first securement member including a portion which is inclined, in the direction from the

open end towards the closed end of the slot, away from the plane containing said face of the remainder of the first structure, so that the distance between the rear main face of said first securement member and the plane containing said face of the remainder of the first structure is greater at the closed end of the slot than at the open end thereof; and the second structure including a second securement member comprising a shank portion and a head portion, the shank portion projecting from a face of the remainder of the second structure to which one end of the shank portion is secured, and the head portion being provided at the other end of the shank portion; the second securement member being slidable through the slot in the first structure from the open end to the closed end thereof, with the shank portion disposed through the part of the slot which is formed in the first securement member and with the head portion disposed within the part of said slot which is formed in said remainder of the first structure; the head portion having a width which is greater than the width of said part of the slot which is formed in the first securement member, at least adjacent to the closed end of the slot; and the length of the shank portion of the second securement member being substantially equal to the distance between the plane containing said face of the remainder of the first structure and

the rear main face of the first securement member adjacent to the closed end of the slot.

10 5 10. A combination according to claim 9, wherein a portion of the rear main face of the first securement member, which is substantially parallel to the plane containing said face of the remainder of the first structure, is disposed between the inclined portion of the rear main face of said member and the closed end of the slot.

15 11. A combination according to claim 5, wherein the thickness of the first securement member, between the front and rear main faces thereof, is substantially uniform so that the front main face of said member is formed with a recess the location and dimensions of which substantially correspond with those of the inclined portion of the rear main face of the member.

20 12. A combination according to claim 9, wherein the thickness of the first securement member, between the front and rear main faces thereof, is substantially uniform so that the front main face of said member is formed with a recess the location and dimensions of which substantially correspond with those of the inclined portion of the rear main face of the member.

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