

Feb. 22, 1966

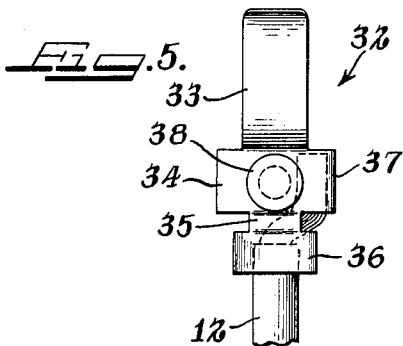
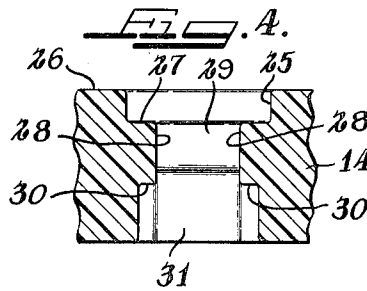
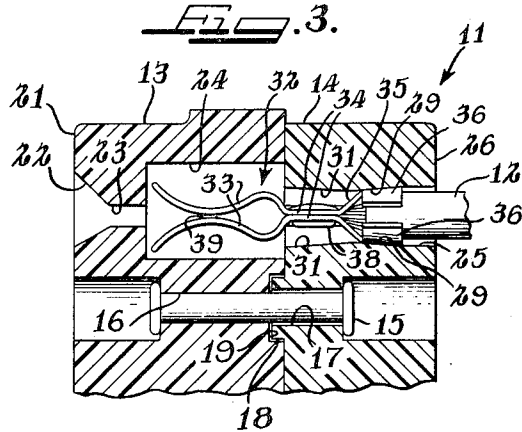
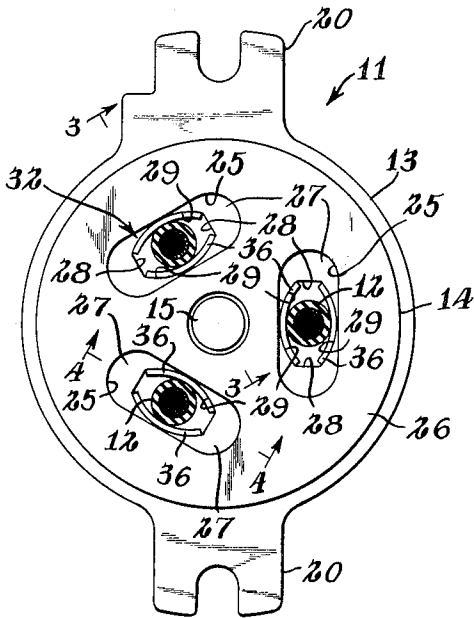
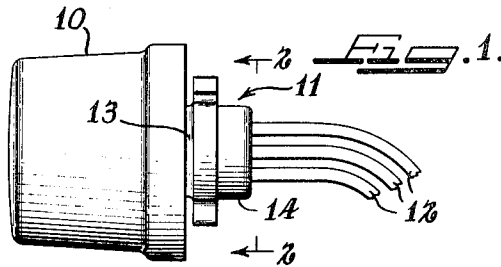
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TERMINAL BLOCKS AND CONNECTORS THEREFOR

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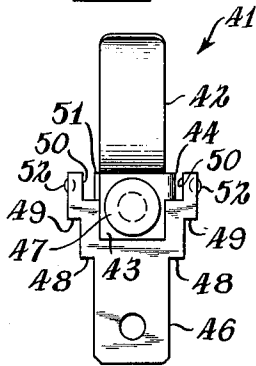
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TERMINAL BLOCKS AND CONNECTORS THEREFOR

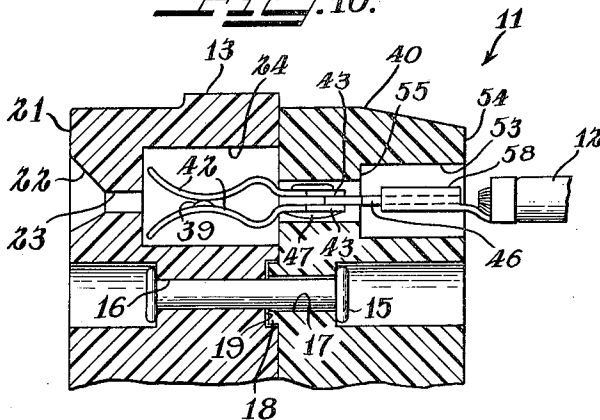
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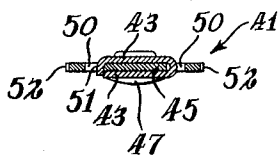
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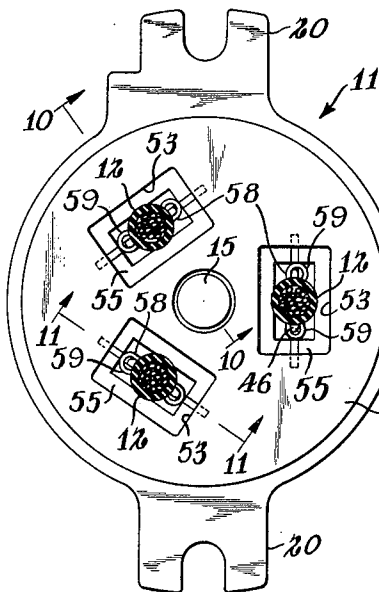
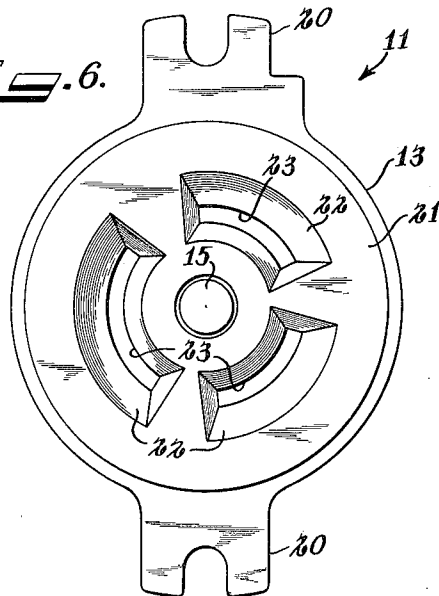
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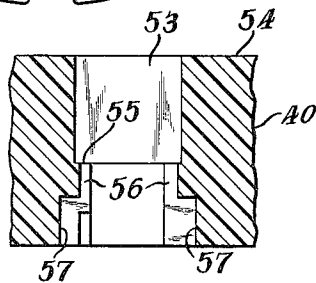
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**3,237,148**  
**TERMINAL BLOCKS AND CONNECTORS**  
**THEREFOR**

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 4 Claims. (Cl. 339-103)

This invention is directed to new and improved terminal blocks of the disconnect type including as parts thereof specially designed and arranged blade and lead connectors.

It is an object of the present invention to provide a new and improved disconnect type terminal block including as a part thereof new and improved terminals or connectors removably mounted in the block and including cooperative design features permitting ready fabrication and assembly of the various components of the connectors and blocks.

Still a further object is to provide new and improved forms of disconnect type terminal blocks especially adapted for use with street light control units permitting ready disconnect mounting and replacement of such units, the blocks including specially designed and arranged control unit blade and lead connectors which also independently constitute a part of the invention.

A further object is to provide new and improved terminal blocks of the type described in the foregoing objects, such blocks being formed from block-like housing portions each including cooperatively aligned openings of special design and arrangement and receiving therein in uniquely assembled relation new and improved forms of double-acting connectors.

An additional object is to provide new and improved forms of terminal-type connectors adapted for use in terminal blocks, such connectors including double-acting blade and lead connections with the lead connections being either of the permanent or disconnect type, the connectors being of unique design for ready and economical fabrication and operative installation.

Other objects not specifically set forth will become apparent from the following detailed description of the invention made in conjunction with the accompanying drawings wherein:

FIG. 1 is a fragmentary elevation of a street light control unit operatively mounted in one form of terminal block forming a part of the invention;

FIG. 2 is an enlarged partly sectioned end elevation of the terminal block of FIG. 1 as viewed generally along line 2-2 therein;

FIG. 3 is a fragmentary transverse section of a portion of the terminal block taken generally along line 3-3 in FIG. 2;

FIG. 4 is a fragmentary section of a portion of one of the block members with the connector removed therefrom as viewed generally along line 4-4 in FIG. 2;

FIG. 5 is a fragmentary elevation of the type of connector forming a part of the terminal block of FIGS. 1-4 and illustrating a lead connected therewith;

FIG. 6 is an elevation of the front face of the terminal block;

FIG. 7 is an elevation of a modified form of connector forming a part of the invention and adapted for use with the terminal block of the invention;

FIG. 8 is a transverse section of the connector of FIG. 7 taken generally along line 8-8 therein;

FIG. 9 is a view similar to FIG. 2 of a modified form of terminal block including as a part thereof the modified connector of FIGS. 7 and 8;

FIG. 10 is a fragmentary transverse section of a portion of the block of FIG. 9 taken generally along line 10-10 therein; and

FIG. 11 is a fragmentary section of one of the connector mounting openings of a block member of the terminal block of FIG. 9 with the connector of FIGS. 7 and 8 removed therefrom, this view being taken generally along line 11-11 in FIG. 9.

Modern controls for street lights include a photoelectric control unit sensitive to natural light conditions prevailing externally of the street light. Such units are of known type and are used extensively to automatically regulate the operation of a specific street light or series of such lights depending upon variations in intensity of natural light. Such a unit is sensitive to a pre-determined natural light intensity to automatically turn on or off the street light or series of such lights.

Toward the interests of reducing installation and replacement time, control units of this type have been designed for connection in the street light control circuit through terminal blocks. FIG. 1 generally illustrates a photosensitive street light control unit 10 which is mounted through a plurality of blades (not shown) forming a part thereof to a terminal block 11 of the type constituting a part of the present invention. The terminal block 11 is adapted to be fixedly mounted in a street light structure or suitable separate control device with a plurality of electrical leads 12 extending therefrom and constituting a part of the street light operational control circuit. Upon the necessity for replacement of the photosensitive control unit 10, it is necessary merely to disconnect the same from the fixedly mounted terminal block 11 without disturbing any of the connections of the control circuit including the leads 12 and block 11. Operative mounting of a replacement photosensitive control unit is just as readily obtained by quick connection of the same through insertion of the exposed blades thereof into appropriate apertures or openings forming a part of the terminal block 11 and of the type to be described.

Referring particularly to FIGS. 1-3 and 6, the terminal block 11 is formed generally from two block or housing portions 13 and 14, these housing portions being suitably interconnected by a centrally located rivet 15 extending through aligned apertures 16 and 17 (FIG. 3) of the housing portions 13 and 14 respectively. The outer ends of the apertures 16 and 17 are counterbored to accommodate the enlarged opposite end heads of the rivets 15 and to recess the same substantially within the housing portions to prevent inadvertent damage thereto. The inner surfaces of the housing portions 13 and 14 and in mutual engagement as best shown in FIG. 3 and one of the housing portions includes an annular boss 18 received in a circular recess 19 formed in the engaging face of the other housing portion to provide for proper centering of the housing portions 13 and 14 relative to one another.

The housing portion 13 as best shown in FIGS. 3 and 6 includes a pair of oppositely directed mounting ears 20 provided to permit ready fixed mounting of the terminal block 11 in its permanent operative position. An outer end surface 21 of the housing portion 13 has formed therein a plurality of arcuate slot-like blade insertion openings 22 which are of reduced width inwardly from the outer surface 21 and terminate in narrow arcuate portions 23 substantially inwardly from the outer surface 21. The slot-like portions 23 are each in communication with an enlarged opening 24 communicating with the rear face of the housing portion 13 and being of substantially larger than the slot-like portions 22 and 23. The known type of photoelectric control unit 10 described above in-

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cludes arcuately shaped blades (not shown) which are readily received in the slot portions 22 and 23 to become inserted within the openings 24 arranged along the rear face of the housing portion 13.

Referring particularly to FIGS. 2-4, the housing portion 14 includes a plurality of spaced openings 25 which extend completely therethrough from the outer rear surface 26 of the housing portion to the inner end face which is in engagement with the adjacent end face of the housing portion 13. Each opening 25 inwardly of the outer surface 26 of the housing portion 14 is provided with a stepped-in shoulder portion 27 defined by oppositely positioned flat end walls 28 and concave side walls 29. As best shown in FIG. 3, the concave side walls 29 are inclined toward one another in a direction axially inwardly of the opening 25. The remaining portion of each opening 25 communicating with the inner face of the housing portion 14 is enlarged to define oppositely positioned shoulders 30 (FIG. 4) with intermediate side wall portions 31 being of concave configuration and being inclined away from one another toward the inner face of the housing portion 14 as best shown in FIG. 3. The openings 25 of the housing portion 14 are aligned with the enlarged openings 24 of the housing portion 13 and cooperatively receive therein a combination blade and lead connector 32 forming a part of the invention.

The connector 32 as best shown in FIGS. 3 and 5, is formed from a pair of face-to-face resilient strip members each of which includes a reversely bowed spring finger 33 integrally formed therewith in oppositely directed relation an intermediate neck portion 35 and an arcuate lead clamping skirt 36. The strip members are transversely interconnected by a continuous web 37 integrally interconnecting adjacent axial edges of the base portions 34. The strip members are cut and shaped from a single piece of conductive resilient metallic material and are folded toward one another into engaging face-to-face relation by reason of the web 37 and are ultimately secured in final operative relation by a suitable fastener, such as a rivet 38, extending centrally through the flat base portions 34.

A lead 12 has the insulating sheathing thereof clamped between the cooperating skirts 36. The bare wire strands in grouped relation extend between the inclined connecting neck portions 35 and between the base portions 34 to one side of the rivet 38 confined between the same and the web 37. Attachment of the lead 12 is brought about during folding of the pair of strip members into face-to-face relation by reason of the web 37 and prior to the application of the rivet 38. The bare wire strands of the lead 12 are grouped next to the connecting web 37 and with the application of the rivet 38 through the central portion of the combined base portions 34, the sheathing of the lead 12 is automatically clamped between the skirts 36 and the bare wire strands are automatically clamped between the base portions 34 without the rivet 38 severing the same.

The connector 32 with its attached lead 12 is operatively mounted in the housing portion 14 before the latter is permanently fixed to the housing portion 13. This is accomplished by the threading of the opposite end of the lead 12 through an opening 25 starting from the inner face of the housing portion 14 in a direction toward the outer surface 26 thereof. The skirts 36 are of arcuate shape as best shown in FIG. 2 to provide a transverse convex outer surface. The skirts 36 are also preferably axially outwardly divergently inclined toward the outer ends thereof, as best shown in FIG. 3, to provide for a complete wedging action thereof between the inwardly inclined wall surfaces 29 of the opening 25.

As the lead 12 including the attached connector 32 is pulled through the opening 25 in a direction toward the outer end surface 26, the skirts 36 become progressively wedged between the outwardly diverging wall surfaces 31. The skirts by reason of being formed from resilient ma-

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terial move toward one another in tight compressive relation against the lead 12. Continued pulling of the lead 12 results in ultimate positioning of the skirts 36 in engagement with the oppositely inclined wall surfaces 29 and the skirts then spring outwardly into their final position of assembly.

During insertion of the connector 32 into the opening 25, the projecting side margins of the base portions 34 including the web 37 are received in the slots defined by the shoulders 30 of the housing portion 14. The registering of the projecting shoulders of the base portions 34 in these slots provide for proper positioning of the connector 32 in the opening 25 and ultimately result in abutment with the shoulders 30 to limit the extent to which the connector is introduced into and through the opening 25. The wedging engagement of the skirts 36 with the wall surfaces 29 aid in preventing displacement of the connector 32 in a direction toward the housing portion 13 as viewed in FIG. 3. Abutment of the shoulders of the base portions 34 against the shoulders 30 of the housing portion 14 prevents displacement of the connector 32 in a direction toward the outer end surface 26 of the housing portion 14. The tight wedging action occurring between the skirts 36 and wall surfaces 29 also provides for tight clamping of the sheathing of the lead 12 to prevent separation thereof from the wire strands which it insulates and protects.

FIG. 3 illustrates final operative mounting of a connector 32 and lead 12 in an opening 25 in the housing portion 14. It will be noted that the cooperating spring fingers 33 of the connector 32 substantially fill the enlarged opening 24 extending inwardly from the rear face of the housing portion 13. This feature further aids in preventing displacement of the connector 32 from its mounting in the housing portion 14 as a result of frictional grab between the spring fingers 33 thereof and a blade of the control unit 10 inserted therebetween through the cooperating slot-like openings 22 and 23. One of the spring fingers 33 preferably is formed with an enlargement 39 along the inner surface thereof which not only provides wiping action on a blade inserted between the spring fingers but also may be useful in providing a positive locking means in the event that the configuration of blades used in the control unit 10 provide for the known type of twist-lock action.

FIGS. 7-11 illustrate a modified form of connector and the manner of mounting the same in a terminal block of the type previously described involving the use of a slightly modified housing portion 40. Similar elements and parts of the terminal block involving the modifications will be identified by the same reference numerals.

As shown in FIGS. 7 and 8, the modified connector 41 is formed from a pair of cooperating reversely bowed spring fingers 42 having integrally formed therewith flat base portions 43 which are interconnected through a transverse web 44 integrally formed therewith along adjacent side margin portions. The web 44, as best shown in FIG. 7, does not extend the full length of the base portion 43. The base portions 43 have received therebetween in clamped relation a flat end portion 45 of a lead connector tab 46. The two separate elements, namely the spring fingers 42 and tab 46 are interconnected by a rivet 47 extending through the overlying base portions 43 and intermediate end portion 45 of the tab 46.

The tab 46 is formed with a first pair of oppositely positioned outwardly projecting shoulders 48 and a second pair of further outwardly projecting oppositely positioned shoulders 49. The end portion 45 is defined by the provision of a pair of axially inwardly extending slots 50 located inwardly of the opposite side margins of the tab 46 adjacent the shoulders 49. The web 44 is received within one of the slots 50 as best shown in FIG. 8 and is in engagement with the base of the slot to rigidify the connection of the spring fingers 42 with the tab 46 and prevent relative movement between the same. If desired, one of

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the base portions 43 along the free side margin thereof may be formed with a flange-like extension 51 which is crimped or folded to be received in the remaining slot 50 in engagement with the base thereof to further stabilize the interconnection of the spring fingers 42 and tab 46. The free outer axial edges of the shoulder portions 49 will also preferably be formed with nub-like projections 52 to become embedded in the material of the terminal block housing portion 40 when the connector 41 is operatively mounted therein as illustrated in FIGS. 9 and 10.

The housing portion 13 is of the type previously described and as illustrated in FIG. 6. The cooperating spring fingers 42 are received in an enlarged opening 24 of the housing portion 13. Also, one of the spring fingers 42 may be provided with a bead-like projection 39 for the purposes previously described.

The housing portion 40 is modified only with regard to the configuration of the plurality of openings 53 formed therein in alignment with the openings 24 of the housing portion 13. FIG. 9 illustrates each opening 53 as including an enlarged rectangular outer end portion communicating directly with the outer end surface 54 of the housing portion. The opening 53 approximately centrally of the housing portion 40 is formed with a rectangular inwardly directed shoulder portion 55 which along opposite ends thereof is axially slotted as indicated by the numeral 56 in FIG. 11. The slots 56 are further formed with radially directed sub-slots 57 communicating with the inner surface of the housing portion 40 which is placed in engagement with the adjacent surface of the housing portion 13 and terminating substantially short of the innermost ends of the slots 56.

The connector 41 is inserted into an opening 53 in the housing portion 40 with the tab 46 thereof being first introduced in a direction starting from the inner face thereof toward the outer end surface 54. The shoulder portions 48 and 49 are aligned in the communicating slots 56 and 57 and introduction of the connector 41 continues until the shoulders 49 engage the innermost ends of the slots 57. This engagement provides means whereby the connector 41 cannot be inadvertently withdrawn through the housing portion 40 in a direction toward the outer end surface 54. Preferably, the projections 52 are provided as previously described and such projections become embedded in the adjacent surfaces of the housing portion 40 to fixedly lock the connector 41 in the opening 53.

The final positioning of the connector 41 in the opening 53 as best illustrated in FIG. 10 results in the tab 46 being centrally located in the rectangular enlarged portion of the opening 53 directly in communication with the outer surface 54. The tab 46 is fully protected within the enlarged opening 53 but is readily accessible for frictional engagement with a known type of lead connector 58 suitably electrically connected to an end of a lead 12. FIG. 9 illustrates each lead connector 58 as including arcuately inwardly folded side margins 59 which overlap the edges of the tab 46 and clamp the same in sliding tight frictional engagement to electrically interconnect the lead 12 therewith.

Each of the connectors 32 and 41 of the present invention are of similar type in that they provide oppositely directed blade and lead connection means. The connectors 32 and 41 are readily and inexpensively formed from resilient electrically conductive material. The fastener-type connection of the various components of the connectors provides a means of ready and efficient final assembly, and in the case of the connector 32 provides a means whereby simultaneous lead connection is efficiently obtained. In the case of the connector 41, the fastener connection of the elements thereof permits mutual interaction of the elements not only electrically but mechanically to prevent lateral relative movement between the spring fingers 42 and the tab 46. The connector 32 provides permanent lead connection while permitting disconnect blade

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connection whereas the connector 41 provides both disconnect blade and lead connection. Each of the housing portions described may be readily formed from moldable plastic material and final assembly of the terminal blocks can be readily and efficiently obtained.

Obviously certain modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A combination blade and lead connector for use in a terminal block, said connector comprising a pair of elongate resilient strip members with each member including a bowed spring finger interconnected by a flat base portion to a transversely arcuate lead clamping skirt, each pair being interconnected through a longitudinally extending web portion formed integral with the base portions and defining therewith oppositely directed shoulder means, said strip members being folded one upon the other through said web portion with a lead end clamped between said base portions at said web portion, said spring fingers and skirts in opposed relationship.

2. A combination blade and lead connector for use in a terminal block, said connector comprising a pair of elongate resilient strip members with each member including a bowed spring finger interconnected by a flat base portion to a transversely arcuate lead clamping skirt, each pair being interconnected through a longitudinally extending web portion formed integral with the base portions and defining therewith oppositely directed shoulder means, said strip members being folded one upon the other through said web portion with a lead end clamped between said base portions and said spring fingers and skirts in opposed relationship, and rivet means extending through said base portions with said lead end further confined between said rivet means and web portion.

3. A combination blade and lead connector for use in a terminal block, said connector comprising a pair of elongate resilient strip members with each member including a bowed spring finger interconnected by a flat base portion to an arcuate lead clamping skirt, each pair being interconnected through a longitudinally extending web portion formed integral with the base portions and defining therewith oppositely directed shoulder means, said strip members being folded one upon the other through said web portion with a lead end clamped between said base portions at said web portion, said spring fingers and skirts in opposed relationship, each of said lead clamping skirts being transversely arcuate to provide a convex outer surface which is also axially outwardly inclined toward the end thereof for wedging action against sheathing forming a part of the lead.

4. A terminal block comprising a pair of block-like housing portions inclosing therein a plurality of combined and oppositely directed blade and lead connectors, one of said housing portions including a plurality of spaced openings extending therethrough with each opening receiving therein a connector, the other of said housing portions including a plurality of spaced openings extending therethrough with each opening comprising an enlarged blade-receiving portion communicating with a slot-like blade-insertion portion, means interconnecting said housing portions with the openings thereof in alignment, each of said connectors comprising a pair of cooperating blade-clamping spring fingers at one end thereof centrally positioned in the blade-receiving portion of an opening of said other housing portion, a relatively flat central portion connected with said spring fingers centrally received in a portion of an opening of said one housing portion which opening portion includes oppositely paired laterally inwardly projecting shoulder means in engagement with cooperating oppositely outwardly projecting shoulder means of said connector to prevent displacement of said connector through the opening on said

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one housing portion away from said other housing portion, and lead attachment means connected with the central portion of said connector and projecting rearwardly therefrom and centrally confined within the remainder of the opening of said one housing portion, the slot-like blade-insertion portion of each opening of said other housing portion confining a connector in said block against displacement through said other housing portion, each connector including a pair of resilient strip members with each member including a bowed spring finger interconnected by a flat base portion to an arcuate skirt for clamping the insulation on a lead therebetween, each pair being interconnected through a transverse web portion formed integral with the base portions and defining therewith oppositely directed shoulder means, said strip members being folded one upon the other through said web portion with a lead end clamped between said base portions, said base and web portions defining said central portion.

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