

July 3, 1962

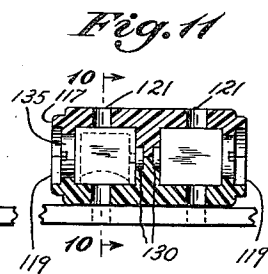
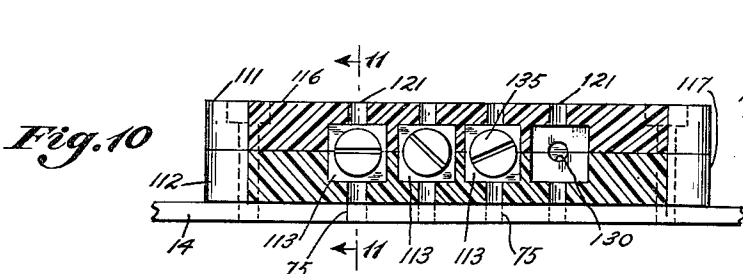
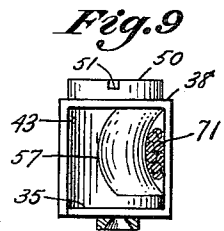
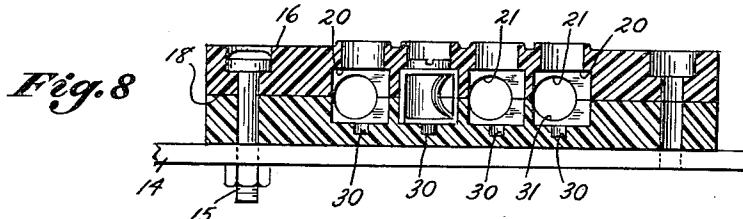
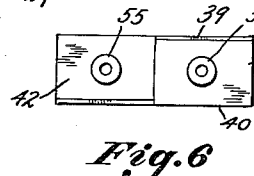
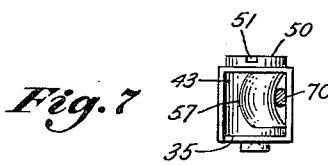
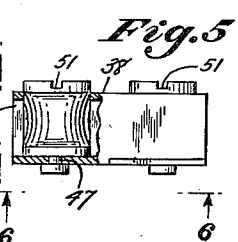
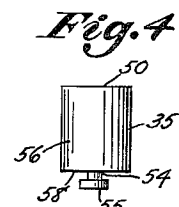
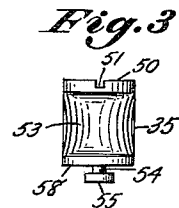
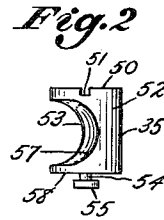
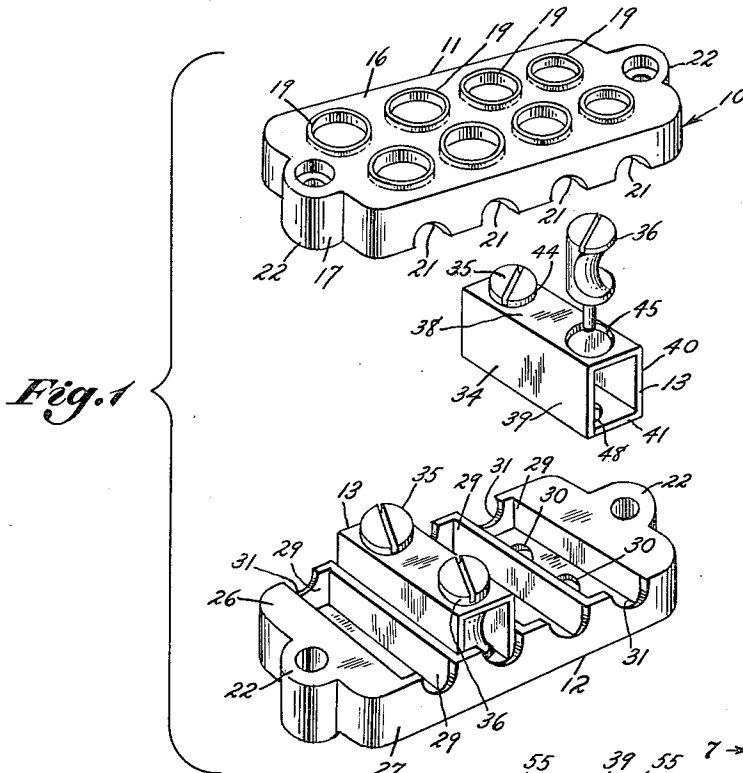
B. DOKTOR

3,042,896

TERMINAL BLOCK CONSTRUCTION

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B. DOKTOR

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Fig. 12

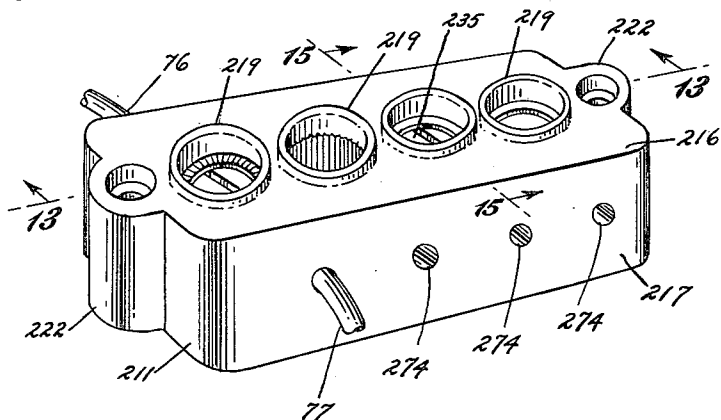


Fig. 13

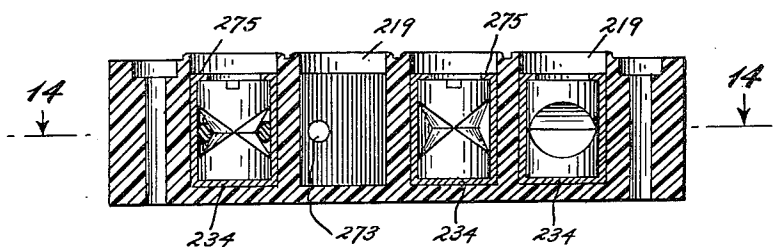


Fig. 14

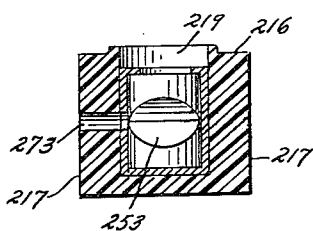
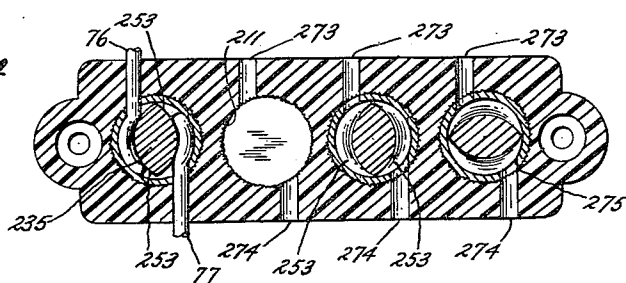


Fig. 15

Fig. 16

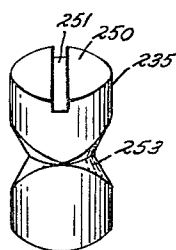
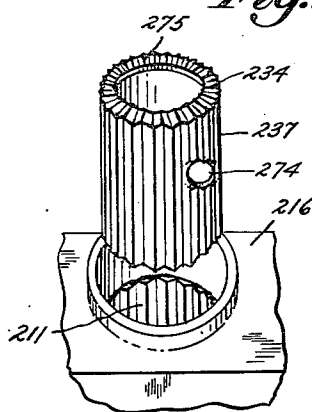


Fig. 17



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3,042,896

TERMINAL BLOCK CONSTRUCTION

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9 Claims. (Cl. 339-198)

This invention relates generally to the field of electrical conductor securing devices, and more particularly to an improved terminal block construction which permits the electrical and mechanical attachment of the ends of electrical conductors in a secure and rapid manner.

With the increasing complexity of electric and electronic devices requiring large numbers of electrical connections, a substantial amount of time must be devoted to the engagement of conductors in predetermined positions on buss bars, terminal blocks and the like. Where conventional methods of securing the conductors in position are used, it is necessary to solder or clamp on to the end of the conductor a bifurcated lug following which a screw or other threaded device is turned through a substantial number of revolutions to firmly grip the soldered lug. This procedure is unnecessarily time consuming, and materially slows the assembly of the device during manufacture, as well as the disassembly of the same during servicing operations. This procedure is also costly in that the lugs which cost approximately a cent a piece can be completely eliminated by a device which renders their presence unnecessary. Thus, it is possible not only to eliminate the labor of installing the lugs upon the end of a conductor, but to eliminate the cost of the lugs themselves.

It is therefore among the principal objects of the present invention to provide an improved terminal block construction in which threaded means for gripping the end of a conductor have been eliminated together with the necessity of soldering a lug upon the same, to be substituted by a wedging construction which requires substantially less than a single turn to move the same from engaged to disengaged condition.

Another object of the invention lies in the provision of an improved terminal block construction in which a single size of the same may be employed to engage a wide variety of sizes of conductors without adaptation or adjustment.

A further object of the invention lies in the provision of improved terminal block construction in which the cost of fabrication may be of reasonably low order, with consequent wide sale, distribution, and use.

Still another object of the invention lies in the provision of terminal block construction possessed of the above enumerated advantages, in which only ordinary tools are necessary for convenient manipulation during the engagement and disengagement of the end of a conductor.

These objects, as well as other incidental ends and advantages, will become more clearly apparent during the course of the following disclosure, and be pointed out in the appended claims.

On the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIGURE 1 is an exploded view in perspective showing a first embodiment of the invention.

FIGURE 2 is an enlarged view in elevation showing

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one of the wedge members comprising a part of the embodiment.

FIGURE 3 is a similar side elevational view showing the wedge member of FIGURE 2 rotated through substantially a right angle.

FIGURE 4 is a similar view in elevation showing the side opposite that seen on FIGURE 3.

FIGURE 5 is a side elevational view, partially in section, showing a completed conductor engagement element.

FIGURE 6 is a bottom plan view of a conductor engagement element.

FIGURE 7 is an elevational view as seen from the plane 7-7 on FIGURE 5.

FIGURE 8 is a vertical central longitudinal sectional view of a completed embodiment mounted upon a plate in well known manner.

FIGURE 9 is an elevational view, corresponding to that seen on FIGURE 7, but showing the device in use with a stranded wire conductor.

FIGURE 10 is a vertical longitudinal sectional view of a second embodiment of the invention, as seen from the plane 10-10 on FIGURE 11.

FIGURE 11 is a vertical transverse sectional view as seen from the plane 11-11 on FIGURE 10.

FIGURE 12 is a view in perspective showing a third embodiment of the invention.

FIGURE 13 is a vertical longitudinal sectional view as seen from the plane 13-13 on FIGURE 12.

FIGURE 14 is a horizontal longitudinal sectional view as seen from the plane 14-14 on FIGURE 13.

FIGURE 15 is a vertical transverse sectional view as seen from the plane 15-15 on FIGURE 12.

FIGURE 16 is a view in perspective showing a wedging member employed in the third embodiment.

FIGURE 17 is a fragmentary exploded view in perspective of the third embodiment.

In accordance with the first embodiment of the invention as seen on FIGURES 1 to 9, inclusive, the device, generally indicated by reference character 10, comprises broadly, an upper body element 11, a lower body element 12 and a plurality of conductor engagement elements 13. The elements 11 to 13 are normally maintained in an assembled condition as shown on FIGURE 8, and may be mounted upon a plate 14 by screw means 15 in well known manner, the plate 14 being a portion of the casing or chassis of any electrical device (not shown).

The upper body element 11 is preferably molded to the configuration best seen on FIGURE 1 of suitable synthetic resinous material, as for example phenol resins, polyethylene or the like. It is bounded by an upper surface 16, a peripheral edge surface 17 and a lower surface 18. A plurality of circular bores 19 which are arranged in pairs extend downwardly from the upper surface 16 and communicate with a plurality of rectangular cavities 20 in which the conductor engagement elements 13 are positionable. A plurality of openings 21 extends inwardly from the peripheral edge surface 17, the same cooperating with similar openings on the lower body element 12 to provide means for the insertion of a conductor. The mounting tabs 22 may be of conventional type including counter sunk bores 23 engageable by the screws 15 in well known manner.

The lower body element 12 is generally symmetrical with respect to the upper body element 11, and includes

an upper surface 26, a peripheral edge surface 27, rectangular cavities 29 corresponding in position with the cavities 20 of the upper body element 11. Extending downwardly from the lower surface of the cavities 29 are circular sockets 30 in which portions of the conductor engagement elements are positionable. The openings 31 cooperate with the above described openings 21 to form a substantially circular opening when the device is assembled, and it will be observed that the same are preferably offset with respect to the principal longitudinal axis of the cavities 20 and 29 to prevent the insertion of an end of a conductor in an improper manner.

The conductor engagement elements 13 are substantially similar, and accordingly, a description of one of such elements will serve to describe all.

The elements 13 include a rectangularly shaped shell member 34 in which first and second wedging members 35 and 36 respectively, are rotatably mounted.

The shell member 34 includes an upper planar member 38, a pair of side planar members 39 and 40 as well as first and second partial bottom members 41 and 42, respectively. As best seen on FIGURES 5, 7 and 9 the members 33-42 form a rectangularly shaped enclosure generally indicated by reference character 43. The upper planar member 38 is provided with first and second circular orifices 44 and 45, respectively, while the partial bottom members 41 and 42 are each provided with a coaxially disposed smaller orifice 47 and 48. It will be observed that the partial bottom members 41 and 42 form a staggered joint insuring continuity of material which supports the wedging members engaged therewith on the side of the shell member which exerts a compressive force upon a conductor, thereby preventing distortion of the shell member when the device is engaged with a conductor.

The first and second wedging members 35 and 36 are also substantially similar, each being generally cylindrical in configuration, and having an upper surface 50 in which there is formed a slot 51 or other means for engaging a screwdriver or similar driving tool (not shown). The cylindrical surface 52 extends only partially about the body of the same, which is also provided with a curved indented wedging surface 53. The wedging surface 53 and cylindrical surface 52 meet in a continuous curved line generally indicated by reference character 57. Extending downwardly from the lower surface 58 is a supporting shaft 54, a portion 55 of which is enlarged by staking after the same has been inserted into one of the orifices 44-45 in one of the partial bottom members 41 and 42.

Referring to FIGURES 7 and 9, it will be observed that the diameter of the wedge members 35 and 36 is such as to afford only minimum clearance when rotating with respect to the inner surfaces of side planar members 39 and 40.

The device is assembled as seen on FIGURE 8 in which the individual conductor engagement elements 13 are positioned within aligned pairs of cavities 20 and 29 in such manner that the upper surfaces 50 thereof are positioned within the bores 19 and the staked portions 55 extend into the sockets 30. The assembled device is then secured to the plate 14 or other suitable supporting means, following which the ends of conductors, generally indicated by reference character 70, may be inserted into the openings 21-31 to be secured therein. In the initial position, the wedge members are aligned such that the slots 51 are disposed transversely with respect to the principal axis of the device, which positioning aligns the wedging surface 53 to permit passage of the conductor. After insertion, the wedge members 35-36 are rotated to bring the innermost portion of the edge 57 in contact with the side of the conductor. During this rotation, the conductor is forced against the inner surface of one of the side planar members 39-40 thus assuring a proper electrical contact. Any tension exerted

upon the conductor merely serves to tighten the grip exerted upon the same between the inner surface of the side wall member and the edge 57, so that the engaging action provides a self-tightening function. In the case of the single conductor as shown on FIGURE 7, a biting action partially flattens the same, whereas in the case of a stranded conductor as shown on FIGURE 9 and indicated by reference character 71 the entire cross sectional shape of the same is distorted to conform to the edge 53. Since rotation to the point where the wedging surface has completely passed the inner surface of the side planar member results in completely closing the opening through which a conductor may be inserted, the same wedge member may be employed for conductors of diameter varying from the maximum width permitted by the available space to the smallest conductor commercially manufactured without any adjustment being necessary.

Turning now to the second embodiment of the invention shown on FIGURES 10 and 11, parts corresponding to those of the first embodiment have been designated by similar reference characters with the additional prefix "1."

The second embodiment of the invention differs from the first embodiment thereof principally in the repositioning of the conductor engagement elements 113 within the upper and lower body elements 111 and 112 respectively, such that conductors may be inserted through openings 75 in the plate 14 or other support. Here, the individual conductor engagement elements 113 are provided with only a single wedge member 135 which is operated from the peripheral surface 117 of the integrated body elements.

Turning now to the third embodiment of the invention shown in FIGURES 12 to 17, inclusive, parts corresponding to those of the first embodiment have been designated by similar reference characters with additional prefix "2."

The third embodiment differs from the first embodiment principally in the provision of a single body element 211 in which a plurality of shell members 234 are molded. The shell members 234 are of cylindrical configuration and are provided with a serrated outer surface 237 which locks the individual shell members in position within the body element 211. The body element 211 and individual shell members 234 are provided with a pair of continuous bores 273 and 274, and the upper edge 275 is headed over as best seen on FIGURE 17 to retain the wedge members 235 therein. Instead of a single wedging surface, a pair of wedging surfaces 253 are provided to operate in conjunction with each of the pair of conductors 76, 77 engaged by the single wedging member 235. To assure even wedging action, the wedging members 235 are not anchored in any way within the cylindrical shell members 234, other than the heading over operation above described. Thus, when the wedging member is rotated to engage the pair of conductors, any slight difference in diameter of the same may be compensated for.

The converging wedging surfaces 253 of the third embodiment may be employed to replace the single wedging surface in the first embodiment where single conductors are being engaged. By using a pair of wedging surfaces which form a V-shaped opening in which the conductor is disposed, compression upon the conductor occurs at three sides rather than two sides as is the case in the first embodiment, which gives a superior engagement on single conductors not only from the standpoint of a mechanical grip, but from decreased electrical resistance and improved conductance. In most cases, it is preferable to use this form of wedge member, except where increased capacity for several conductors is required.

The third embodiment is particularly useful where it is desired to engage a pair of conductors coming from op-

posite directions using only a single wedging member. The third embodiment is also useful where a solid rather than a stranded conductor is employed by virtue of the fact that the pair of surfaces 253 permit the exertion of pressure at three points upon the outer surface of the same, rather than two as is the case in the first embodiment.

It may thus be seen that I have invented novel and highly useful improvements in terminal block construction in which means is provided for the quick engagement and disengagement of the terminals of electrical conductors with a convenience and speed heretofore unknown in the prior art. Owing to the particular configuration of the wedge members employed, each individual wedge member is adapted to secure a plurality of conductors simultaneously which may vary in size from the smallest possible gauge to the largest which may be inserted in the space formed between the shell member and the wedge member in disengaged position. The conductors, once engaged, are maintained in a self-tightening relation such that any tension applied to the conductor serves merely to tighten the engagement within the device. By resort to mass-production techniques known and existing in the art, the cost of production of the inventive structure need be no greater than that involved in the manufacture of conventional devices, and the saving in labor costs in the assembly of electrical devices with which the inventive device is employed more than compensate for a substantial part of the manufacturing cost. No special tools are required in using or assembling the inventive device, thus permitting electrical equipment employing the device to be readily disassembled where required with a minimum effort on the part of the user.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. A terminal connector comprising a contact wall, a circular cylindrical lock member including end faces and rotatably supported about its central longitudinal axis substantially parallel to the plane of said contact wall and being substantially tangent thereto, said lock member having formed in its peripheral face a circumferentially extending groove having a base substantially along a plane perpendicular to said longitudinal axis and of substantially smooth curved continuously varying depth, substantially from the peripheral surface of said lock member to a depth not exceeding the radius thereof, said lock member being rotatable to bring successive portions of said groove into confronting relationship with said contact wall to delineate a passageway therewith of varying cross-section, and means connected to said lock member for rotating said lock member.

2. A terminal connector comprising a longitudinally extending contact wall, a second wall opposing said contact wall, a circular cylindrical lock member including end faces and rotatably supported about its central longitudinal axis substantially parallel to the plane of said contact wall and being substantially tangent to said contact wall and said second wall, said lock member having formed in its peripheral face a groove having a base substantially symmetrical to a plane perpendicular to said longitudinal axis and of substantially smooth curved continuously varying depth substantially from the peripheral surface of said lock member to a depth not exceeding the radius thereof, said lock member being rotatable to bring successive portions of said groove into confronting relationship with said contact wall to delineate a passageway therewith of varying cross-section, and means connected to said lock member for rotating said lock member.

3. A terminal connector comprising a longitudinally extending metal tube of substantially rectangular cross-

section including top and bottom walls and a contact defining first side wall and an opposing parallel second side wall, a circular cylindrical lock member disposed in said tube and journaled about its central longitudinal axis to said top and bottom walls, said lock member having a peripheral face substantially tangent to said first and second side walls, and having formed thereon a groove having a base substantially symmetrical to a plane perpendicular to said longitudinal axis and of substantially smooth curved continuously varying depth substantially from the peripheral surface of said lock member to a depth not exceeding the radius thereof, said lock member being rotatable to bring successive portions of said groove into confronting relationship with said contact wall to delineate a passageway therewith of varying cross-section, and means connected to said lock member for rotating said lock member.

4. A connector according to claim 3 including a housing formed of an electrically insulating material surrounding said tube and having openings formed therein providing access to the end openings in said tube.

5. A connector according to claim 1 including a casing of insulating material housing said contact wall and lock member and having an opening formed therein in alignment with said delineated passageway.

6. A terminal connector comprising a longitudinally extending metal tube of substantially rectangular cross-section including top and bottom walls and a contact defining first side wall and an opposing parallel second side wall, a pair of transversely spaced parallel circular cylindrical lock members disposed in said tube and journaled about their central longitudinal axes to said top and bottom walls, each of said lock members having a peripheral face substantially tangent to said first and second side walls and having formed therein a groove having a base substantially symmetrical to a plane perpendicular to said longitudinal axis and of substantially smooth curved continuously varying depth substantially from the peripheral surface of said lock member to a depth not exceeding the radius thereof, said lock member being rotatable to bring successive portions of said groove into confronting relationship with said contact wall to delineate a passageway therewith of varying cross-section, and means connected to said lock member for rotating said lock member.

7. A terminal connector according to claim 6 wherein said tube is formed of a metal blank including a top wall defining panel, a pair of side wall defining panels depending from opposite side edges of said top panel, and bottom wall defining longitudinally spaced panels directed inwardly from the bottom edges of corresponding side wall panels to the bottom edges of the opposite side walls and having confronting transverse edges.

8. A connector according to claim 6 including a casing of insulating material housing said tubular member and having formed therein openings in alignment with said delineated passageways and openings providing access to the top of said tube.

9. A terminal block comprising a casing of insulating material having formed therein a plurality of laterally spaced transversely extending bores and openings communicating with the ends of said bores and the tops thereof, a metal tube of substantially rectangular cross-section located in each of said bores and extending for the length thereof and including top and bottom walls and contact side walls, a pair of transversely spaced parallel circular cylindrical lock members disposed in said tube and journaled about their central longitudinal axes to said top and bottom walls, each of said lock members having a peripheral face substantially tangent to said first and second side walls and having formed therein a groove having a base substantially symmetrical to a plane perpendicular to said longitudinal axis and of substantially smooth curved continuously varying depth substantially from the peripheral surface of said lock mem-

ber to a depth not exceeding the radius thereof, said lock member being rotatable to bring successive portions of said groove into confronting relationship with said contact side wall to delineate a passageway therewith of varying cross-section, and means connected to said lock member for rotating said lock member.

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