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E. JACKS ETAL

3,315,059

ELECTRICAL CONNECTION APPARATUS

Filed Aug. 10, 1964

2 Sheets-Sheet 1

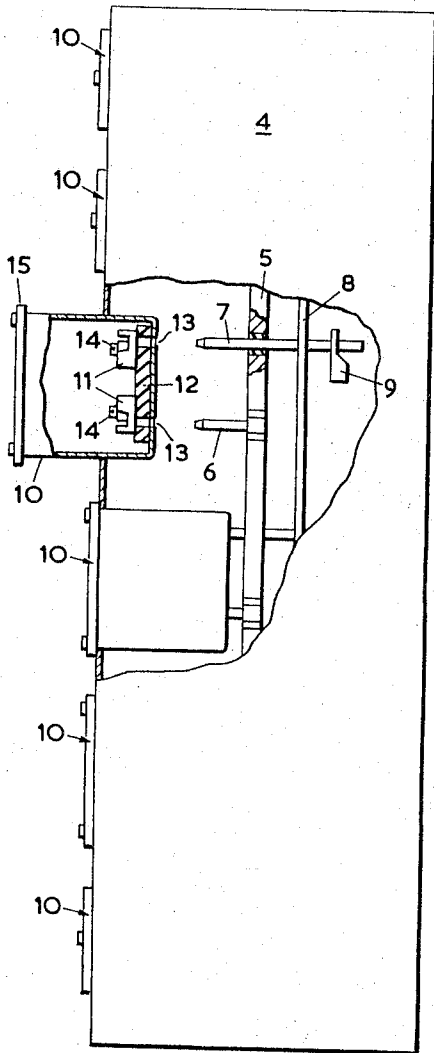


FIG. 1

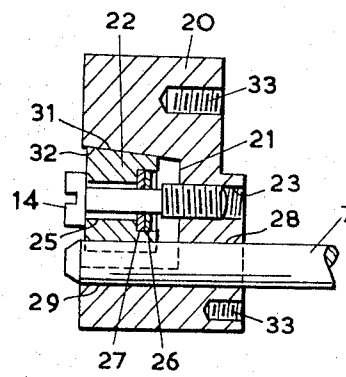


FIG. 3

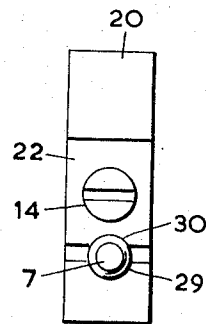


FIG. 4

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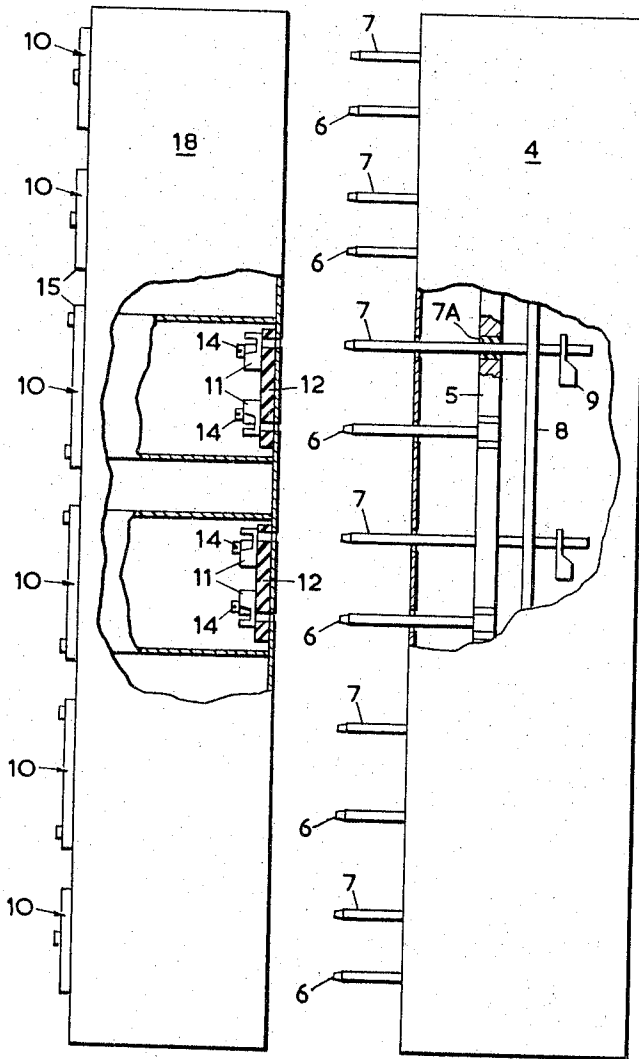


FIG. 2

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ELECTRICAL CONNECTION APPARATUS

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32,253/63

5 Claims. (Cl. 200—166)

The invention relates to electrical connection apparatus. According to the invention, electrical connection apparatus includes, in combination, support means, a plurality of spaced parallel elongated conductors supported from the support means, at least one electrical device, a plurality of terminal devices carried by the electrical device each corresponding with a respective one of the conductors, the support means and the electrical device being relatively movable between a disengaged position and an engaged position, and each terminal device being positioned so that in said engaged position each terminal device receives the corresponding conductor, each terminal device being operable to fasten the received conductor to the terminal device both electrically and mechanically.

Advantageously, the said terminal devices are operable from the front of the electrical device, that is, from the side thereof furthest from the support means when the support means and the electrical device are in the engaged position.

Preferably, the said disengaged position of the support means and the electrical device permits electrical connections to be made to the conductors.

Advantageously, each terminal device includes a terminal block defining a bore for receiving the conductor, a wedge arranged for sliding movement relative to the block with one face engaging a surface on the block and the opposite face engaging the received conductor whereby when the wedge is slidingly moved in one direction it applies a sideways force to the conductor so as to force the conductor into electrical and mechanical engagement with the terminal block, and fastening means for releasably fastening the wedge in the position in which the conductor engages the terminal block.

Preferably, the terminal block defines a recess having sides and a base, the said bore connecting the recess with the side of the terminal block opposite to the recess so that when received, the conductor passes through the bore from the side of the terminal block opposite to the recess and protrudes into the recess closely adjacent to one side thereof, the wedge being movable towards the base of the recess so as to force the conductor into electrical and mechanical engagement with the said one side of the recess.

The electrical device or at least one of the electrical devices includes a fuse switch adapted to make an electrical connection between two of the conductors when they are fastened to the corresponding terminal devices.

Two forms of electrical connection apparatus incorporating the invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a partly sectioned and broken side elevation of one form of the apparatus;

FIG. 2 is a partly sectioned and broken side elevation of another form of the apparatus;

FIG. 3 is a section of a terminal device for use in the apparatus; and

FIG. 4 is a side elevation of the terminal device shown in FIG. 3.

FIG. 1 shows the apparatus as comprising a support means in the form of housing 4 which supports a busbar 5. The busbar carries a number of conductors 6 and means are provided (not shown) enabling an electrical supply to be connected to the busbar. The housing 4 also carries a number of conductors 7. Each conductor 7 is insulated from the busbar 5 by insulation 7A but is to be connected to a corresponding one of the conductors 6 in a manner to be described. The conductors 7 are carried on an insulating support 8. Each conductor 7 carries a terminal 9 to which a cable may be connected so as to connect the electrical supply to an external electrical circuit when the connection is made between the conductor 7 and a conductor 6.

The apparatus also includes a number of housings 10 which are movable into and out of openings in the housing 4 and may be removed altogether.

Each housing 10 includes two terminal devices 11, one for a conductor 6 and one for the corresponding conductor 7. The terminal devices 11 are mounted on an insulating support 12. The housing 10 has two holes 13 positioned in alignment with the conductors 6 and 7 so that when the housing 10 is fully inserted in the appropriate opening in the housing 4, the conductors 6 and 7 protrude through the holes and engage the terminal devices 11. The terminal devices 11 will be described in detail below: however, each device is operable by adjustment of a bolt 14 so as to fasten the appropriate conductor to the terminal device both electrically and mechanically thus securing the conductor to the housing 10. The housing 10 has a cover plate 15 which may be removed to enable the bolts 14 to be adjusted. The housing 10 also contains a switch, which has been omitted from the drawing for clarity, enabling the required electrical connection to be made between the two conductors 6 and 7 after they have been fastened to the terminal devices 11. The switch may be arranged to be operable from outside the housing 10 and may be a fuse switch.

In use, the housings 10 are removed from the housing 4 and connections are made to the terminals 9 as desired. The arrangement permits access for this purpose from the front of the housing 4, that is, through the openings provided for the housings 10. The housings 10 with their cover plates 15 removed are then fully inserted into the openings in the housing 4 and the conductors 6 and 7 pass through the aligned holes 13. The conductors are then fastened by adjustment of the bolts 14. The cover plates 15 are then replaced and the switches in the housings 10 operated to make connections between the conductors 6 and 7 as required.

When it is desired to alter the electrical connections between the external circuits and the conductors 7, the bolts 14 in the appropriate housings 10 are loosened and the housing 10 is removed from the housing 4 thus permitting access to the terminals 9.

In FIG. 2 an alternative arrangement is shown. Parts performing the same function as parts in FIG. 1 have similar references. The housing 4 again carries the con-

ductors 6 and 7. The housings 10 are now fixed in a carrier 18, however, which is movable towards and away from the housing 4. Each housing 10 carries separate terminal devices (not shown) similar to the terminal devices 11 (FIG. 2) for receiving the conductors 6 and 7 and the mode of use is similar to that described with reference to FIG. 1. The carrier 18 may have means at its base permitting the temporary attachment of wheels so that it can more easily be moved.

The arrangement illustrated in FIG. 2 provides even better access to the conductors 6 and 7, and the terminals 9, when the carrier 18 is moved away from the housing 4 than does the arrangement illustrated in FIG. 1. There is no need for access to the rear or sides of the housing 4 to be provided: connections can easily be altered from the front of the housing.

The conductors 6 and 7 may be of round or non-round cross-section.

The terminal devices 11 will now be described with reference to FIGS. 3 and 4. Each device includes a terminal block 20 formed with a recess 21 arranged to receive a wedge 22. The terminal block 20 has a threaded bore 23 which is engaged by the bolt 14 previously mentioned which passes through a clearance hole 25 in the wedge 22. The hole 25 accommodates a captive washer 26 and reinforcing washer 27. The terminal block 20 also has a through hole 28 arranged to be aligned with the appropriate hole 13 in the insulating support 12 in the housing 10 (FIG. 1). When the housing 10 is fully inserted into the housing 4 (FIG. 1), or the carrier 18 abuts against housing 4 (FIG. 2), the appropriate conductor 6 or 7 (conductor 6 is shown in the figures) extends as shown through the hole 28 into the recess 21. The hole 28 is positioned so that the conductor is located closely adjacent to the side 29 of the recess which is curved to receive it. The wedge 22 has a correspondingly curved side 30 (FIG. 4). The recess 21 and the wedge 22 are provided with equally sloping sides 31 and 32 respectively. The terminal block 20 is electrically conductive and is screwed to the insulating support 12 (FIG. 1) by means of screws engaging threaded bores 33.

In operation, when the housing 10 has been fully inserted into the housing 4, or the carrier 18 abuts against the housing 4, so that the conductor extends into the recess 21 as shown, the bolt 14 is tightened forcing the wedge 22 into the recess 21. The sloping sides 31 and 32 cause the wedge 22 to move sideways in the recess so as to apply a sideways force to the conductor gripping it securely between the sides 29 and 30 of the recess and wedge respectively. The conductor is thus fastened securely to the connector block, both electrically and mechanically. Release of the conductor when the bolt 14 is untightened is assisted by the action of the washer 26 which causes the shoulder of the thread on the bolt 14 to lift the wedge out of the recess. The washers 26 and 27 are initially slipped over the thread on the bolt 14 by distorting them.

What we claim as our invention and desire to secure by Letter Patent is:

1. Electrical connection apparatus comprising support means, a plurality of parallel spaced elongated conductors supported by, and protruding from, said support means, mounting means movable relatively to said support means, a plurality of electrical housings secured to said mounting means and having a forward side and a rearward side, a plurality of terminal blocks disposed in each said housing and each defining a recess having an angled side, a screw-threaded bore communicating with the recess and an aperture extending through the block into the recess, said aperture lying in alignment with a corresponding one of said conductors whereby said

terminal blocks are engageable with and disengageable from, one another in response to said relative movement,

a wedge disposed in said recess and having a first side adapted to mate with said angled side and a second side opposite the first side for engaging with the conductor, said wedge further defining a plain bore in alignment with said screw-threaded bore in the block, and

clamping means accessible from the forward side of said housing and selectively operable to force the first side of said wedge into mating contact with said angled side of the recess, whereby to lock the conductor against said second side, and to release the first side from said angled side whereby to unlock the conductor and permit said relative movement between the housing and the support means, the clamping means comprising,

a screw having a small diameter portion extending through said plain bore and a larger diameter screw-threaded portion for threadably engaging the bore in the block, and

a washer captively held about said small diameter portion of the screw and adapted to abut the wedge whereby, upon rotation of the screw in a sense such as to withdraw the screw the said larger diameter portion thereof abuts the washer and positively releases the wedge to unlock the conductor.

2. Electrical connection apparatus comprising support means,

a plurality of parallel spaced elongated conductors supported by, and protruding from, said support means at least one electrical housing movable relatively to said support means and having a forward side and a rearward side,

a plurality of terminal sockets mounted in said housing and positioned in alignment with corresponding ones of said conductors whereby said terminal sockets and conductors are engageable with, and disengageable from, one another in response to said relative movement, each terminal socket comprising

a block defining a recess having an oblique side, a screw-threaded bore communicating with the recess and an aperture extending through the block into said recess for accommodating a said conductor, fastening means associated with each terminal socket and comprising

a wedge disposed in said recess and having a first side mating with said oblique side of the recess and a second side opposite said first side for engaging with the conductor, said wedge defining a plain bore in alignment with said screw-threaded bore in the block, and

screw-threaded means which extends freely through said plain bore and is screwed into said screw-threaded bore in the block, said screw-threaded means being accessible from the forward side of the housing and being selectively operable in a first mode to force the first side of the wedge into mating contact with said oblique side of the recess, whereby to lock the conductor against said second side, and operable in a second mode to release said first side from said oblique side whereby to unlock said conductor and permit relative movement between the housing and support means, said screw-threaded means including a rigid member held captive thereon between the wedge and the base of said recess in the block whereby to assist the release of the first side of the wedge from the oblique side of the block in said second mode of operation.

3. Electrical connection apparatus according to claim 2, wherein said screw-threaded means comprises

a small diameter portion freely extending through the plain bore in the block, and

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- a larger diameter screw-threaded portion for threadably engaging the said screw-threaded bore in the block, said rigid member comprising a washer captively held on said small diameter portion of the screw-threaded means and adapted to abut the wedge.
4. Electrical connection apparatus according to claim 2, comprising mounting means, and means for supporting a plurality of said housings in said mounting means.
5. Electrical apparatus according to claim 2, comprising mounting means, and means securing a plurality of said electrical housings in said mounting means whereby the mounting means

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is movable, together with said housings, relatively to said support means.

References Cited by the Examiner

UNITED STATES PATENTS

2,325,698	8/1943	Millermaster et al. ---	339—270 X
3,015,756	1/1962	Kreekon et al. -----	317—103
3,183,476	5/1965	Sacks et al. -----	339—270 X
3,188,413	6/1965	Netzel -----	200—50.15 X

FOREIGN PATENTS

356,516 10/1961 Switzerland.

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