

PATENT SPECIFICATION

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(52) Index at acceptance
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(54) ELECTRICAL TERMINAL UNIT

(71) We, C A WEIDMÜLLER KG, of 175 Paderborner Strasse, 4930 Detmold, West Germany, a German 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 electrical terminal units of the kind comprising an insulating housing, a contact bar disposed therein, at least one clamping sleeve embracing the contact bar, and clamping means for effecting relative movement of the sleeve and bar transversely to the latter, whereby an electrical conductor can be clamped in the sleeve between the latter and the bar. The invention is particularly applicable to such units in which the insulating housing is a relatively thin slab capable of being mounted side by side with similar units to form an electrical terminal assembly, mounted for example on channel-section supporting rails of standardised dimensions.

A problem which arises in terminal units of this kind is that of maintaining the sleeve and bar in the correct orientation relative to one another.

German Utility Model specification No. 1,808,756 discloses a terminal unit of the aforesaid kind in which the parallel sides of the clamping sleeve are provided with elongate apertures transverse to the contact bar, and the latter has lateral projections which project into the said apertures, so as to guide the clamping sleeve with respect to the bar during the transverse relative movement of the bar and sleeve. However, it is nevertheless possible for the clamping sleeve to pivot about the contact bar with the result that the apertures in the sleeve can lose their engagement with the projections of the bar and the sleeve can slip off the bar.

The present invention resides in an electrical terminal unit comprising an insulating housing, a contact bar disposed therein, at least one clamping sleeve

embracing the contact bar, and clamping means for effecting relative movement of the sleeve and bar transversely to the latter whereby an electrical conductor can be clamped in the sleeve between the latter and the bar, the sleeve having opposed parallel sides in at least one of which is an elongate aperture transverse to the bar and the bar having at least one lateral projection projecting into and movable along said aperture for guidance of said relative movement, opposed internal surfaces of the sleeve sides being disposed with respect to respective sides of the bar in a manner resisting relative rotation of the sleeve and bar.

In a preferred embodiment of the invention, the or each projection is a detent tooth with an oblique surface permitting assembly of the sleeve and bar by relative movement in the longitudinal direction of the bar, the sleeve and/or projection being resiliently deformable to permit such movement.

Preferably, the or each projection is rigid and it is the sleeve that is resiliently deformable.

The or each projection is preferably integral with the bar, but it may alternatively be a component attached to the bar, for example, in the case of a terminal unit in which the sleeve is rigid and the projection is or projections are resilient or resiliently mounted.

In an alternative arrangement, the or each projection is fitted to the bar after the sleeve and bar have been assembled together.

In general, the clamping sleeve will be made of stamped and bent sheet metal, in particular hardened steel or other springy metal. However, if high current capacity and/or high clamping forces are required, the sleeve may be made of heavy-gauge metal and therefore substantially rigid, the projection or projections being resilient or being inserted after assembly of the clamping sleeve and contact bar, as mentioned above.

The clamping force can be provided in

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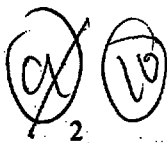
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various ways, for example, by means of a clamping screw or a spring.

5 An embodiment of the invention is shown by way of example, in the accompanying drawing, in which:

Fig. 1 is a side view of an electrical terminal unit embodying the invention, and

Fig. 2 is a plan view of a contact bar of the terminal unit shown in Fig. 1.

10 Fig. 1 shows a terminal unit which is generally of the well-known clip-on type. It comprises an insulating housing 1 of relatively thin generally slab-shaped form provided with a foot 7 incorporating a spring 8 by means of which it can be clipped on to, and unclipped from a flanged supporting rail 9 of standardised cross section. The housing contains a contact bar 2 embraced at each end by a respective clamping sleeve 4 provided with a clamping screw 6. Each clamping sleeve faces an aperture 10 in a narrow side of the housing, through which a conductor can be inserted into the sleeve below the contact bar 2. By tightening the clamping screw 6, the sleeve can then be moved upwards, transversely to the bar, so as to clamp the inserted conductor between the bottom of the sleeve and the underside of the contact bar. The latter may be provided with longitudinal serrations to improve electrical contact with and the grip on the clamped conductor.

35 Each clamping sleeve is made of stamped and bent sheet metal and has a rectangular cross section, the clamping screw being provided in the upper wall of the sleeve defined by over-lapping bent portions of the sheet metal. The contact bar is of rectangular cross section, and its width is not less than, and preferably slightly greater than, the internal width of the sleeve between the opposed parallel sides of the latter. Consequently, the sides of the sleeve, the metal of which is resilient, engage respective sides of the bar, thereby resisting relative rotation of the sleeve and bar and ensuring that the sleeve maintains its correct orientation relative to the bar.

50 In one of the opposed parallel sides of each sleeve, there is slot 5 perpendicular to the bar. The slot accommodates a lateral projection 3 on one side of the bar, so that the sleeve is guided by the projection 3 during the movement of the sleeve transverse to the bar when a conductor is being clamped or unclamped.

60 In the illustrated embodiment each projection 3 is a detent tooth with an oblique surface on the side nearer the adjacent end of the bar and a steep face facing away from the adjacent end of the bar, as can be seen in Fig. 2. The length of the tooth is slightly less than the width of the slot 5.

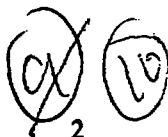
In the course of assembly of the terminal unit, the sleeves and the bar are fitted together by relative movement in the longitudinal direction of the bar. The relatively gentle slope of the oblique surfaces of the projections 3 permit such movement, the resilient sides of the clamping sleeves being spread apart by the projections, until the latter reach the slots 5, where upon the sides of the clamping sleeve snap against the sides of the contact bar. Movement in the opposite direction is impossible because the steep face of each projection engages the side of the associated slot 5.

80 The assembly consisting of the sleeves and bar is then fitted into the insulating housing. Since the sides of the sleeves fit closely against the sides of the bar, it is difficult or impossible for the sleeves to rotate about the bar, and the assembly of sleeves and bar can safely be handled as a single unit. This greatly facilitates the assembly process and the latter can be made largely or entirely automatic including the step of inserting the contact assembly in the insulating housing. It is not necessary to tighten the clamping screws to prevent separation of the sleeves and bar. The close engagement between the sleeves and bar also eliminates any risk of tilting of the sleeves during use of the terminal unit.

95 In an alternative arrangement, which is particularly suitable for terminal units using heavy-gauge and therefore rigid metal, the projections 3 are not present on the contact bar when the latter is assembled with the contact sleeves, the projections, for example, metal pins, being attached to the contact bar after assembly with the sleeves, by being inserted through the guide slots 5. In this case, the internal width of the clamping sleeve will be substantially equal to or perhaps slightly greater than the width of the contact bar, since the contact sleeve will be unable to "give" during assembly. Since the components in this case are rigid and of heavy gauge, a small amount of play between the bar and sleeve can be tolerated, as long as the internal dimensions of the sleeve and the cross section of the contact bar are so related that rotation of one with respect to the other is prevented.

WHAT WE CLAIM IS:—

1. An electrical terminal unit comprising an insulating housing, a contact bar disposed therein, at least one clamping sleeve embracing the contact bar, and clamping means for effecting relative movement of the sleeve and bar transversely to the latter whereby an electrical conductor can be clamped in the sleeve between the latter and the bar, the sleeve having opposed parallel sides in at



various ways, for example, by means of a clamping screw or a spring.

An embodiment of the invention is shown by way of example, in the accompanying drawing, in which:

Fig. 1 is a side view of an electrical terminal unit embodying the invention, and

Fig. 2 is a plan view of a contact bar of the terminal unit shown in Fig. 1.

Fig. 1 shows a terminal unit which is generally of the well-known clip-on type. It comprises an insulating housing 1 of relatively thin generally slab-shaped form provided with a foot 7 incorporating a spring 8 by means of which it can be clipped on to, and unclipped from a flanged supporting rail 9 of standardised cross section. The housing contains a contact bar 2 embraced at each end by a respective clamping sleeve 4 provided with a clamping screw 6. Each clamping sleeve faces an aperture 10 in a narrow side of the housing, through which a conductor can be inserted into the sleeve below the contact bar 2. By tightening the clamping screw 6, the sleeve can then be moved upwards, transversely to the bar, so as to clamp the inserted conductor between the bottom of the sleeve and the underside of the contact bar. The latter may be provided with longitudinal serrations to improve electrical contact with and the grip on the clamped conductor.

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In one of the opposed parallel sides of each sleeve, there is slot 5 perpendicular to the bar. The slot accommodates a lateral projection 3 on one side of the bar, so that the sleeve is guided by the projection 3 during the movement of the sleeve transverse to the bar when a conductor is being clamped or unclamped.

In the illustrated embodiment each projection 3 is a detent tooth with an oblique surface on the side nearer the adjacent end of the bar and a steep face facing away from the adjacent end of the bar, as can be seen in Fig. 2. The length of the tooth is slightly less than the width of the slot 5.

In the course of assembly of the terminal unit, the sleeves and the bar are fitted together by relative movement in the longitudinal direction of the bar. The relatively gentle slope of the oblique surfaces of the projections 3 permit such movement, the resilient sides of the clamping sleeves being spread apart by the projections, until the latter reach the slots 5, where upon the sides of the clamping sleeve snap against the sides of the contact bar. Movement in the opposite direction is impossible because the steep face of each projection engages the side of the associated slot 5.

The assembly consisting of the sleeves and bar is then fitted into the insulating housing. Since the sides of the sleeves fit closely against the sides of the bar, it is difficult or impossible for the sleeves to rotate about the bar, and the assembly of sleeves and bar can safely be handled as a single unit. This greatly facilitates the assembly process and the latter can be made largely or entirely automatic including the step of inserting the contact assembly in the insulating housing. It is not necessary to tighten the clamping screws to prevent separation of the sleeves and bar. The close engagement between the sleeves and bar also eliminates any risk of tilting of the sleeves during use of the terminal unit.

In an alternative arrangement, which is particularly suitable for terminal units using heavy-gauge and therefore rigid metal, the projections 3 are not present on the contact bar when the latter is assembled with the contact sleeves, the projections, for example, metal pins, being attached to the contact bar after assembly with the sleeves, by being inserted through the guide slots 5. In this case, the internal width of the clamping sleeve will be substantially equal to or perhaps slightly greater than the width of the contact bar, since the contact sleeve will be unable to "give" during assembly. Since the components in this case are rigid and of heavy gauge, a small amount of play between the bar and sleeve can be tolerated, as long as the internal dimensions of the sleeve and the cross section of the contact bar are so related that rotation of one with respect to the other is prevented.

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- least one of which is an elongate aperture transverse to the bar and the bar having at least one lateral projection projecting into and movable along said aperture for guidance of said relative movement, opposed internal surfaces of the sleeve sides being disposed with respect to respective sides of the bar in a manner resisting rotation of the sleeve and bar. 5
2. A terminal unit as claimed in Claim 1 in which the or each projection is a detent tooth with an oblique surface permitting assembly of the sleeve and bar by relative movement in the longitudinal direction of the bar, the sleeve and/or projection being resiliently deformable to permit such movement. 10
3. A terminal unit as claimed in Claim 2 in which the sleeve is rigid and the or each projection is constructed in resilient manner. 20
4. A terminal unit as claimed in Claim 2 in which the sleeve is resiliently deformable and the or each projection is rigid.
5. A terminal unit as claimed in Claim 1, 2 or 3 in which the or each projection is a component attached to the bar. 25
6. A terminal unit as claimed in Claim 1, 2, 3, 4 or 5 in which the bar has, at least in the region embraced by the sleeve, a substantially rectangular cross section and a width at least substantially equal to the internal width of the sleeve between the said parallel sides whereby the said sides of the sleeve engage respective sides of the bar in a manner resisting relative rotation of the sleeve and bar. 30
7. An electrical terminal units substantially as herein described with reference to the accompanying drawings. 35 40

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