

PATENT SPECIFICATION

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(54) EARTHING CONNECTOR

(71) We, HEGO ELECTRIC GMBH of 8750 Glarus, Spielhof 16, Switzerland, a Swiss Company, 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 earthing connectors for making a connection with an earthed rail or bar which has opposite outwardly directed edge regions.

The rail or bar may for example be a simple flat bar constituting an earthing bus-bar. Alternatively, it may be a terminal-supporting rail such as is now commonly used in electrical appliances and circuit installations to support a multiplicity of clip-on terminal blocks. Such supporting rails are of various standard cross sections. One standard cross section is asymmetrical, with opposite inwardly turned flanges between which the terminal blocks are clipped. Another form of standard supporting rail has opposite outwardly bent flanges and in general is of symmetrical cross section, and the present invention is concerned with earthing connectors for fitting to such supporting rails.

Because a good earth requires considerable effort to establish, individual electrical components in electrical appliances and circuit installations are in general not individually earthed but are connected to a common earth. When multi-core cables are used, the main conductors (for example line and neutral) will in general be connected to some form of terminal and it is then necessary for the earth conductor to be connected to an earth terminal. This can cause considerable inconvenience in the case of an installation or appliance using an array of terminal blocks mounted upon a standard supporting rail as described above, because it may be necessary to insert an

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earthing connector between existing terminal blocks on the rail. In particular, it is very desirable that it should be possible to insert an earthing connector alongside the terminal blocks so that an earthing connection can be made, in particular to a multi-core cable.

In the case of the aforesaid asymmetrical supporting rails with inwardly turned flanges, earthing connectors are already known which can be inserted between previously fitted terminal blocks. In the case of supporting rails with outwardly turned flanges, there is at present one form of earthing connector which can be fitted between existing terminal blocks, but this convenience is achieved at the price of safety since the earthing connector in question has a fixing foot which engages only one of the outwardly turned flanges. Although the connector is clamped to the rail, if the rail itself is imperfect the connector may not even touch the said other flange, and the connector is easily loosened or dislodged by accident. Another disadvantage of this connector is that the conductor can be connected only in the central position, which is inconvenient in many situations.

According to the present invention, we provide an earthing connector, for making a connection with an earthed rail or bar with two opposite outwardly directed edge regions, which connector comprises a conductive body member provided with a hook arranged and adapted to fit round one said edge region, a retaining member provided with a hook to fit round the other edge region thereby to clamp the body member to the said other edge region, and a clamping screw for moving positively the retaining member relative to the body member in two opposite directions whereby the retaining member can be engaged with or disengaged from the said other edge region.

By "moving positively" we mean that 90

movement of the screw necessarily causes movement of the retaining member in each said direction; and does not merely remove a pressure exerted on the retaining member by the screw.

The retaining member may be movable rectilinearly towards and away from the body member, or it may be pivotable, for example in the form of a lever or arm coupled to a non-rotatable nut threaded on the clamping screw.

The body member will be provided with at least one terminal for connection of one or more electrical conductors. The terminal is preferably a screw-clamping terminal and can conveniently be mounted on a projecting finger of the body member.

The connector may have an insulating housing.

By virtue of the provision of a retaining member which is movable positively in two opposite directions to be engaged with or disengaged from the rail or bar, the connector can be firmly secured to the rail or bar and yet can be inserted between previously fitted terminal blocks.

The components of the connector can be a very simple construction, since the terminals and clamping screw can be standard components and the body member and retaining member can be made for example as simple castings or mouldings, or by straight forward stamping and/or bending operations.

Four embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figures 1 to 4 show respectively earthing connections embodying the invention, in side view.

Figure 1 shows an earthing connector embodying the invention, mounted on a supporting rail 7 of standard cross section, comprising opposite outwardly directed edge flanges 9, 10. In the case of Figures 1, 3 and 4, terminals for connection of electrical conductors are not shown; these can be provided for example as shown in Figure 2.

The connector comprises a metal body member 2 formed with a hooked arm 11 which fits round and under the flange 9; this arm also acts as a reactor or supporting element bearing on top of the rail. A metal retaining member 3 is also provided with a hook 12 which can fit round, and in particular under, the other flange 10 of the supporting rail. The member 3 is screw-threaded on a clamping screw 5 which is free to rotate in a transverse bore 13 provided in the upstanding portion 14 of the body member 2, a spring washer 6 being provided between the head of the screw and the said portion 14. The upper end of the portion 14, remote from the supporting rail 7, is T-shaped, having laterally project-

ing fingers 15 to receive cable terminals as shown in Figure 2.

The clamping screw is accessible from one side of the supporting rail and, when turned, positively moves the member 3 towards or away from the flange 10 at the other side of the rail. The member 3 can be moved by the screw sufficiently far away from the body member 2 to bring the hook 12 completely clear of the flange 10, so that the connector can be lifted away from, or fitted to, the rail between previously fitted terminal blocks. Since the rail is engaged by hooks at both flanges, the connector is reliably secured to the rail.

To increase the tracking distances and air paths between the earthing connector and adjacent live terminal blocks, the earthing connector may be provided with an insulating housing as indicated at 1 in Figure 1. The housing may for example, comprise two half-shells fastened together with the body member and the retaining member there between; the half-shells can for example be provided with lugs, ribs or other projections and/or sockets or grooves for locking the halves together. Alternatively, the housing can be a single integral shell fitted over the body and retaining members and attached to the body member by co-operating projections and recesses, for example lugs on the housing engaging recesses in the foot portion of the body member.

Figure 2 shows an earthing connector broadly similar to that of Figure 1 but of somewhat simpler construction, the hooks being sheet metal bent in semi-circular form. Figure 2 shows that the earthing connector can be fitted to a simple flat earthing busbar 8 as well as to a flanged supporting rail as shown in Figure 1. Figure 2 also shows the preferred form of cable terminal, comprising a clamping sleeve 9 embracing the finger 15, and a clamping screw 16 threaded in one side of the sleeve and bearing on the finger, so that a conductor 17 can be clamped between the opposite side of the sleeve and the finger. Such terminals are of course well known in themselves, being the standard form of terminal for rail-mounted terminal blocks.

Figures 3 and 4 show connectors in which the retaining member 3 is a pivotal arm or lever instead of a rectilinearly movable member as in Figures 1 and 2. In each case, the clamping screw extends perpendicular to the supporting rail, in a bore 18 provided in the upstanding portion 14 of the body member 2. In each case the retaining member 3 comprises two parallel portions and an inter-connecting web 19, and is formed by stamping and bending sheet metal, but can alternatively be a solid body.

In each case, the end of the retaining member remote from its hook 12 is provided with an aperture in which fits a nut 4 which extends through an aperture 20 in the body member 2 and is screw-threaded on the clamping screw 5. The nut is non-rotatable by virtue of its engagement with the retaining member 3 and consequently when the clamping screw is rotated the nut is moved along it so as to pivot the retaining member 3 and bring the hook into engagement under the flange 10 (or an edge of the busbar), or to release the hook from the flange so that the hook can be pivoted clear of the flange and the connector can be lifted away from the rail or busbar. It will be seen that the body member rests on one face of the rail 7 in both edge regions of the latter and its hooked arm 11 engages the other face of the rail in one edge region, whereas the retaining member engages the other face of the rail in the other edge region to clamp the latter against the body member.

25 WHAT WE CLAIM IS:—

1. An earthing connector, for making a connection with an earthed rail or bar with two opposite outwardly directed edge regions, which connector comprises a conductive body member provided with a hook arranged and adapted to fit round one said edge region, a retaining member provided with a hook to fit round the other edge region thereby to clamp the body member to the said other edge region, and a clamping screw for positively moving in two opposite directions whereby the retaining member can be engaged with or disengaged from the said other edge region.

40 2. An earthing connector as claimed in claim 1 wherein the retaining member is movable and rectilinearly towards and away from the body member by rotation of the screw.

45 3. An earthing connector as claimed in claim 1 wherein the retaining member is pivotable relative to the body member for engagement with and disengagement from

the other edge region of the rail or bar.

4. An earthing connector as claimed in claim 3 in which the body member is adapted to rest on one face of the rail or bar in both edge regions and the retaining member is adapted to clamp the said other edge region against the body member resting thereon, the retaining member in use engaging the other face of the rail or bar.

5. An earthing connector as claimed in claim 3 or 4 in which the retaining member is coupled to a non-rotatable nut threaded on the clamping screw.

6. An earthing connector as claimed in any preceding claim in which the body member is provided with at least one terminal for connection of one or more electrical conductors.

7. An earthing connector as claimed in claim 6 in which at least one said terminal is a screw-clamping terminal.

8. An earthing connector as claimed in claim 6 in which at least one said terminal comprises a clamping sleeve embracing a projecting finger of the body member, and a clamping screw threaded in a side of the sleeve and bearing on the finger whereby a conductor can be clamped between the opposite side of the sleeve and the finger.

9. An earthing connector as claimed in any preceding claim having an insulating housing.

10. An earthing connector as claimed in claim 9 wherein the housing comprises two half-shells fastened together with the body member and retaining member therebetween.

11. An earthing connector as claimed in claim 9 wherein the housing is a single integral shell fitted over the body and retaining members and attached to the body member.

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45 3. An earthing connector as claimed in claim 1 wherein the retaining member is pivotable relative to the body member for engagement with and disengagement from

the other edge region of the rail or bar.

4. An earthing connector as claimed in claim 3 in which the body member is adapted to rest on one face of the rail or bar in both edge regions and the retaining member is adapted to clamp the said other edge region against the body member resting thereon, the retaining member in use engaging the other face of the rail or bar.

5. An earthing connector as claimed in claim 3 or 4 in which the retaining member is coupled to a non-rotatable nut threaded on the clamping screw.

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8. An earthing connector as claimed in claim 6 in which at least one said terminal comprises a clamping sleeve embracing a projecting finger of the body member, and a clamping screw threaded in a side of the sleeve and bearing on the finger whereby a conductor can be clamped between the opposite side of the sleeve and the finger.

9. An earthing connector as claimed in any preceding claim having an insulating housing.

10. An earthing connector as claimed in claim 9 wherein the housing comprises two half-shells fastened together with the body member and retaining member therebetween.

11. An earthing connector as claimed in claim 9 wherein the housing is a single integral shell fitted over the body and retaining members and attached to the body member.

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