Jan. 18, 1966 M. THOME 3,229,335

DEVICE FOR PRODUCING CORNER AND BUTT JOINTS

Filed March 5, 1964 2 Sheets-Sheet 1

Fig.1

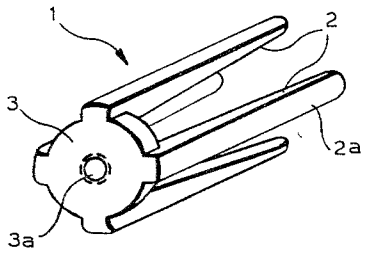


Fig.2

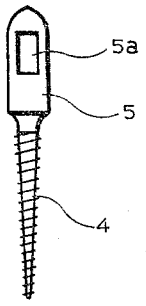
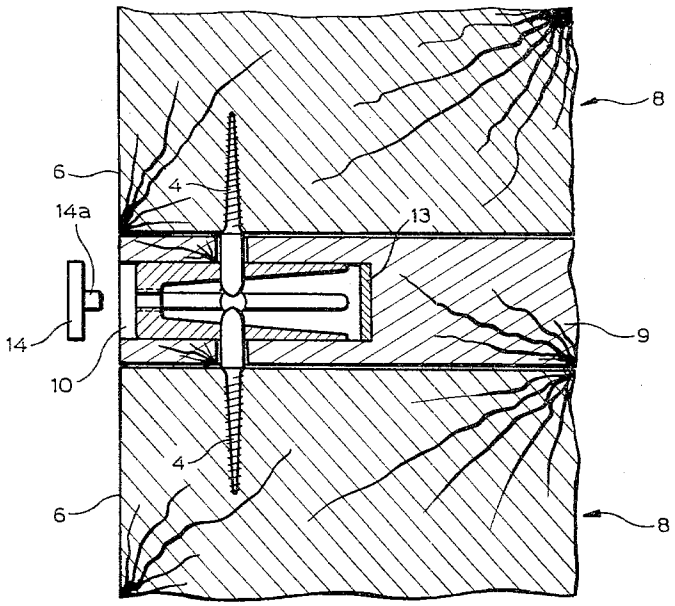


Fig.3



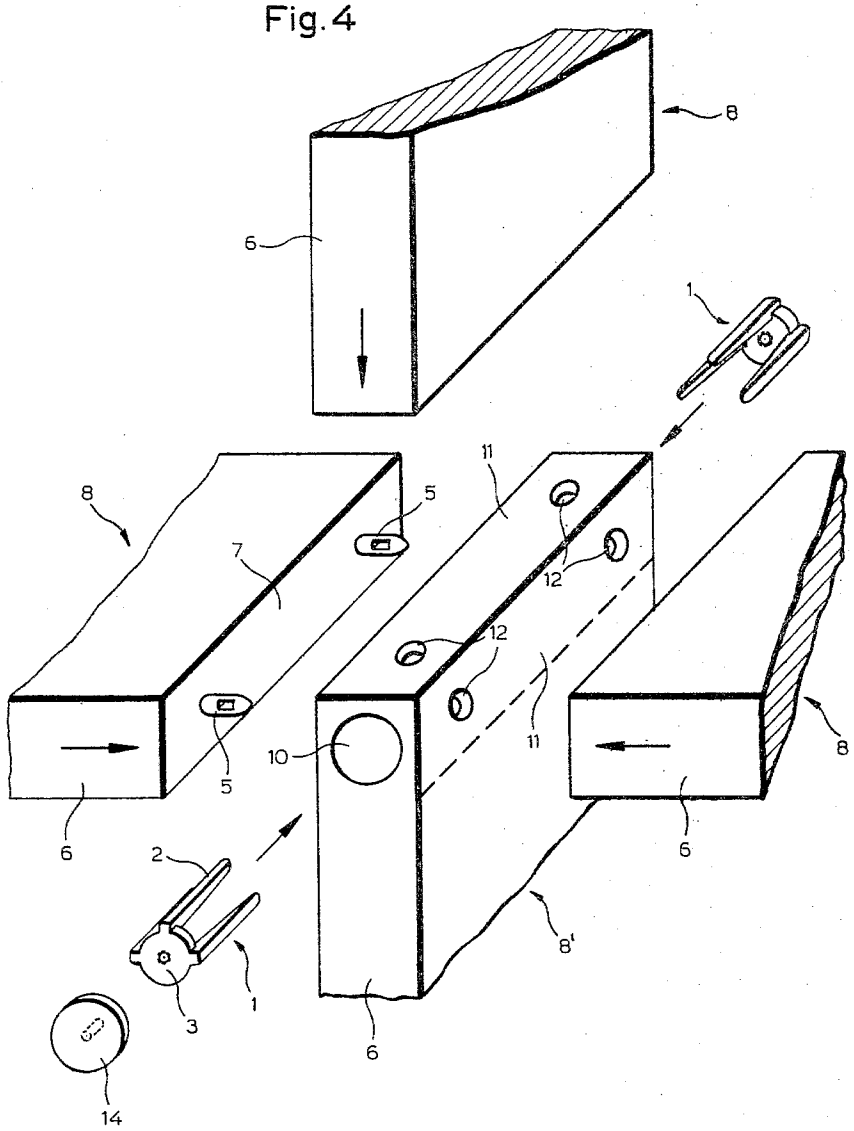
INVENTOR.
Manfred Thome
BY Dicke & Craig
ATTORNEYS

Jan. 18, 1966 M. THOME 3,229,335

DEVICE FOR PRODUCING CORNER AND BUTT JOINTS

Filed March 5, 1964 2 Sheets-Sheet 2

Fig. 4



INVENTOR.
Manfred Thome
BY Dicke & Craig
ATTORNEYS

United States Patent Office 3,229,335 Patented Jan. 18, 1966

3,229,335

DEVICE FOR PRODUCING CORNER AND BUTT JOINTS

Manfred Thome, Karlsruhe, Germany, assignor to Gebruder Thome Kommanditgesellschaft, Mobelfabrik, Forchheim, Baden, Germany

Filed Mar. 5, 1964, Ser. No. 349,559
Claims priority, application Germany, Mar. 8, 1963, T 23,597
8 Claims. (Cl. 20—92)

The present invention relates to devices for producing corner and butt joints between flat structural components, such as the top, bottom, or side walls or partitions of furniture items, shipping boxes, or other commodities which are adapted to be easily assembled and disassembled. More particularly, the invention relates to improvements in such devices as described and claimed in my copending application, Serial No. 247,627, filed on December 27, 1962, and entitled "Corner or Butt Joint."

In compliance with public demand, the furniture industry has in recent years turned extensively to the production of furniture items which may be easily assembled of standard parts and extensively varied to comply with different wishes or requirements as to the shape and purpose of the particular article. This means that pieces of furniture such as wardrobes, chests of drawers, dressers, shelves, and many other articles are no longer manufactured as finished units which, if they are to be enlarged or combined with each other, can only be placed adjacent to or on top of each other, but that they are made of a plurality of individual elements, such as top, bottom, and side walls and partitions, which may be easily attached to each other like the parts of a toy construction box to form a skeleton into which shelves, compartments, drawers, doors, sliding windows, and the like may thereafter be installed. In this manner it is possible to assemble a multitude of different furniture units and combinations of any desired sizes which may even be so large as to take up an entire wall of a room.

Further very important advantages of furniture items which are made of individual parts of standard sizes and which may be assembled like the pieces of a construction box consist in the considerable savings which can be made in the manufacture, transportation and assembly of such items. Thus, for example, even very large furniture combinations may be packed and shipped while disassembled into their individual components which then require very little space. Since the work of assembling the individual components requires no particular knowledge or training, it may be carried out by almost any layman, for example, the purchaser himself who will thus save the considerable difference in the cost between the individual parts and a finished piece of furniture. In order to permit the individual furniture components to be applied as universally as possible, the individual boards and the like are generally made of a uniform width which is equal to the depth of the assembled piece. The length of the boards is generally limited to a few standard sizes and may be, for example, in accordance with the width or height of a normal wardrobe. Usually, there are boards provided of two or three intermediate lengths to permit the number of combinations to be increased in accordance with different wishes or architectural requirements.

It is an object of the present invention to provide a very simple device for producing corner and butt joints between flat boardlike or platelike structural components such as the walls or partitions of furniture items, shipping boxes, or any other commodities, which device is of a very simple and inexpensive construction and may

be very easily mounted on the components to produce a very solid joint between them and may, if desired, again be just as easily removed to disassemble the components. According to the present invention, this object is attained by employing a connecting element which may either consist of one of the components to be connected by the corner or butt joint or of a separate connecting bar, by providing this connecting element with a longitudinal bore of a certain depth in one end thereof and parallel to and near one side of this connecting element or with a pair of such bores coaxially in its opposite ends, in providing a transverse bore in this connecting element in each side thereof to which another component is to be secured and making this transverse bore of a length so as to terminate into the longitudinal bore, and by further providing a mechanical connecting device consisting of at least two operatively associated connecting members, one of which consists of a connecting frame which has at least a number of wedge-shaped arms thereon in accordance with the number of components which are to be secured to the connecting element, while the other connecting member consists of a short cylindrical connecting stud which is secured to and projects from the surface of the component to be secured to the connecting element, i.e., the connecting bar or connecting component, and has a diameter approximately equal to the diameter of the transverse bore in the connecting element and has an aperture or eye near its free end. When a joint is to be formed between at least one component and the connecting element, the cylindrical connecting stud on this component is inserted into the transverse bore in the connecting element so that its free end with the eye therein extends into the longitudinal bore, and thereupon the connecting frame is inserted into the longitudinal bore in such a position that one of its wedge-shaped arms extends through the eye in the connecting stud. The connecting frame is then driven fully into the longitudinal bore and to such a depth that the wedge-shaped inner surface of the arm thereof draws the component tightly against the connecting element so as to form a solid corner or butt joint between these two parts.

As already indicated above, the connecting element in which the longitudinal bore is provided in one end or in which a pair of coaxial longitudinal bores are provided in the opposite ends for the insertion of one or two connecting sockets may consist either of one of the components to be connected by the corner or butt joint or of a separate connecting bar which preferably has a square cross section. The first of these two embodiments in which one of the components to be connected by the joint is usually preferred, especially if only two components are to be secured to each other. In the latter case, the connecting frame is only required to have a single wedge-shaped arm. If, however, two components are to be secured at right angles to a third component and the latter is provided with the longitudinal bore or bores, the connecting frame has to have at least two wedge-shaped arms. Similarly, if still another component is to be secured to the connecting component so as to extend within the same plane as the latter, the connecting frame has to be provided with at least three wedge-shaped arms. Although each of these connecting frames is preferably provided with four arms which project at equal peripheral distances from each other in the same direction, because such a connecting frame can be applied in any joint according to the invention, such a four-armed frame is actually required only if four components are to be secured to an intermediate connecting bar. If the connecting frame has more than one arm, the outer surfaces of these arms extend parallel to each other and at equal

distances from the central axis of the frame head and form a part of a common cylindrical surface.

According to another feature of the invention, the head of the connecting frame is provided with a central tapped bore extending in the axial direction of the frame. By screwing a long screw on a suitable tool into this tapped bore until the end of the screw abuts against the bottom of the longitudinal bore in which the frame is mounted, and by then continuing the rotation of this screw, the frame will move upwardly along the screw and will thereby be drawn out of the longitudinal bore so that the different components will then also no longer be secured to each other and may thereafter be removed from each other.

Another feature of the invention consists in providing the cylindrical connecting studs so as to form the heads of wood screws which are screwed into the surfaces of the components which are to be connected to the connecting element, i.e. the connecting component or the separate connecting bar. These connecting studs preferably have a diameter only slightly smaller than the diameter of the transverse bores in the connecting element and the free ends of the studs are preferably tapered or rounded so as to facilitate their insertion into the transverse bores. The longitudinal bore or bores in the connecting element are also made of a diameter equal to or preferably slightly smaller than the diameter of the connecting frame so that the latter will fit tightly therein and its arms will remain firmly wedged in the eyes of the connecting studs.

The connecting device according to the invention has the advantage that the positions of the components which are secured to each other in the corner or butt joint are accurately fixed relative to each other and are drawn concentrically toward and tightly against each other when the connecting frame is driven in. This may be carried out up to the breaking strength of the materials of the parts of the connecting device. The connecting device according to the invention therefore produces a joint of a tightness and stability at least equal to a glued wooden joint. Over such a glued joint the joint according to the invention has also the great additional advantage that it may not only be very easily produced but may also be very easily severed whenever the components are to be removed from each other.

The connecting device according to the invention is by no means limited to the construction of furniture, but may be applied for innumerable other purposes in which different elements, especially of a flat boardlike or platelike shape, are to be removably secured to each other. Thus, for example, shipping boxes for heavy goods, especially for oversea shipping, can be built up in a manner similarly as described. For a return shipment of the empty boxes, they may be easily taken apart and their components be packed within a very small space. By means of the invention it is also possible to build up household utensils, such as ladders, vehicle frames, toys, and the like. The connecting elements of the device according to the invention may also form components of toy construction sets.

The above-mentioned as well as further features and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which:

FIGURE 1 shows a perspective view of a connecting frame according to the invention which is provided with four wedge-shaped arms;

FIGURE 2 shows an elevation of one of the connecting screws with an eye therein which is associated with the connecting frame according to FIGURE 1;

FIGURE 3 shows a vertical longitudinal section of the connecting frame according to FIGURE 1 which is inserted into a separate square-shaped connecting bar to form a solid joint between four plate-shaped components;

FIGURE 4 shows a perspective explosive view of a corner and butt joint between three plate-shaped components and a fourth component into which two three-armed connecting frames are to be inserted.

For producing a solid corner or butt joint between two to four plate-shaped components, such as the walls or partitions of furniture items, shipping boxes, or any other commodities, the invention provides a connecting frame 1 which, as illustrated in FIGURE 1, has four wedge-shaped arms 2 which are spaced at equal sector angles of 90° from each other, and the outer surfaces 2*a* of which lie within a common cylindrical surface. At their thicker ends, these arms 2 are integrally secured to a head 3 which also serves as an impact surface and is provided with a central tapped bore 3*a* for a purpose as will be later described.

Each wedge-shaped arm 2 of the frame 1 is operatively associated with a connecting screw, as shown in FIGURE 2, which has a threaded stem 4 and a substantially cylindrical head 5 which may be rounded or tapered at its upper end and is provided with an eye 5*a* of a rectangular cross section which has a width slightly greater than the width of one of the arms 2 of the frame and an axial length substantially equal to the greatest thickness of each arm 2 at its point of connection to the head 3 of the frame, so that each of these wedge-shaped arms 2 may be inserted into the eye 5*a* of a connecting screw until the head 5 of the latter engages upon the inner side of the head 3 of the frame 1.

For producing a corner and butt joint in the manner as illustrated in FIGURE 4 between three plate-shaped components 8 and a fourth component 8', the connecting screws 4, 5 are screwed vertically into the end surfaces 7 of these three components 8 at a distance from the outer edges 6 which is approximately equal to one half of the length of the wedge-shaped arms 2 of the frames 1 and in a manner so that the eyes 5*a* extend in the longitudinal direction of the end surfaces 7. The opposite outer edge surfaces of the fourth or connecting component 8' are provided with coaxial longitudinal bores 10, each of which has a diameter equal to or slightly smaller than the maximum diameter of the frames 1 and a depth slightly greater than the length of each frame. The common axis of these bores 10 is spaced at equal distances from the opposite lateral surfaces and the end surface 11 of this connecting component 8'. These three surfaces 11 are provided with bores 12 which terminate into the longitudinal bores 10 and have a diameter slightly greater than that of the heads 5 of the connecting screws 4, 5. When the four components 8 and 8' are to be assembled to form the joint between them, the screw heads 5 which project from the end surfaces 7 of the three outer components 8 are inserted into the bores 12 in the connecting component 8', which is facilitated by the tapered or rounded ends of the screw heads 5. Thereafter the connecting frames 1 are inserted into the longitudinal bores 10 so that the wedge-shaped arms 2 engage into the eyes 5*a* in the screw heads 5. The connecting frames 1 are then driven by a hammer or similar tool deeply into the bores 10, whereby the wedge-shaped inner surfaces of the frames draw the three outer components 8 tightly and concentrically to the axis of the bores 10 against the surfaces 11 of the connecting component 8'.

Instead of employing one of the components 8' as a connecting component between the three outer components 8, as illustrated in FIGURE 4, it is also possible, as shown particularly in FIGURE 3 and as also indicated in dotted lines in FIGURE 4, to employ a separate connecting bar 9 of a square cross section which may then be used for securing four plate-shaped components 8 by a solid joint to each other. The common axis of the longitudinal bores 10 then extends centrally between the four longitudinal sides of this connecting bar 9.

In order to permit the frames 1 to be withdrawn from

the longitudinal bores **10** when the respective piece of furniture or other commodity is being disassembled, the bottom of each bore **10** is provided with a small plate **13** of metal or plastic. When the threaded shaft of a suitable tool is screwed through the tapped bore **3***a* until its end engages upon the bottom plate **13** and the tool is then further turned in the same direction, the frame will move along the threaded shaft and will thus be drawn out of the bore **10**.

After being driven into bore **10**, each frame **1** is preferably covered by a cap **14**, for example, of plastic, which is provided with a smooth stem **14***a* of a diameter equal to the inner diameter of the tapped hole **3***a* into which the stem **16** may be pressed.

If three or even less than three components **8** are to be secured to a connecting component **8'**, as shown in FIGURE 4, or to a connecting bar **9**, as shown in FIGURE 3, the frames **1** may be provided with a corresponding smaller number of wedge-shaped arms **2**. Thus, for example, in FIGURE 4 the frames **1** are provided with only three arms **2**. If only a single board or the like is to be secured at right angles to a wall surface, each frame **1** only needs to have a single wedge-shaped arm.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A device removably securing structural components to each other and permitting them to be easily assembled and disassembled comprising a plurality of components each having at least one cylindrical connecting stud rigidly secured thereto and projecting therefrom, each said stud having an eye therein near its free end, and a connecting frame having a head and a plurality of arms on said head in accordance with the number of components to be simultaneously secured by said frame, the outer surface of each of said arms extending substantially parallel to the axis of said frame head and the inner surface thereof having a wedge-shaped tapering toward the free end thereof, a connecting element having at least one longitudinal bore in one end thereof extending parallel to said element and having a depth slightly greater than the length of said frame, said connecting element further having at least one transverse bore in each side thereof extending at right angles to and terminating into said longitudinal bore and receiving said connecting stud with its free end having the eye therein extending into said longitudinal bore, said connecting frame being inserted into said longitudinal bore in such a position that one of its arms extends through said eye whereby said connecting frame is fully inserted into said longitudinal bore to such a depth that the wedge-shaped inner surface of said arm holds said component tightly against said connecting element so as to form a solid corner or butt joint between the components.

2. A device as defined in claim **1**, in which said head of said connecting frame has a central tapped bore extending in the axial direction thereof for receiving a threaded tool for withdrawing said frame from said longitudinal bore.

3. A device as defined in claim **1**, in which said connecting stud has a reduced end to facilitate the insertion of said stud into said transverse bore, said comnecting stud forming the head of a screw adapted to be screwed into the surface of the component to be secured to said connecting element.

4. A device as defined in claim **1**, in which said connecting stud a diameter substantially equal to the diameter of said transverse bore in said connecting element.

5. A device as defined in claim **1**, in which the diameter of said longitudinal bore in said connecting element is substantially equal to the maximum diameter of said connecting frame.

6. A device as defined in claim **1**, in which the diameter of said longitudinal bore in said connecting element is slightly smaller than the maximum diameter of said connecting frame.

7. A device as defined in claim **1**, in which said connecting element is one of the components to be secured to at least one other component.

8. A device as defined in claim **1**, in which said connecting element is a separate connecting bar adapted to be interposed between at least two components to be secured by said bar to each other.

No references cited.

FRANK L. ABBOTT, *Primary Examiner.*

R. A. STENZEL, *Assistant Examiner.*