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(54) FURNITURE

(71) We, HILLE INTERNATIONAL LIMITED, a Company organised under the laws of Great Britain, of 132 St. Albans Road, Watford, Hertfordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to furniture and is more particularly concerned with a modular system for the erection of screens which can be made up into desks, tables, etc., suitable for office use and to which cabinets and other fittings may be attached.

According to the present invention, we provide a connector device for use in erecting a furniture unit built up of two or more panels, said device comprising an elongated central section or spine for attachment to an edge of one panel and at least one pair of end sections for attachment to an edge of another panel or other panels, each section comprising a central flat portion provided with at least one aperture to receive means for fixing the section to a panel edge and longitudinal edge ribs which are hollow at least in part for receiving fixing pins so that, in use, the panels can be secured one to another at their edges by means of fixing pins inserted in aligned ribs of the said central and end sections.

The invention also provides an article of modular furniture comprising a plurality of panels connected together by means of one or more connector devices as defined above.

In practice the several sections of the connector device are cut out from an aluminium or lightweight metal or alloy strip, the strip, which is provided at spaced intervals with apertures to receive fixing screws, having a central flat portion and hollow ribs along each longitudinal edge.

The panels for use in the invention may comprise a rectangular framework including vertical and transverse fillets of wood or like

material enclosed by facing layers with or without a facing sheet on each side and having, on two opposite edges, edge fillets, preferably of plastics material in which are formed apertures for the fixing screws.

The invention is illustrated in the accompanying drawings, in which:—

Figure 1 is an elevation of a panel in accordance with a preferred embodiment of the invention;

Figure 2 is an enlarged transverse section on the lines A—A of Figure 1;

Figure 3 is an exploded part perspective view of a three piece connector unit for joining a panel module as shown in Figure 1 to a similar panel;

Figure 4 is a part elevation showing the spine or central component of a connector unit;

Figure 5 is a part plan view of the unit of Figure 4;

Figure 6 is a view in elevation showing one or two complementary connector units for connection to the spine attached to an adjacent panel as shown in Figure 4;

Figure 7 is a diagrammatic plan view showing the connector unit as used for connecting two panels in line;

Figure 8 is a plan view showing a three-panel screen and their connector units by which the panels are connected to one another;

Figure 9 is a part view on an enlarged scale showing a modified construction of panel having a duct for electrical services, e.g. telephone, power, etc.

Figure 10 is a part plan view showing a wiring tube in the form of a spacer for insertion between a panel and connector unit;

Figure 11 is a part plan view to illustrate the wiring scheme between two adjacent panels;

Figure 12 is a perspective view showing two panels having a desk unit for a typewriter, and a bookshelf unit, and provided

with a wiring tray for the electrical leads from the typewriter to the panel;

Figure 13 is a plan view showing a cruciform arrangement of four panels;

5 Figure 14 is a part sectional view on an enlarged scale on the line C—C of Figure 1, and

10 Figure 15 is a perspective view of a book-shelf unit as in Figure 12 provided with a top and a door panel when it is required to make up a cupboard construction.

Referring to Figures 1 and 2 of the drawings, the panels of this invention are of modular construction. In its standard size and form the panel is of rectangular formation and in the embodiment shown comprises a long side which in use is arranged vertically and a shorter side extending horizontally.

20 Each panel is made up on a wooden frame having verticals 2 joined by transverse end members 3 of wood or wood substitute, the whole being enclosed within facing boards 4, e.g. of plywood or hardboard (with or without a facing such as fabric to render it sound absorbent) or of plastics material such as that sold under the R.T.M. "Formica" and as shown in Figure 2. The vertical members 2 are grooved to receive an insert 5 consisting of a strip of T-section of plastics material, e.g. PVC. In an alternative construction, instead of a T-section strip having a single rib, a double T-section strip having two ribs 5', as shown in Figure 5, may be used. Provided at predetermined spaced intervals lengthwise of the one or two opposite sides, preferably the vertical sides, of each panel are threaded inserts of which conveniently there are three, 6, 7 and 8, to receive fixing screws for a connector unit by which two panels can be joined to form a two-panel screen, or more usefully, two or three such panels making up a group including a central panel and two side panels as when making up a writing or typing desk. Figure 8 shows one other such group of three panels, P1, P2 and P3, arranged edge to edge with a common joining point. The interior space of the panel so formed has a core 10 of preferably non-inflammable packing material. Figure 13 shows a four-panel design including a fourth panel P4.

To permit of attachment of accessories to the panels, e.g. shelving, table tops or cupboards, apertured rails 50, which may be formed of steel or aluminium, are provided on one or both sides of the panel, as shown in Figure 1. In order firmly to secure the rails, a steel strap 53 (Fig. 14) is slit fitted into the vertical members of the wooden frame of the panel. Self-tapping screws 66 at suitable intervals affix the apertured rails to the steel strap. For co-operation with the rails, the apertures in which are at regular intervals, brackets 51 (Fig. 12) are provided,

each bracket having two or more teeth 52, correspondingly spaced to notch into the apertures in the rails.

As shown in Fig. 14, the panel may be provided with a surface covering of fabric as indicated at 65 and conveniently use is made of apertured rails 50 for anchoring one end of a sheet of fabric to each facing board. For this purpose self-tapping screws 66 are inserted at intervals in the rails 50. Along the vertical edges of the panels the fabric may be held in position by an elongated plug or strip of mushroom cross-section as indicated at 67, the edge of the panel being cut away so as to form a groove 68 to receive the plug or strip. In order to secure firm engagement the strip 67 is formed with tongues or pins 70 for engagement in correspondingly shaped sockets 71 in the bottom wall of the recess 68.

The connector unit is made up of three components, a central and elongated part 11, termed the spine, and two end parts 12, 12' (see Fig. 3). Each connector component is obtained from an extruded metal section conveniently formed of aluminium including a central flat 14 and hollow tubular edge ribs 15. It will be understood that the strip formation having the flat 14 and ribs 15 is common to both the central spine and to the two associated end components. In use opposite ends of the bore of both ribs 15 of the spine 11 are tapped to form a threaded end portion 16 to receive a fixing pin in the form of a set screw 17 having a conical head to fit a countersink, formed in the outer ends of the bores in the other two components, which at the same time are reamed out to provide clearance for the screws 17.

As can be seen from Figure 3, the central component or spine 11 is provided with three holes spaced apart from one another to correspond with the spacing of the holes 6, 7 and 8 in the panel and in practice the spine 11 is cut away at each end for distance to form a tongue 11' which corresponds in length to the depth of each of the outer components 12, 12' of the connector unit, the two components 12 12' being drilled to provide a hole for insertion of the fixing screw 9 by which it is secured in the edge of the panel.

To make up a straight two-panel screen a spine 11 is attached to one panel indicated at P1 and the two end components are attached to the upper and lower ends respectively of the other panel P2, each of the several components being made fast to their respective panels by fixing screws corresponding to those shown at 9, 20, 20' and 20'' which are standard and the components being placed with their flat and inside faces indicated at 22 flush against the edge surfaces of the panel so that the ribs 15 face outwardly.

It will be appreciated that the fixing screws 20 and 20' in the spine 11, when the panels are assembled, will be in alignment with the fixing screws of the two outer connector components and for this reason it is necessary to cut away the central component or spine 11 at each end so as to remove the rib portions and leave a projecting tongue 11' which will recess into the space between the ribs 15 of the two end components 12, 12' of the connector. Having secured the connector components to their respective panels it is a simple matter to line up the ribs of each section for insertion of the connecting pins 17 in aligned ribs of the sections 12, 12' and 11.

Where, as in the construction of, for example, a three-panel screen, the spine 11 is secured to panel P1 as before, in the case of the other two panels P2 and P3 it is only necessary to ream out the bore of the ribs on one side of the connector components 12 as indicated at 15 in Fig. 8. The rib 15' on the other side may be removed entirely as indicated in broken lines. In this arrangement the connector pin performs a secondary function of a hinge pin since limited angular displacement of one panel relative to the other is possible.

It will be appreciated that in a screen made up for office use it is necessary to provide accommodation for services, e.g. telephone wires and/or power leads for electrical sockets, e.g. for desk lamps, etc. For this purpose, as shown in Figure 9, the bottom of the panel may be modified to provide a through-duct indicated at D for wiring, etc. and for this purpose the outer frame 2, 3, is reinforced at its lower end by means of a rail 25. In this case the surface panel 4 is cut away on at least one or if desired on both sides so as to expose an inner void between the rail 25 and the bottom bar 3 of the main frame, the polystyrene or other packing material being removed for this purpose. Entrant apertures 26-27, 26'-27' are provided in each of the side members 2, which apertures may be fitted with closing plugs 28, the latter being removed as required for introduction of a telephone wire or power lead.

A vertical conduit of, for example, rigid PVC, may be led through the panel from the top into the duct D to allow wiring to be carried from above the modular unit.

The panels are supported by ground feet, indicated at F, to enable any unevenness which may occur in the floor level, and provision is made for adjusting the effective length of the feet. For this purpose vertical sockets are inserted in the underside edge of each panel which in the embodiment illustrated take the form of tubular inserts 30, within which the feet are a push fit. Each foot is in the form of a threaded spindle 32

upstanding from a base 31. The spindles 32, which are a clearance fit within inserts 30, are threaded so that the panel can rest freely on adjustable thumb nuts 33; suitable adjustment of the latter permits any irregularity to be taken up.

In order to meet official regulations the central void may be divided by a partition 29 into two or (if necessary) more channels so that there is no direct contact between the power or telephone wires. The partition may extend horizontally or vertically and, when vertical, apertures are provided so that a lead may be taken from one side to the other. 36 indicates a cover plate of channel section which is a friction fit within the or each side opening and to which may be secured various forms of fitting. 37 indicates a three-pin socket.

It will be appreciated that the apertures 26, 27, 26', 27', giving access to the central void coincide with the position of attachment of the outer connector component 12' and for this purpose the connector components are additionally drilled to provide one or a pair of holes to be in alignment with the apertures 26, 27, 26' and 27' which is or are off-set to the central hole for the fixing stud (see Figure 9).

To prevent exposure of a lead wire between two adjacent panels there is provided a shroud in the form of a flexible tube indicated generally at 39 (Figure 11). Conveniently, the tube may be longitudinally split to allow the shroud to be removed without disturbing the wire. In use the shroud is fitted over the lead wire, the ends of the shroud being a push fit with respect to the openings 26-27, 26'-27' (Fig. 11).

So far described the accommodation for service wires is provided with an intake at the lower end of each panel. To provide for an overhead supply, i.e. at ceiling level, use is made of a wiring tube as shown in Figure 10. The wiring tube may be made up from a plastics or aluminium extrusion in the form of a strip 44 of flat cross-section from which is cut lengths corresponding to the spine or module size panel for which it is required. Holes whose longitudinal spacing corresponds to that of the inserts 6, 7 and 8 in the panel may be provided in the strip to receive the fixing screws by which the main connector component or spine is secured in position. In each side of the strip is a duct 46, 46' extending throughout the length of the strip through which a lead wire may be drawn through the spine and the other connector component at the bottom. At its lower end the lead wire may be threaded through a shroud 39 and then passed through the aperture 27 giving access to the bottom duct D.

In the arrangement of Figure 12 there is shown a bookrest or shelf B having two

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brackets 51 attached to the side panels thereof for engagement with the rails. Beneath the cupboard B is a worktable T which is similarly fixed in position by the brackets 51.

Alternatively, the accessories may be simply bolted to the framework of the panels without the need for the apertured rails.

Provision may be made for enclosing the bookrest or shelf B by means of a top panel and a door as shown at 73 in Figure 15. The door may be self-closing, e.g. spring-actuated and hingedly connected to the front edge of the top panel, or may slide upwards and backwards in substantially horizontal grooves.

Provision may also be made for introduction of a power line to the upper side of the table, e.g. for a typewriter or lamp. In the arrangement shown the table is provided with a shouldered aperture 56, access to which is obtained by removal of a cover plate 57 provided with a radial slot 58 for passage of a power line when required. The aperture 56 is of a size to accommodate a plug or socket as required and provision is made on the underside of the table to accommodate, e.g. the power line to the typewriter motor. One such arrangement consisting of a wiring tray 59 is shown in Figure 12, the tray being provided with holes for fixing screws 60 and by forming slots 61 in the opposite side edges of the tray the power line can be stowed in the manner shown.

35 WHAT WE CLAIM IS:—

1. A connector device for use in erecting a furniture unit built up of two or more panels, said device comprising an elongated central section or spine for attachment to an edge of one panel and at least one pair of end sections for attachment to an edge of another panel, or other panels, each section comprising a central flat portion provided with at least one aperture to receive means for fixing the section to a panel edge and longitudinal edge ribs which are hollow at least in part for receiving fixing pins so that, in use, the panels can be secured one to another at their edges by means of fixing pins inserted in aligned ribs of the said central and end sections.

2. A connector device as claimed in claim 1 in which the central and end sections are both cut from an aluminium or other lightweight metal strip having a central flat portion with apertures at predetermined intervals and hollow longitudinal edge ribs.

3. An article of furniture comprising a plurality of panels connected by means of a connector device or devices as claimed in claim 1 or claim 2, the panels being provided with holes at spaced intervals along

one edge or two opposite edges which receive fixing screws whereby the said central and end sections are secured to the panels.

4. An article of furniture as claimed in claim 3 in which each panel comprises a rectangular framework including vertical and transverse edge fillets of wood or wood substitute and has a facing layer on each side with or without a facing sheet and in which along two opposite edges the edge fillets are provided with strips of plastics material.

5. An article of furniture as claimed in claim 3 or claim 4 wherein threaded inserts are provided in the panel to receive the fixing screws.

6. An article of furniture as claimed in any one of claims 3—5 in which a service duct is provided extending between two opposite edges of the panel.

7. An article of furniture as claimed in claim 6 in which the framework is provided at its base end with a reinforcement rail, the rail being spaced from the bottom edge fillet to provide a service duct.

8. An article of furniture as claimed in claim 7 in which at least two apertures are provided in the vertical edge fillets to provide access to the service duct, each aperture having a closing plug.

9. An article of furniture as claimed in any one of claims 3—8 in which a panel has open ended sockets on its underside releasably receiving ground feet.

10. An article of furniture as claimed in claim 9 in which the ground feet each comprise a threaded spindle upstanding from a ground base and provided with a thumb nut on which the panel is adjustably supported.

11. An article of furniture as claimed in claim 4 and in any one of claims 6—10 in which the facing layer is cut away on one side to provide an access opening to the service duct and comprising a cover plate by which the duct normally remains enclosed.

12. An article of furniture as claimed in any one of claims 6—11 in which an access duct is provided extending along a vertical edge of the panel for a lead-in conductor or other supply line to the service duct.

13. An article of furniture as claimed in claim 12 in which the access duct comprises a strip of substantially flat cross-section and having a passage-way extending the length of the strip.

14. An article of furniture as claimed in any one of claims 3—13 in which apertured rails are provided at least on one face of the panel for attachment thereto of support brackets.

15. A connector device as claimed in claim 1 for use in erecting a furniture unit substantially as described with reference to the accompanying drawings.

brackets 51 attached to the side panels thereof for engagement with the rails. Beneath the cupboard B is a worktable T which is similarly fixed in position by the brackets 51.

Alternatively, the accessories may be simply bolted to the framework of the panels without the need for the apertured rails.

Provision may be made for enclosing the bookrest or shelf B by means of a top panel and a door as shown at 73 in Figure 15. The door may be self-closing, e.g. spring-actuated and hingedly connected to the front edge of the top panel, or may slide upwards and backwards in substantially horizontal grooves.

Provision may also be made for introduction of a power line to the upper side of the table, e.g. for a typewriter or lamp. In the arrangement shown the table is provided with a shouldered aperture 56, access to which is obtained by removal of a cover plate 57 provided with a radial slot 58 for passage of a power line when required. The aperture 56 is of a size to accommodate a plug or socket as required and provision is made on the underside of the table to accommodate, e.g. the power line to the typewriter motor. One such arrangement consisting of a wiring tray 59 is shown in Figure 12, the tray being provided with holes for fixing screws 60 and by forming slots 61 in the opposite side edges of the tray the power line can be stowed in the manner shown.

WHAT WE CLAIM IS:—

1. A connector device for use in erecting a furniture unit built up of two or more panels, said device comprising an elongated central section or spine for attachment to an edge of one panel and at least one pair of end sections for attachment to an edge of another panel, or other panels, each section comprising a central flat portion provided with at least one aperture to receive means for fixing the section to a panel edge and longitudinal edge ribs which are hollow at least in part for receiving fixing pins so that, in use, the panels can be secured one to another at their edges by means of fixing pins inserted in aligned ribs of the said central and end sections.

2 A connector device as claimed in claim 1 in which the central and end sections are both cut from an aluminium or other lightweight metal strip having a central flat portion with apertures at predetermined intervals and hollow longitudinal edge ribs.

3. An article of furniture comprising a plurality of panels connected by means of a connector device or devices as claimed in claim 1 or claim 2, the panels being provided with holes at spaced intervals along

one edge or two opposite edges which receive fixing screws whereby the said central and end sections are secured to the panels.

4. An article of furniture as claimed in claim 3 in which each panel comprises a rectangular framework including vertical and transverse edge fillets of wood or wood substitute and has a facing layer on each side with or without a facing sheet and in which along two opposite edges the edge fillets are provided with strips of plastics material.

5. An article of furniture as claimed in claim 3 or claim 4 wherein threaded inserts are provided in the panel to receive the fixing screws.

6. An article of furniture as claimed in any one of claims 3—5 in which a service duct is provided extending between two opposite edges of the panel.

7. An article of furniture as claimed in claim 6 in which the framework is provided at its base end with a reinforcement rail, the rail being spaced from the bottom edge fillet to provide a service duct.

8. An article of furniture as claimed in claim 7 in which at least two apertures are provided in the vertical edge fillets to provide access to the service duct, each aperture having a closing plug.

9. An article of furniture as claimed in any one of claims 3—8 in which a panel has open ended sockets on its underside releasably receiving ground feet.

10. An article of furniture as claimed in claim 9 in which the ground feet each comprise a threaded spindle upstanding from a ground base and provided with a thumb nut on which the panel is adjustably supported.

11. An article of furniture as claimed in claim 4 and in any one of claims 6—10 in which the facing layer is cut away on one side to provide an access opening to the service duct and comprising a cover plate by which the duct normally remains enclosed.

12. An article of furniture as claimed in any one of claims 6—11 in which an access duct is provided extending along a vertical edge of the panel for a lead-in conductor or other supply line to the service duct.

13. An article of furniture as claimed in claim 12 in which the access duct comprises a strip of substantially flat cross-section and having a passage-way extending the length of the strip.

14. An article of furniture as claimed in any one of claims 3—13 in which apertured rails are provided at least on one face of the panel for attachment thereto of support brackets.

15. A connector device as claimed in claim 1 for use in erecting a furniture unit substantially as described with reference to the accompanying drawings.



16. An article of furniture as claimed in claim 3 substantially as described with reference to any one of the accompanying drawings.

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