

# United States Patent [19]

[ 19 ]

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**Bertrams**

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## [54] CONNECTOR

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Oct. 27, 1971 Netherlands ..... 7114769

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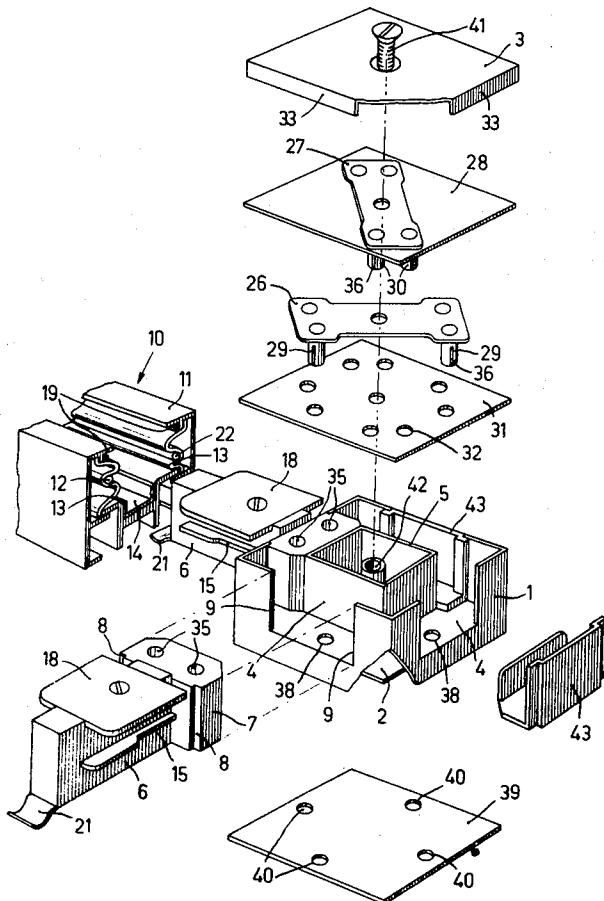
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[57]

## ABSTRACT

The invention relates to a connector for mechanically and electrically coupling current rails. The connector has a number of coupling members which can each be clamped in a current rail and a number of plates which are electrically insulated from each other. Each plate is connected by means of a plug contact to a lead-through element which is incorporated in the coupling member and which can be clamped against one of the current conductors of the current rail.

## 5 Claims, 3 Drawing Figures



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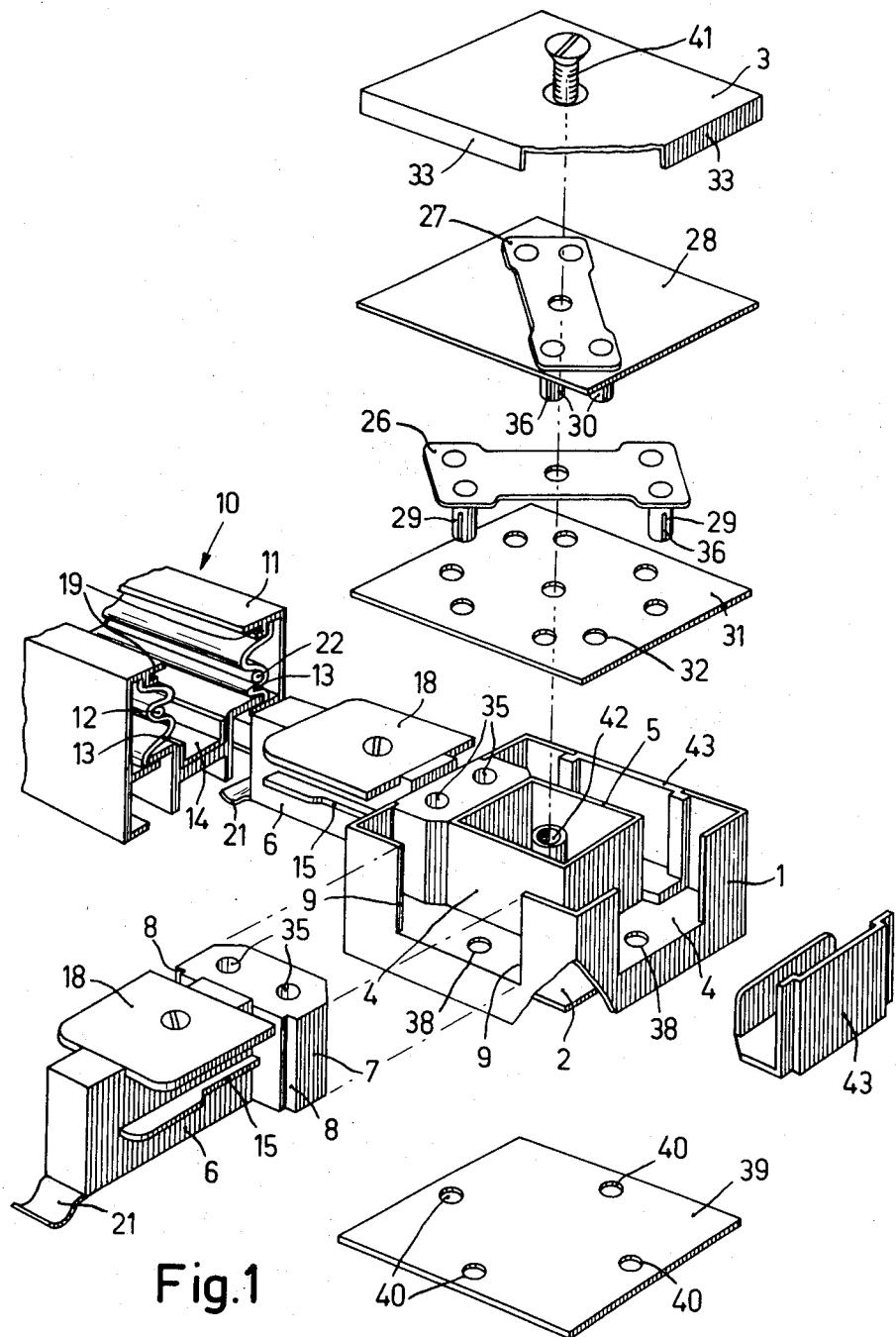


Fig. 1

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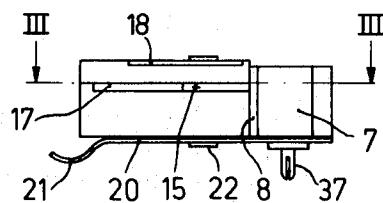


Fig.2

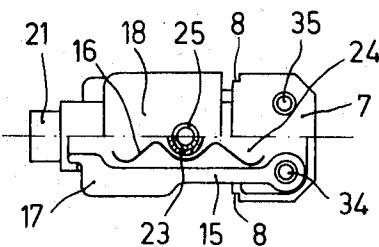


Fig.3

**1**  
**CONNECTOR**

The invention relates to a connector for mechanically and electrically connecting two or more current rails together. Such a connector generally includes a housing of an insulating material incorporating a number of parallel extending metal plates which correspond to the number of the current conductors in the current rail and which are insulated from each other. At least two first contact members are secured to each plate and connected to a second contact member in a lead-through element. The first contact members are coupled to the second contact members by an insertion movement. Each of the lead-through elements projects beyond the housing through an aperture recessed in the wall of the housing and has a shape which is suitable for being coupled to a current conductor. Such a connector is known. See for example German Patent Specification No. 1,102,851.

In the known connector, each of the contact members secured to the plates are shaped as a cylindrical sleeve secured to the edge of the plate and the axis of which extends parallel to the plane of the plate. Said sleeve is incorporated in an aperture in a sidewall of the housing. The lead-through element comprises a plug which fits in the sleeve in a clamping manner. Because each plate comprises at least two laterally projecting sleeves on its circumference the housing has rather large dimensions. A further drawback in this known connector is the weak mechanical connection to the current rails.

It is the object of the invention to provide a connector which does not exhibit said drawbacks.

For that purpose, the connector according to the invention is characterized in that the first contact members are secured to a plate and the second contact members are secured to a lead-through element so that the direction of the insertion in order to establish contact is transverse to the plane of the plate. A group of lead-through elements intended to cooperate with a current rail are embedded in a coupling member of an insulating material. The coupling member is secured to the housing so as to be detachable. As a result of this the electric connection is realized in a thin-walled comparatively small housing, while a very rigid connection of a current rail to the connector becomes possible by using a coupling member.

A favorable embodiment of the connector according to the invention is characterized in that each of the first contact members secured to a plate is formed as a pin extending with its longitudinal direction transversely to the plane of the plate. Each of the lead-through elements are formed as a strip in which a hole is recessed, the pin fitting in the hole in a clamping manner. The pin preferably has a slot extending in its longitudinal direction so that two pin halves are formed which can be moved towards each other in a resilient manner. The hole in the strip is chosen to be slightly smaller than the cross-section of the pin so that a good electric connection is obtained.

A further embodiment of the connector according to the invention is characterized in that the housing is formed as a box having a bottom wall having a boss centrally arranged in the box. Each coupling member is clamped between said boss and the sidewall of the housing with a thickened portion so that a very rigid mechanical connection is ensured.

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Another favorable embodiment provides a metal earth strip connected to a metal earth plate in the housing on the side of the bottom wall remote from the coupling member. A pin which passes through the bottom wall and fits in a clamping manner in an aperture recessed in the earth plate is preferably secured to the earth strip. The electric connection of earth conductors in the current rails to be coupled is thus realized in a place which is electrically insulated from the current-conveying parts in the connection member.

The invention will be described in greater detail with reference to a drawing, in which

FIG. 1 is an exploded perspective view showing the connector according to the invention;

FIG. 2 is a side view of the coupling member and

FIG. 3 is a plan view and a partial sectional view taken on the line III—III of the coupling member of FIG. 2.

The embodiment of the connector according to the invention shown in FIG. 1 comprises a housing 1 which is manufactured from a synthetic material and is formed as a rectangular box having a bottom wall 2 and a cover 3. The upright sidewalls of the box have recesses 4. The bottom wall 2 has a likewise rectangular boss 5 the walls of which extend in parallel with the sidewalls of the box.

The connector furthermore comprises a number of coupling members 6 two of which are shown in FIG. 1 and which enable an angular joint. Each coupling member 6 has a widened portion 7 which can be clamped between one of the walls of the boss 5 and a sidewall of the housing. The slots 8 occurring in the widened portion 7 cooperate with the edges 9 of the recess 4. The part of the coupling member 6 projecting beyond the housing in the assembled condition is constructed for cooperation with current rail 10. Said current rail 10 comprises a metal beam 11, two current conductors 12 and 22 which are each secured in the beam 11 by a supporting member 13 of a synthetic material, and a metal earth conductor 14.

The coupling member 6 shown in detail in FIGS. 2 and 3 is formed by a block of a synthetic material in which an electric lead-through element 15 is embedded on either side. The lead-through elements are forced apart by means of springs 16 present in a recess 24 of the block. The portion 17 of the lead-through element 15 projecting beyond the block is pressed against one of the current conductors 12 by the action of the spring when the coupling member 6 is inserted into the current rail 10. The metal plate 18 is clamped in the slots 19 of the current rail so that a good mechanical connection is obtained.

The coupling member furthermore comprises a metal earth strip 20 which has a bent end 21 which is slightly resilient and can contact the earth conductor 14 in the current rail 10. The metal plate 18 and the earth strip 20 are secured to the block of the coupling member by means of a sleeve 25 which has flanged edges. At the area of the springs 16, said sleeve comprises a jacket 23 of an insulating synthetic material.

The electric connection of the current conductors 12 and 22 is effected by means of two metal plates 26 and 27 which are insulated from each other by a plate 28 of a synthetic material. The plates 26 and 27 each have four contact members constructed as pins 29 and 30, respectively. The plates 26 and 27 are maintained in the correct position relative to each other by means of

a plate 31 of an insulating synthetic material which has eight holes 32 located on a circle and through which the pins 29 and 30 project. The plates 26, 27, 28 and 31 fit between the edges 33 of the cover 3. Each pin cooperate with a second contact member which is formed by an aperture 34 occurring in a lead-through element 15. For that purpose, said pin should be inserted into one of the cylindrical recesses 35 in the widened portion 7 of the coupling member 6. Each of the pins 29 and 30 has a slot 36 which extends over a part of the length of the pin so that two free ends are formed which can resiliently be moved towards each other. Since the diameter of the pin is chosen to be slightly larger than the diameter of the aperture 34, the pin fits in the aperture in a slightly clamping manner, which results in a good electric connection.

As shown in FIG. 1 of the drawing, the current conductor 12 is connected to the plate 26 via one of the lead-through elements 15 and one of the pins 29. The current conductor 22 is connected to the plate 27 via the other lead-through element 15 and one of the pins 30. In this manner, the current conductors occurring in other current rails to be connected can be connected to the current conductors 12 and 22 via the plates 26 and 27.

The metal earth strip 20 secured to the coupling member comprises a pin 37 at the area of the thickened portion 7. Said pin projects through one of the apertures 38 in the bottom 2 of the housing 1 and contacts a metal earth plate 39 which has four holes 40 in one of which the pin 37 fits in a clamping manner. As a result of this, the earth conductors 14 which occur in two current rails to be connected can be connected together via the earth strips 20, the pin 37 and the earth plate 39.

The plates 31, 26, 28 and 27 and the cover 3 are secured to the housing 1 by means of a screw 41 which in this embodiment is constructed as a self-tapping screw. The bottom 2 of the housing has a central upright sleeve 42 into which the screw 41 can be screwed.

In the embodiment shown an angular joint is realized. Of course, a T- or cross-joint can also be made with this connection member. The recesses 4 in which no coupling member is provided can each be closed by means of a U-shaped cover 43 which can be clamped between an upright wall of the boss 5 and the edges 9 of the recess 4.

The connector according to the invention is suitable for the connection of current rails having two current conductors. Connection of current rails having more than two current conductors is of course also possible. In that case an adapted coupling member and a number

of plates corresponding to the number of current conductors should be used.

What is claimed is:

1. A connector for mechanically and electrically connecting together two or more current rails having current conveying conductors, said connector comprising a housing of insulating material, a recessed opening in the wall of said housing for each current rail, a coupling member for each current rail of insulating material detachably secured to said housing, at least one lead-through element embedded in each coupling member for cooperative engagement with a current conveying conductor of said current rail, each lead-through element projecting beyond said housing through said openings having a shape comparable for engagement with said current conductor, a plurality of parallel extending metal plates secured within said housing, the number of plates corresponding to the number of current conveying conductors, insulating means electrically insulating said plates from each other, a plurality of first contact members carried by each plate, and a plurality of second contact members, each said second contact member being carried by one of said lead-through elements, said first and second contact members arranged for contact with each other and insertion of one with respect to the other, the direction of insertion being transverse to the plane of said plates.

2. The connector according to claim 1 wherein each of said first contact members comprises a pin secured to said plates having its longitudinal axis extending in a direction transverse to the plane of said plates, and wherein each of said lead-through elements is strip-shaped, said second contact members comprising a recessed hole in said lead through-element, said pin arranged for clamping engagement with said hole.

3. The connector according to claim 1 wherein said housing is formed as a box having a bottom wall, and further comprising a boss centrally arranged in the box, each said coupling member having a thickened portion clamped between said boss and a sidewall of the housing.

4. The connector according to claim 1 further comprising a metal earth strip carried by said coupling member, said earth strip being connected to a metal earth plate in said housing on the side of the bottom wall remote from the coupling member.

5. The connector according to claim 4 further comprising a pin secured to said earth strip passing through the bottom wall of said housing, said pin fitting in a clamping manner in an aperture recessed in the earth plate.

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