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(71) Applicants:
- **Thermatech Timber Structures Ltd.**
  St Austell, Cornwall PL25 3JN (GB)
- **Blagden Chemicals Limited**
  Sully, Vale of Glamorgan CF64 5YU (GB)

(72) Inventor: **Williams, Keith**
Mevagissey Cornwall PI26 6PN (GB)

(74) Representative: **Austin, Hedley William**
Urquhart-Dykes & Lord
Alexandra House
1 Alexandra Road
Swansea Wales SA1 5ED (GB)

(54) Dowel

(57) A longitudinally extending dowel (1a) having a substantially uniform cross-sectional shape, wherein the shape includes a median waist portion (2) and, tapering outwardly from the waist portion, a pair of wedge members (3,4).

FIGURE 3

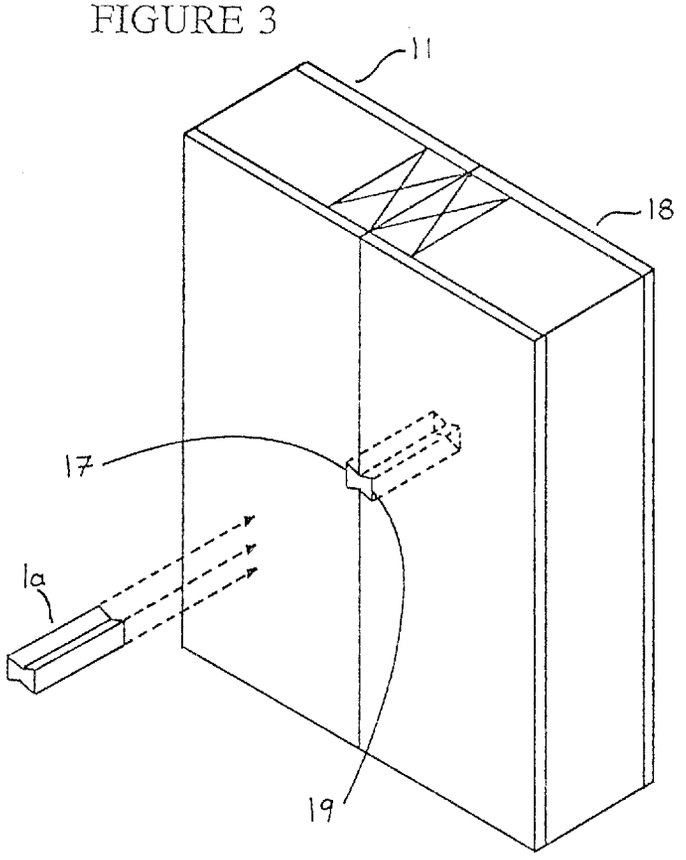

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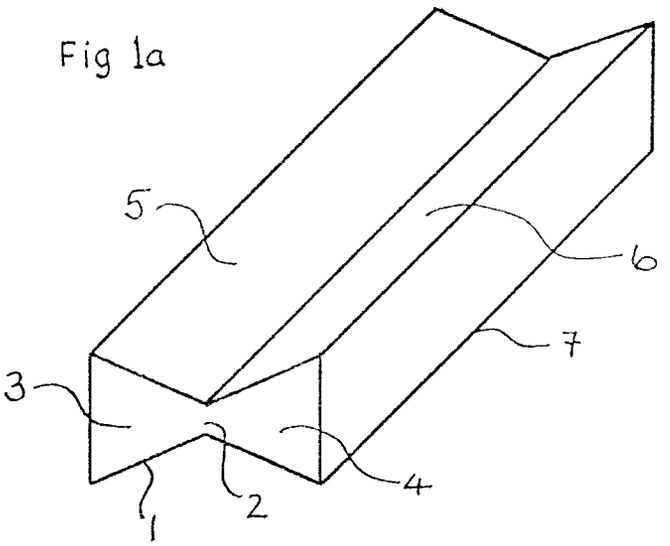
Fig 1a



Description

The present invention relates to a dowel, and the use thereof for holding together panels, slabs or the like.

A dowel is a generic word which, according to the Chambers Dictionary, is a "pin for fastening things together by fitting into a hole in each". It is well known to use dowels for the purpose described in its definition. However, dowels come in all shapes and sizes and they are always used in a format which whilst adequately strong for most purposes, are not sufficiently reliable to withstand great shearing forces and hence result in the separation of the two pieces of wood, etc being held together by the dowel.

It has now been found that, by appropriately specifically shaping the dowel and having a mating shape corresponding to the external shape of the dowel at the point where the two pieces of wood or the like are to be joined, it is possible to form a relatively clean joint having enormous cohesive force without impairing the pieces of wood, etc being held together by said joint.

Therefore, according to the present invention there is provided a longitudinally extending dowel having a substantially uniform cross-sectional shape, wherein the shape includes a median waist portion and, tapering outwardly from the waist portion, a pair of wedge members.

The wedge members are appropriately shaped portions of the dowel, arranged to fit snugly in a complementary longitudinally extending recess or groove.

It is preferred that the wedge members are of substantially the same shapes and sizes (one being a mirror image of the other). However, it is envisaged that the wedge members may be of different dimensions.

Preferably, the dowel has an axis of symmetry about the median waist portion, and/or a plane of symmetry passing through the median waist portion. In some embodiments, the dowel may have two or more planes of symmetry passing through the median waist portion.

According to a first embodiment of the present invention, the uniform cross-sectional shape is substantially of an x-shape cross-section, with an axis at the intersection of the two arms of the "x" shape.

According to a second embodiment of the present invention, the wedge members are of substantially dovetail cross-section.

According to a further embodiment of the present invention, the cross-sectional shape corresponds to two triangles having their respective apices in abutment with each other so as to form an hour-glass shape with the axis thereof running through the line of the apices.

According to a further embodiment of the present invention, the cross-sectional shape corresponds to two Y-shape units being joined together through the tails of the Ys such that the line joining the two tails passes through the axis of the dowel.

According to another embodiment of the present invention, the cross-sectional shape corresponds to a bow-tie shape (in cross-section).

It is preferred that external faces of the wedge members are at an obtuse external angle relative to one another, for example in the range from about 175° to about 115°, preferably less than 160°, more preferably less than or equal to about 140°.

The dowel can be of any material such as wood, steel or metal, fibre-reinforced polymers, solid rigid polymers such as polypropylene, nylon, or other similar material which has an inherent strength. When fibre reinforcement is used, they may be glass fibres, synthetic fibres, natural fibres or the like. Advantageously, when the dowel is of plastics, it is formed by extrusion.

It may also be either of a solid shape or may be hollow provided that the material of which it is made is sufficiently resilient to enable it to be hammered into position without buckling or being deformed under the force applied to place the dowel in position. The dowel is typically a unitary body. The surface of the dowel may be smooth or rough and the edges thereof may be straight or serrated.

A feature of the present invention is that such dowels can be used to hold together two solid materials including *inter alia* wood, metal, plastics, concrete and the like. In particular, the dowels of this invention are suitable for holding together solid materials, such as panels, boards or the like, which are sufficiently soft to enable the dowel to be hammered in but are sufficiently strong to be able to withstand ambient forces of the surroundings where they are used.

In order to improve the cohesive force between the solid bodies, eg solid panels, being held together by the dowels of the present invention, it is preferable that a recess is provided in each of the respective sides of solid bodies to be held together, the recesses being of such a shape that when the recesses of the two solid bodies are in alignment and ready to be joined together, the cross-sectional shape of the combined elongate opening from the two bodies at the point of the joint between the bodies substantially corresponds to the external cross-sectional surface of the dowel thereby forming a substantially sealing fit with the dowel when the dowel is positioned inside the elongate opening.

It is a feature of the present invention that the recess in each body is shaped to complementarily receive a respective wedge member. Thus, force applied transferse to the dowel or recess to pull the joined bodies apart is automatically resisted by the difficulty of the narrowest part of the respective recess in the solid body having to ride over the respective wedge member of the dowel.

The present invention therefore further comprises a kit (typically for assembling panels or the like when the bodies are themselves panels) which comprises a dowel according to the invention and a plurality of bodies adapted to be secured together by means of the dowel, a first one of the bodies including a complementary recess for receiving a first one of the pair of wedge members and a second one of the bodies including a com-

plementary recess for receiving a second one of the pair of wedge members.

The present invention still further comprises a method of fastening two such bodies using a dowel according to the invention, the first solid body having a first recess corresponding to the shape of the first wedge member and the second solid body having a recess corresponding to the shape of the second wedge member, wherein (i) the first recess is arranged in alignment with the second recess so as to form an elongate opening, and (ii) the dowel is introduced into the elongate opening.

Prior to the dowel being positioned inside the elongate opening, it is preferable to glue the surfaces together by means of an adhesive, not only to improve the cohesion between the panels being held together, but also to facilitate alignment of the recesses in the respective panels at the time of insertion of the dowel.

The present invention is further illustrated with reference to the accompanying drawings which are given by way of example only, wherein:

Figure 1a is a perspective view from above and one side of a first embodiment of a dowel;

Figures 1b, 1c, 1d, 1e and 1f are cross-sectional views of further embodiments of dowel according to the invention;

Figure 2 illustrates a method of connecting a panel to a similar panel utilising a dowel according to the present invention; and

Figure 3 represents two panels which have been joined together utilising a dowel according to the present invention.

Referring to Figure 1a, the dowel has a cross-section (and an end-face 1) of substantially "bow-tie" shape. The end-face 1 has a median waist portion 2, and a pair of wedge members 3,4 tapering outwardly from the waist portion. The external face 5 of wedge member 3 is at an obtuse angle relative to the external face 6 of wedge member 4. The dowel illustrated is of uniform cross-section along its length 7, and has two, mutually perpendicular planes of symmetry including its longitudinal axis.

Referring to Figures 1b to 1f, various alternative shapes of dowel according to the invention are shown in cross-sectional view, where the view shown corresponds to the end face 1 of the dowel in Figure 1a.

Referring to Figures 2 and 3, where like numerals have been used to identify like parts, a panel 11 comprises a first board 12 and a second board 13, having sandwiched therebetween a layer 14 of thermally insulating foam. A face panel 15 positioned along the thickness thereof has a timber frame 16.

Timber frame 16 has a groove 17 cut therein corresponding in shape to the external shape of dowel 1a. On a second complementary panel 18 to be attached to the panel 11 and face 15, a second groove 19 is cut on an opposing face; this groove corresponds in shape to the external shape of the other half of dowel 1a.

An adhesive layer is applied to face panel 15 and the corresponding face panel of the second panel 18, so as to reinforce the bonding between the panel faces.

Panels 11 and 18 are then aligned so that the grooves 17 and 19 are in alignment and form a recess corresponding in shape to dowel 1a to be inserted therein.

Dowel 1a is cut to the thickness of panel 11 and 18, and inserted into the recess.

The resultant join is extremely difficult to separate without destroying the panels themselves. It would be possible to insert a plurality of such dowel joints between panels, if necessary.

Claims

1. A longitudinally extending dowel having a substantially uniform cross-sectional shape, wherein said shape includes a waist portion and, tapering outwardly from said waist portion, a pair of wedge members.

2. A dowel according to claim 1, wherein said wedge members are of substantially the same shape and size.

3. A dowel according to claim 1 or 2, which has an axis of symmetry about said median waist portion and/or one or more planes of symmetry about the median waist portion.

4. A dowel according to any of claims 1 to 3, wherein said uniform cross-sectional shape (I) is substantially of an x-shape cross section (such as an x-shape cross-section with an axis at the intersection of the two arms of the x shape); (ii) corresponds to two triangles having their respective apices in abutment with each other so as to form an hour-glass shape with the axis thereof running through the line of the apices; (iii) corresponds to two Y-shape units joined together through the tails thereof such that the line joining the two tails forms the axis of the dowel; or (iv) corresponds to a bow-tie shape (in cross-section).

5. A dowel according to any of claims 1 to 3, wherein said wedge members are of substantially dovetail cross-section.

6. A dowel according to any of claims 1 to 5, wherein said wedge members are at an obtuse external angle (such as in the range 115° to 175°) relative to one another.

7. A dowel according to any of claims 1 to 6, wherein said dowel is of wood, steel, metal, fibre-reinforced

polymer or a solid rigid polymer.

8. A dowel according to any of claims 1 to 7, wherein said dowel is an unitary body and/or formed by extrusion.

9. A method of fastening two solid bodies utilising a dowel according to any of claims 1 to 8, said first solid body having a first recess corresponding to said shape of said first wedge member and said second solid body having a recess corresponding to said shape of said second wedge member, wherein (i) said first recess is arranged in alignment with said second recess so as to form an elongate opening; and (ii) said dowel is introduced into said elongate opening.

10. A kit which comprises a dowel according to any of claims 1 to 8 and a plurality of bodies adapted to be secured together by means of said dowel, a first one of said bodies including a complementary recess for receiving a first one of said pair of wedge members and a second one of said bodies including a complementary recess for receiving a second one of said pair of wedge members.

Fig 1a

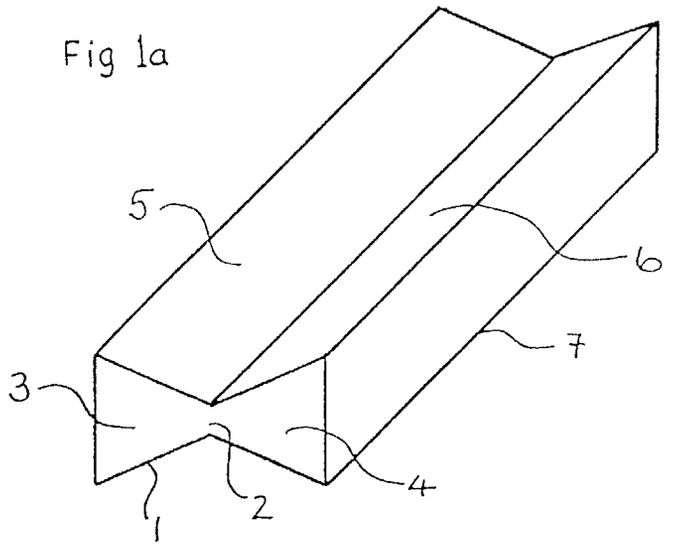


Fig 1b

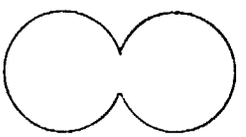


Fig 1c

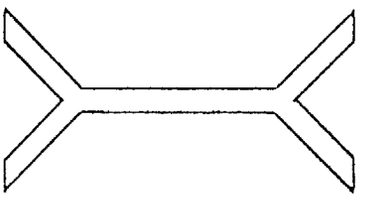


Fig 1d

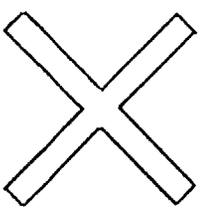


Fig 1e

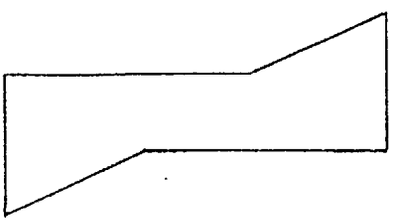


Fig 1f

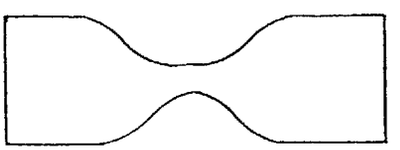


FIGURE 3

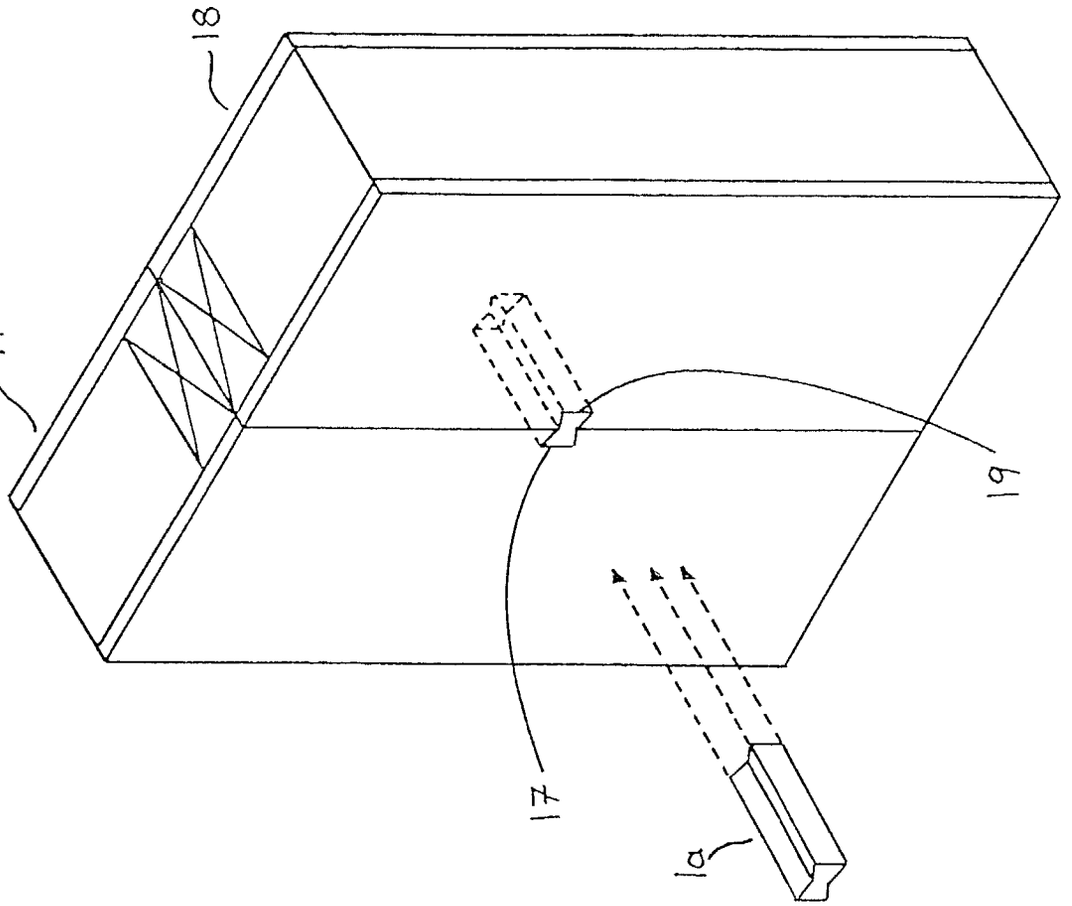
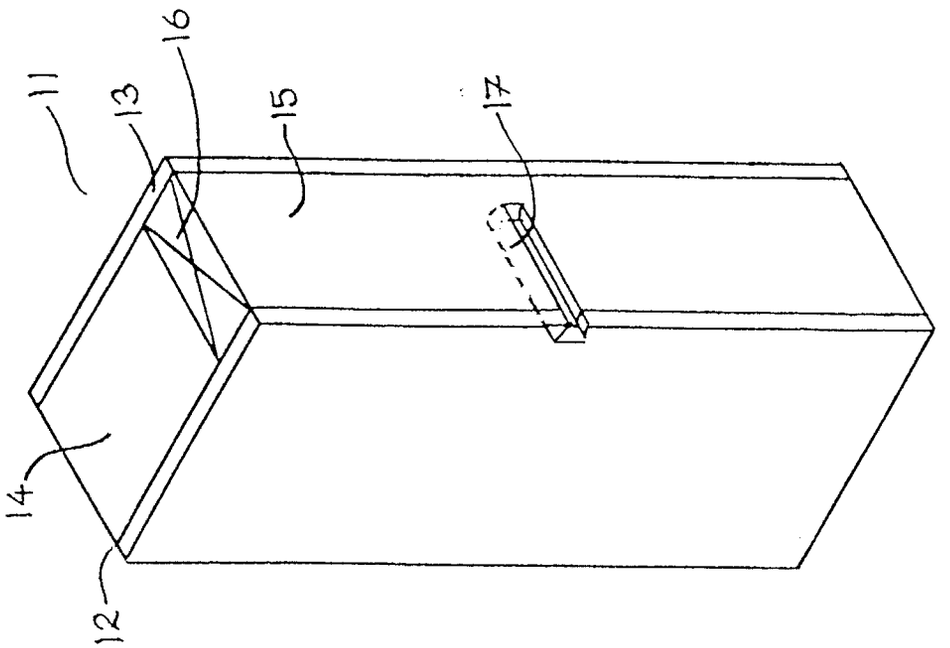


FIGURE 2



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EUROPEAN SEARCH REPORT

Application Number
EP 98 30 4832

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	AU 47028 72 A (BOND ROBERT R. WHINTON) 11 April 1974 * page 3, paragraph 2 - last paragraph * * page 5, last paragraph * * page 17; figure * ---	1-3,5-10	E04B1/61
X	FR 637 507 A (S.A.DU FIBROCIMENT ET DES REVETEMENTS ELO) 2 May 1928 * page 1, line 7 - line 16 * * page 1, line 52 - line 62 * * figures * ---	1-4,7-10	
X Y	US 4 052 832 A (JUNGERS JAMES W ET AL) 11 October 1977 * column 3, line 25 - line 37 * * column 3, line 58 - line 64 * * figures 1,2,5 * ---	1-3,6,7, 9,10 4	
Y	US 4 400 925 A (VAN LOGHEM JOHANNES J ET AL) 30 August 1983 * figure 4 * -----	4	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 September 1998	Urbahn, S

CATEGORY OF CITED DOCUMENTS

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