July 21, 1953 W. V. EAKINS 2,646,018

ELECTRICAL TERMINAL DETECTING SIGNAL

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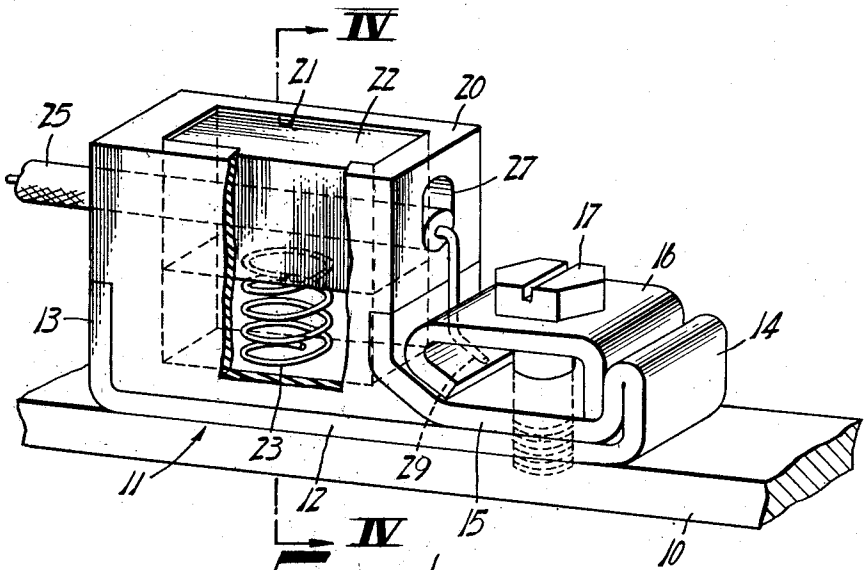


Fig. 1.

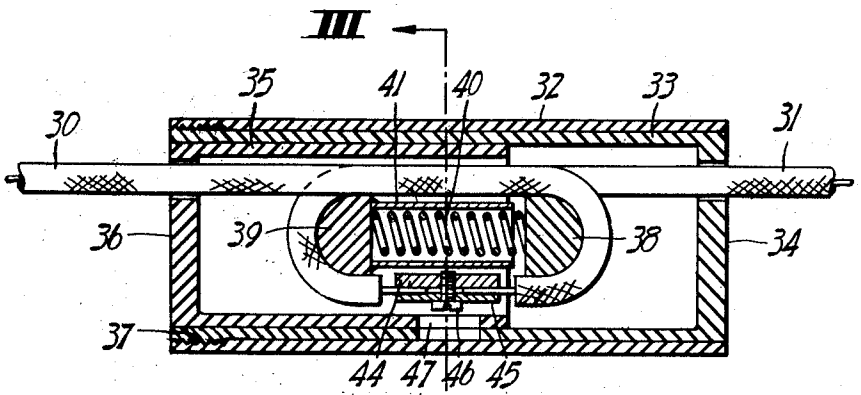


Fig. 2.

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Fig. 3

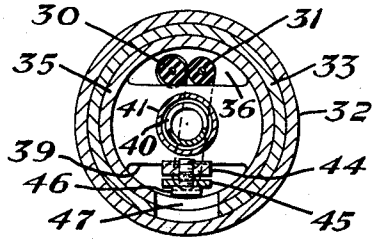
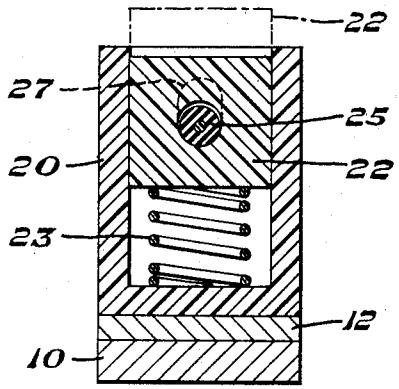


Fig. 4



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ELECTRICAL TERMINAL DETECTING SIGNAL

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8 Claims. (Cl. 116—114)

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This invention relates to electrical connectors and particularly to signaling, warning, or telltale means for quickly locating loose electrical connections.

In conventional electrical terminals where the ends of conductors are held in terminal sockets by set-screws or similar devices or where the conductor ends are otherwise clamped to a terminal device the connection may be loose enough to make a poor contact or no contact at all while the end of the conductor might still appear to be in the socket or other clamp and properly connected, so that the defect would not be apparent on casual inspection. Much time may thus be spent in locating trouble of this nature particularly in the case of extensive electrical panel boards in industrial and like applications.

The device of the present invention provides means whereby a loose terminal may be located by merely scanning an electrical panel board or an aggregation of electrical apparatus or devices. Speaking generally, this is accomplished, in accordance with the principles of the present invention, by providing an electrical connector so arranged that a moderate tension force is exerted on the conductor tending to pull it from the terminal socket. In combination with the tensioning means there is provided a visual signal or telltale which is operable by and upon the disconnecting movement of a loose conductor which signal may readily be located.

By way of example there are disclosed herein two embodiments of the principles of the present invention, one wherein a conductor is held in connection with a terminal as at a panel or the like, and one wherein two conductors are connected to each other in end-to-end relation to form an electrically continuous conductor. It is to be understood that these embodiments are by way of example only, and that many mechanical modifications may be made without departing from the spirit of the present invention, the scope of which is limited only as defined in the appended claims.

In the drawing:

Fig. 1 is a perspective view, partly broken away for added illustration, of one form of the connecting and signalling means of the preesnt invention;

Fig. 2 is a longitudinal cross-sectional view of another form of the connecting and signaling means of the present invention;

Fig. 3 is a cross-sectional view taken approximately on the line III—III of Fig. 2; and

Fig. 4 is a cross-sectional view taken approximately on the line IV—IV of Fig. 1.

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Like characters of reference denote like parts and, referring to Fig. 1, the numeral 10 designates a conducting bar which may be a bus bar or a part of an electrical terminal panel or the like. The numeral 11 designates a metallic strap having a base portion 12 and an end flange 13, an opposite end flange 14, and a return bent portion 15. The return bent portion is of channel formation and is adapted to receive a clip 16 of generally channel formation. A screw 17 threads into bar 10 to retain the strap 11 and the clip 16 in their illustrated assembled position.

Clip 16 further cooperates with strap 12 to engage and clamp the end of an electrical conductor in a manner which will presently be described. A block 20 which may conveniently comprise insulating material such as synthetic resin or the like is rigidly assembled with strap 12 between flange 13 and the end of return bent portion 15 and in production may be molded directly in place on strap 12. Block 20 is provided with a rectangular opening 21 in its upper face in which is assembled for vertical sliding movement a further block of insulating material designated 22. A compression coil spring 23 seats in the bottom of the opening 21 and normally bears against the bottom of insulating block 22.

Block 22 is provided with a longitudinal axial bore for receiving an insulated conductor 25 and the opposite ends of block 20 are provided with openings 27, preferably in the form of vertically elongated slots. Block 22 is a plain rectangular block resting on the top of spring 23 and its longitudinal axial bore is only slightly larger in diameter than the insulated conductor 25 as shows best in Fig. 4.

Conductor 25 is threaded through the slots 27 and the bore in block 22 with block 22 held manually depressed to the approximate position in which it is illustrated in Fig. 1, and the bare end of conductor 25 is then clamped between strap 12 and clip 16 as is clearly illustrated at 29 in Fig. 1. When screw 17 is tight and the end of conductor 25 is firmly gripped, the block 22 is prevented from moving upwardly from the position illustrated in Fig. 1, the upward urge of spring 23 being relatively light and not great enough to materially deform the insulated body portion of conductor 25.

However, if the screw 17 should become loose or if the bare end of the conductor should break near its clamped end 29, the spring 23 will urge block 22 upwardly until the conductor engages the upper ends of the slots 27, which slots are proportioned to properly limit upward movement of the block 22 and its assembled conductor.

This will expose a substantial portion of the upper part of block 22 above the top of block 20. The upper or signaling position of block 22 is indicated in dot-and-dash lines at the top of Fig. 4. Block 22 may be entirely of material of a color contrasting with the color of block 20, or its side walls may be thus contrastingly colored. In either event the exposure of a portion of block 22 above block 20 will thus afford an easily located signal indicating the failure of the electrical connection at that terminal.

Since the screw 17 which provides the wire clamping force also holds the entire clamping device to the bus bar or terminal strip 10, a warning signal will also indicate that the clamping device is not securely fixed to the bus bar or terminal strip.

Referring to the embodiment illustrated in longitudinal cross-section in Fig. 2, the numerals 30 and 31 designate a pair of insulated conductors which are connected in end-to-end conducting relation. The numeral 32 designates an outer protective sleeve of fiber, synthetic resin, or other insulating material. The numeral 33 designates an intermediate telescoping sleeve, likewise of insulating material having an end wall 34. Sleeves 32 and 33 are separable axially but relatively fixed in operation by virtue of a threaded connection which is indicated at 37 in Fig. 2. The numeral 35 designates an inner telescoping sleeve, likewise of insulating material, having an end wall 36. The sleeves 33 and 35 are mounted for axial intersliding movement.

Sleeve 33 has fixed thereto an internal transverse bar formation 38 which may be molded integrally therewith, and inner sleeve 35 is likewise provided with a transverse rigid bar formation 39. A compression coil spring 40 normally urges the bars 38 and 39 away from each other and a supporting and protecting sleeve 41 for spring 40 may be provided. In the present instance sleeve 41 is secured at one end to bar 39 in any desired manner.

The portions of the bars 38 and 39 which face outwardly of the tubular assembly are rounded as shown in Fig. 2, and the conductors 30 and 31 wrap around the bars 38 and 39, respectively, and the bare ends of the conductors 30 and 31 are held between the opposite ends of a pair of clamp plates 44 and 45 by a clamping screw 46 which passes freely through plate 45 and threads into plate 44. The sleeves 33 and 35 are apertured as indicated at 47 to permit access to screw 46 for tightening or loosening the same, outer sleeve 32 being unscrewed and slid endwise out of the way during such operations.

Sleeve 35 is of a contrasting color from that of sleeve 32, or at least its outer peripheral wall is so colored. Accordingly, if either or both of the conductors were to pull out of the clamp assembly due to the screw 46 being loose, or if the wires of the conductors should break off close to the clamp members 44 and 45, the spring 40 would urge the sleeve 35 axially outwardly of the sleeves 32 and 33 and thus expose the colored peripheral portions of sleeve 35 to afford a ready indication of the failure.

What is claimed is:

1. Electrical terminal means comprising a releasable clamp, means adjacent to said clamp engaging against a conductor having its end engaged in said clamp and bearing against said conductor in a direction generally outwardly of said clamp, resilient means urging said engaging means to withdraw the conductor end from said clamp when the clamp is loose, and signal means on said engaging means rendered visible by such movement of the engaging means.

2. Electrical terminal means comprising a releasable clamp adapted to clamp the end portion of an electrical conductor, abutment means adjacent to said clamp with the conductor bent to lie thereagainst, said abutment being movable to withdraw the conductor from the clamp when the latter is loose, resilient means urging said abutment means to so withdraw a conductor, and signal means movable with said abutment means and rendered visible by movement thereof to separate a conductor from its clamp means.

3. Electrical terminal means comprising a releasable clamp, means adjacent to said clamp engaging against a conductor having its end engaged in said clamp and bearing against said conductor to tend to withdraw the conductor from said clamp, and signal means on said engaging means rendered visisble by such withdrawing movement of the engaging means.

4. Electrical terminal means comprising a releasable clamp, means adjacent to said clamp engaging against a conductor having its end engaged in said clamp and bearing against said conductor, resilient means urging said engaging means to tend to withdraw the conductor end from said clamp, and signal means on said engaging means rendered visible by conductor-withdrawing movement of the engaging means.

5. Electrical terminal means comprising a releasable clamp adapted to clamp a pair of electrical conductors in end-to-end relation, a pair of abutment members adjacent to said clamp, resilient means urging said abutment means apart whereby with the clamped conductors wrapped about the abutment means in return bent fashion the abutments tend to withdraw the conductors from the clamp, and signal means movable with said abutment means and rendered visible by movement thereof in withdrawing a conductor from its clamp means.

6. Electrical terminal means comprising a releasable clamp adapted to clamp the end portion of an electrical conductor with the adjacent portion of the conductor extending away from the clamp, abutment means adjacent to said clamp and movable in a direction generally parallel to said adjacent conductor portion, resilient means urging said abutment means in a direction generally away from the clamp whereby when the conductor is bent to lie across the abutment means the latter tends to withdraw the conductor from the clamp, and signal means movable with said abutment means and rendered visible by movement thereof to separate a conductor from its clamp means.

7. Electrical connector means comprising a releasable clamp for connecting the end portions of a pair of electrical conductors in end-to-end relation, a pair of abutments adjacent said clamp and mounted for sliding movement in a direction parallel to the end portions of the conductors, each of said conductors being adapted to extend across one of the abutments, spring means urging said abutments away from each other to exert a disconnecting pull on each of said conductors, and signal means rendered visible by movement of said abutments upon disconnecting movement.

8. Electrical connector means comprising a pair of slidable telescoping sleeves and a releasable clamp therein for connecting the end portions of a pair of electrical conductors in end-to-end relation, a pair of abutments adjacent said clamp

and mounted one on each of said sleeves for sliding movement therewith in a direction parallel to the end portions of the conductors, each of said conductors being adapted to be wrapped across one of the abutments, spring means urging said abutments away from each other to exert a disconnecting pull on each of said conductors, and signal means on one sleeve rendered visible by movement of said abutments upon disconnecting movement.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,605,033	Jensen	Nov. 2, 1926
2,259,261	Miller	Oct. 14, 1941
2,531,147	McFarland	Nov. 21, 1950