

(1)

"An Enclosure Assembly"

This invention relates to an enclosure assembly and more particularly, but not exclusively, to an enclosure assembly for housing electrical apparatus.

5 According to this invention, an enclosure assembly for electrical apparatus comprises a frame formed of corner blocks each having projections extending in three mutually perpendicular directions on which associated rails defining the peripheral edges of the enclosure are
10 mounted, and securing means for securing each rail to the associated projection, wherein the securing means for securing one rail to the projection of the corner block associated therewith extends through apertures in the rail and engages in recesses in the projection which are
15 disposed on each side of the longitudinal axis of the rail and the projection.

 Preferably, the securing means for securing one rail to the projection of the corner block associated therewith extends through apertures in the rail which are
20 spaced-apart longitudinally of the rail.

 Preferably, also, the securing means for securing each rail to the projection of the corner block associated therewith is a snap-fit into the or each aperture and the or each recess to initially secure the rail to the
25 associated corner block.

 The corner blocks, rails and securing means are,

(2)

preferably, formed of electrically conducting material and the snap-fit connections of the securing means between the rails and the corner blocks are interference fits to provide electrical connections between the rails and the
5 corner blocks.

Preferably, the initial snap-fit connection of the securing means between each rail and the associated corner block is supplemented by a further connection therebetween.

10 Preferably, also, each rail is of hollow cross-section and the associated projections are a sliding fit in the end portions thereof.

The securing means, preferably, comprises a locking plate having projections thereon which extend through the
15 apertures in the rails and engage in the recesses in the projections of the corner blocks.

Preferably, the locking plate is bolted to the associated projection of the corner block.

Preferably, also, an additional locking plate is
20 mounted within the rail adjacent to the end of the associated projection of the corner block and projections on the locking plate extend through the apertures in the rail and into recesses in the additional locking plate when the locking plate is bolted to the additional locking
25 plate.

Each of the corner blocks is, preferably, provided

(3)

with connection means to enable panel lifting means and/or panel securing means and/or castor means to be connected thereto.

Preferably, the connection means comprises an
5 aperture formed in the or each corner block to which a lifting eye for lifting the panel or a support surface engaging bolt for securing the panel to the surface on which it is disposed can be secured.

An enclosure for electrical apparatus having an
10 enclosure assembly according to any one the preceding eleven paragraphs, preferably, comprises a frame having one or more panels secured thereto, at least one panel having an aperture formed therein, a bezel mounted on the external surface of the panel at the edge of the aperture
15 and secured to a clamping frame mounted on the internal surface of the panel at the edge of the aperture, wherein securing means for securing the bezel to the clamping frame extends through the aperture.

Preferably, the securing means comprises one or more
20 screw-threaded members connected at one end to the bezel and at the other end to the clamping frame.

Preferably, also, said one end of the or each
screw-threaded member has a head portion which is located
in a T-shaped slot formed on the internal surface of the
25 bezel.

The internal surface of the bezel is, preferably,

(4)

provided with sealing means engaging in sealing contact with the external surface of the panel adjacent to the aperture therein.

Preferably, a transparent panel is clamped between
5 the bezel and the external surface of the panel so as to extend over and cover the aperture.

Preferably, also, a flexible membrane is secured to the edge of the bezel and extends over the front surface thereof.

10 A mounting plate for mounting electrical apparatus thereon is, preferably, clamped at its edges between the internal surface of the panel and the clamping frame.

Preferably, one or more rails or mounting plates are secured to the clamping plate to enable additional
15 electrical apparatus to be secured in position on the panel.

An enclosure for electrical apparatus having an enclosure assembly according to any one of the previously referred to said eleven preceding paragraphs, preferably,
20 comprises a frame having one or more panels secured thereto and including power supply connection means disposed in one or part of one of the panels mounted on the frame, the power supply connection means comprising a flame proof panel having one or more fish plates extending
25 through associated slots formed in the flame proof panel which fish plates are adapted to be connected at each end

to power supply buzz bars, wherein each fish plate and the connection of one side thereof to the associated buzz bar is provided with an insulating boot to enclose the fish plate and the connection thereof to the associated buzz
5 bar therein.

Preferably, individual insulating boots are provided for each end of each fish plate on each side of the flame proof panel.

Preferably, also, the insulating boots are formed of
10 flexible insulating material such as, polyvinylchloride.

Preferred embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings of which :-

Figure 1 is a front elevation of an enclosure
15 assembly for electrical apparatus;

Figure 2 is a perspective view of a corner block of a frame of the enclosure shown in Figure 1 of the drawings;

Figure 3 is a perspective view of an end portion of a rail of the frame of the enclosure shown in Figure 1 of
20 the drawings;

Figure 4 is a plan view of a locking plate positioned in the end portion of the rail;

Figure 5 is a front elevation of the locking plate;

Figure 6 is a front elevation of an additional
25 locking plate;

Figure 7 is a perspective view of the corner block

(6)

from the interior of the enclosure;

Figure 8 is a perspective view of a power supply connection panel of the enclosure;

Figure 9 is a sectional side elevation of the panel
5 shown in Figure 8 of the drawings;

Figure 10 is a sectional plan view of part of the panel shown in Figure 8 of the drawings;

Figure 11 is a plan view of a bracket for connecting together two of the enclosures shown in Figure 1 of the
10 drawings;

Figure 12 is a side view of the bracket shown in Figure 11 of the drawings;

Figure 13 is a perspective view of a bezel assembly of the enclosure shown in Figure 1 of the drawings with
15 the parts thereof in a partly dismantled position; and

Figure 14 is a section through one side of a bezel of the bezel assembly shown in Figure 13 of the drawings.

Referring now to the drawings, an enclosure assembly for housing electrical apparatus such as a motor control
20 centre comprises a frame indicated generally at 10 having panels 12 secured thereto.

The frame 10 comprises corner blocks 14 having rails 16 connected thereto. Each corner block 14 has three projections 18 extending in mutually perpendicular
25 directions and one end of an associated one of the rails 16 is a close sliding fit on the associated one of the

projections 18.

The end portion of each rail 16 has two pairs of apertures 20 formed therein, the two apertures 20 of each pair being disposed on each side of the longitudinal axis of the rail 16 and the pairs of apertures 20 being spaced-apart longitudinally of the rail 16.

It will be appreciated that although only two pairs of apertures 20 are required in the end portion of each rail 16, the rails 16 are conveniently manufactured in lengths having apertures 20 spaced-apart along the entire length thereof enabling the required length of rail 16 for a particular part of the enclosure to be cut from a stock length of rail 16. Cutting points between the apertures are marked on the stock lengths of rail 16 to facilitate cutting the required length of rail 16 from stock whilst ensuring the correct spacing is provided between the cut end of the rail 16 and the first of the apertures 20 therein.

Each one of the projections 18 of the corner block 14 has a pair of recesses 22 formed therein which are aligned with the upper pair of apertures 20 in the associated rail 16 when the rail 16 is mounted in position on the projection 18.

The rail 16 is connected to the associated projection 18 on the corner block 14 by means of a locking plate 24. The locking plate 24 is formed as a pressing or,

(8)

alternatively, as a die casting. The locking plate 24 is provided with two pairs of projections 26 and the initial connection of the rail 16 to the projection 18 on the corner block 14 is effected by inserting the projections 5 26 on the locking plate 24 through the apertures 20 in the rail 16 so that they engage in the recesses 22 in the projection 18 of the corner block 14, as shown in Figure 4 of the drawings.

The locking plate 24 and the projections 26 thereof 10 are dimensioned so that the projections 26 are an interference snap-fit in the apertures 20 of the rail 16 and the recesses 22 of the projection 18 of the corner block 14. Where the corner blocks 14, the rails 16 and the locking plates 24 are formed of electrically conducting 15 material, such as mild or stainless steel, this interference fit provides an electrical connection between the rails 16 and corner blocks 14 facilitating earthing of the frame 10 and the entire enclosure assembly. An additional electrical connection is obtained by providing 20 dimples (not shown) on the faces of the locking plate 24 which abuts against the rail 16 so that the dimples penetrate any protective layer such as paint on the rail 16.

The snap-fit feature of the connection of the locking 25 plates 24 to the rails 16 and corner blocks 14 enables the frame 10 to be initially quickly assembled without the use

of tools.

The locking plates 24 are provided with holes 28 and the projections 18 of the corner blocks 14 are provided with screw-threaded holes 30 to enable the locking plates 5 24 to be bolted to the corner blocks 14.

An additional locking plate 32 having recesses 34 and a central screw-threaded hole 36 is mounted in the rail 16 adjacent to the end of the projection 18 of the corner block 14 associated therewith. The lower pair of 10 projections 26 of the locking plate 24 extend through the lower pair of apertures 20 in the rail 16 and engage in the recesses 34 in the additional locking plate 32. The locking plate 24 is also bolted to the additional locking plate 32 to complete the connection of the rail 16 to the 15 associated projection 18 of the corner block 14.

The strength of the connection of each rail 16 to the associated corner block 14 is dependent upon the number of pairs of apertures 20 in the rail 16, and the number of pairs of projections 26 provided on the locking plate 24 20 which are utilised for effecting the connection. It is therefore possible to vary the strength of the connection of the rails 16 to the corner blocks 14 to take into account the stress which is to be imposed on this connection according to the type of enclosure being 25 manufactured without changing the method of construction.

Mounting points for securing apparatus within the

enclosure are provided on either the horizontal or vertical rails 16 of the frame 10. the mounting points each comprise one of the additional locking plates 32 which is inserted within the rail 16 and a single version
5 of the locking plate 24 formed from the upper or lower half of the locking plate 24 shown in Figure 5 which is bolted to the additional locking plate 32. The bolted connection can include a conventional L-shaped bracket (not shown) to which the apparatus to be secured is
10 connected. The additional locking plate 32 is provided with a spring (not shown) on its rear surface so that when it is inserted into the rail 16, it is held in position by the spring whilst the locking plate 24 is bolted thereto to complete the connection to the rail 16.

15 The corner blocks 14 are provided with a further hole 38 to enable a lifting eye (not shown) to be connected thereto by means of which the enclosure can be lifted into a desired position. The holes 38 in the lower corner blocks 14 can also be utilised for the attachment of
20 ground engaging bolts or the like (not shown) to secure the enclosure in a desired operative position.

Alternatively, the holes 38 can form mounting points for the attachment of castor or wheel assemblies to facilitate movement of the enclosure.

25 Referring now to Figures 1, 13, and 14 of the drawings, at least one of the panels 12 of the enclosure

has a plane rectangular aperture 40 formed therein.

A bezel 42 is mounted on the external surface of the panel 12 at the edge of the aperture 40 and is secured to a clamping frame 44 mounted on the internal surface of the
5 panel 12.

The surface of the bezel 42 adjacent to the panel 12 has T-shaped slot 46 formed therein. The heads of screw-threaded securing members, such as bolts, (not shown) are mounted in the slot 46, extend through the
10 aperture 40, pass through holes 48 in the clamping frame 44 and are secured thereto in conventional manner so that the bezel 42 and the clamping frame 44 are clamped together in position on opposite side of the panel 12.

A mounting plate 50, adapted to have electrical
15 equipment secured thereto, is clamped between the frame 44 and the internal surface of the panel 12. Two rails 52 and/or an additional electrical equipment mounting plate 54 are secured to the frame 44 utilising the same securing members (not shown) which secure the bezel and the frame
20 44 together.

Where required, a transparent panel 56 is clamped between the bezel 42 and the external surface of the panel 12 so as to extend over the aperture 40 and a sealing gasket 58 is also provided.

25 The surface of the bezel 42 adjacent to the panel 12 is provided with two sealing rings 60 formed of, for

(12)

example, neoprene or the like, mounted in grooves and the external surface of the bezel 42 is provided with an O-ring 62 for securing a flexible membrane 64 thereto.

The utilisation of the bezel 42 and the clamping frame 44 to mount the plate 50 carrying electrical equipment on the panel 12 enables the panel 12 to merely have a standardised rectangular aperture 40 formed therein whilst allowing different types of electrical equipment to be mounted thereon and even allowing equipment to be changed after completion of the enclosure.

This method of mounting equipment on the bezel 42 also enables pre-assembly of the equipment on a production line prior to final assembly on the panel of the enclosure.

Referring now to Figures 1, 8, 9, and 10 of the drawings, a power supply connection assembly indicated generally at 70 which is provided on one of the panels 12 of the enclosure comprises a flame proof panel 72 having four slots therein through each of which a fish plate 74 extends.

Buzz bars 76 are bolted to each end of the fish plates 74 and the connection of each buzz bar 76 to the end of the associated fish plate 74 is covered by an individual boot 78 formed of flexible insulating material such as, for example, polyvinylchloride.

Referring now to Figures 1, 11, and 12 of the

drawings, where two or more of the enclosures are disposed in side-by-side relationship, adjacent frames 10 are connected together by one or more U-shaped brackets indicated generally at 80. Each bracket 80 is a close
5 sliding fit over the inwardly projecting portions of the rails 16 of adjacent frames 10. The arms of the U-shaped brackets 80 are provided with holes 82 to enable the brackets 80 to be rivetted to the frames 10. The base of each U-shaped bracket 80 is provided with a further hole
10 84 which can be used as a mounting point for securing apparatus within the enclosure.

Although the above described enclosure is particularly suitable for housing electrical equipment, such as, equipment for use as a motor control centre, it
15 will be appreciated that the enclosure can be formed as modular enclosures of plastics material based on the same theme or concept and used for other purposes without departing from the scope of this invention.

What I claim is:-

1. An enclosure assembly for electrical apparatus comprising a frame formed of corner blocks each having projections extending in three mutually perpendicular
5 directions on which associated rails defining the peripheral edges of the enclosure are mounted, and securing means for securing each rail to the associated projection, wherein the securing means for securing one rail to the projection of the corner block associated
10 therewith extends through apertures in the rail and engages in recesses in the projection which are disposed on each side of the longitudinal axis of the rail and the projection.
2. An enclosure assembly according to Claim 1, wherein
15 the securing means for securing one rail to the projection of the corner block associated therewith extends through apertures in the rail which are spaced-apart longitudinally of the rail.
3. An enclosure assembly according to Claim 1 or Claim
20 2, wherein the securing means for securing each rail to the projection of the corner block associated therewith is a snap-fit into the or each aperture and the or each recess to initially secure the rail to the associated corner block.
- 25 4. An enclosure assembly according to Claim 3, wherein the corner blocks, rails and securing means are formed of



electrically conducting material and the snap-fit connections of the securing means between the rails and the corner blocks are interference fits to provide electrical connections between the rails and the corner
5 blocks.

5. An enclosure assembly according to Claim 3 or Claim 4, wherein the initial snap-fit connection of the securing means between each rail and the associated corner block is supplemented by a further connection therebetween.

10 6. An enclosure assembly according to any one of the preceding claims, wherein each rail is of hollow cross-section and the associated projections are a sliding fit in the end portions thereof.

7. An enclosure assembly according to any one of the
15 preceding claims, wherein the securing means comprises a locking plate having projections thereon which extend through the apertures in the rails and engage in the recesses in the projections of the corner blocks.

8. An enclosure assembly according to Claim 7, wherein
20 the locking plate is bolted to the associated projection of the corner block.

9. An enclosure assembly according to Claim 7 or Claim 8, wherein an additional locking plate is mounted within the rail adjacent to the end of the associated projection
25 of the corner block and projections on the locking plate extend through the apertures in the rail and into recesses



in the additional locking plate when the locking plate is bolted to the additional locking plate.

10. An enclosure assembly according to any one of the preceding claims, wherein each of the corner blocks is
5 provided with connection means to enable panel lifting means and/or panel securing means and/or castor means to be connected thereto.

11. An enclosure assembly according to Claim 10, wherein the connection means comprises an aperture formed in the
10 or each corner block to which a lifting eye for lifting the panel or a support surface engaging bolt for securing the panel to the surface on which it is disposed can be secured.

12. An enclosure for electrical apparatus having an
15 enclosure assembly according to any one of Claims 1 to 11, comprising a frame having one or more panels secured thereto, at least one panel having an aperture formed therein, a bezel is mounted on the external surface of the panel at the edge of the aperture and is secured to a
20 clamping frame mounted on the internal surface of the panel at the edge of the aperture, wherein securing means for securing the bezel to the clamping frame extends through the aperture.

13. An enclosure according to Claim 12, wherein the
25 securing means comprises one or more screw-threaded members connected at one end to the bezel and at the other



end to the clamping frame.

14. An enclosure according to Claim 13, wherein said one end of the or each screw-threaded member has a head portion which is located in a T-shaped slot formed on the
5 internal surface of the bezel.

15. An enclosure according to any one of Claims 12 to 14, wherein the internal surface of the bezel is provided with sealing means engaging in sealing contact with the external surface of the panel adjacent to the aperture
10 therein.

16. An enclosure according to any one of Claims 12 to 15, wherein a transparent panel is clamped between the bezel and the external surface of the panel so as to extend over and cover the aperture.

15 17. An enclosure according to any one of Claims 12 to 16, wherein a flexible membrane is secured to the edge of the bezel and extends over the front surface thereof.

18. An enclosure according to any one of Claims 12 to 17, wherein a mounting plate for mounting electrical apparatus
20 thereon is clamped at its edges between the internal surface of the panel and the clamping frame.

19. An enclosure according to any one of Claims 12 to 18, wherein one or more rails or mounting plates are secured to the clamping plate to enable additional electrical
25 apparatus to be secured in position on the panel.

20. An enclosure for electrical apparatus having an



enclosure assembly according to any one of Claims 1 to 11, comprising a frame having one or more panels secured thereto and including power supply connection means disposed in one or part of one of the panels mounted on
5 the frame, the power supply connection means comprising a flame proof panel having one or more fish plates extending through associated slots formed in the flame proof panel which fish plates are adapted to be connected at each end to power supply buzz bars, wherein each fish plate and the
10 connection of one side thereof to the associated buzz bar is provided with an insulating boot to enclose the fish plate and the connection thereof to the associated buzz bar therein.

21. An enclosure according to Claim 20, wherein
15 individual insulating boots are provided for each end of each fish plate on each side of the flame proof panel.

22. An enclosure according to Claim 21, wherein the insulating boots are formed of flexible insulating material such as, polyvinylchloride.

20 23. An enclosure assembly constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, and as illustrated by, Figures 1 to 7, 11 and 12 of the accompanying drawings.

24. An enclosure constructed, arranged and adapted to
25 operate substantially as hereinbefore described with reference to and, as illustrated by, Figures 1, and 8 to



(19)

14 of the accompanying drawings.



* C L M S *