

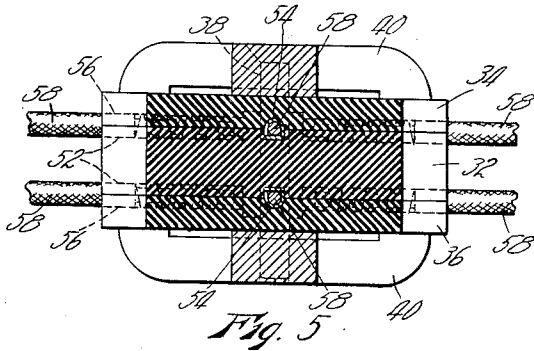
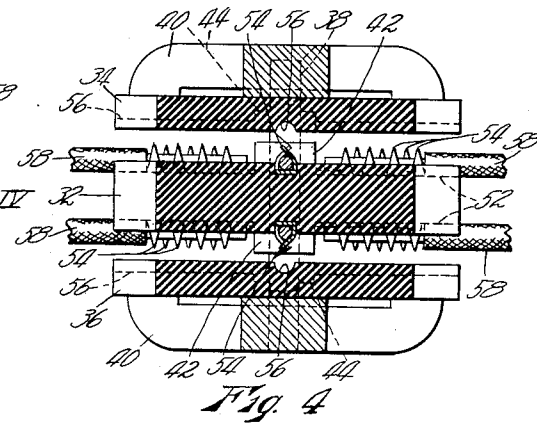
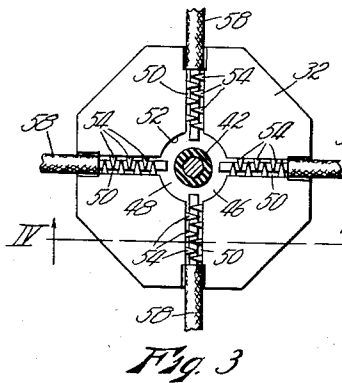
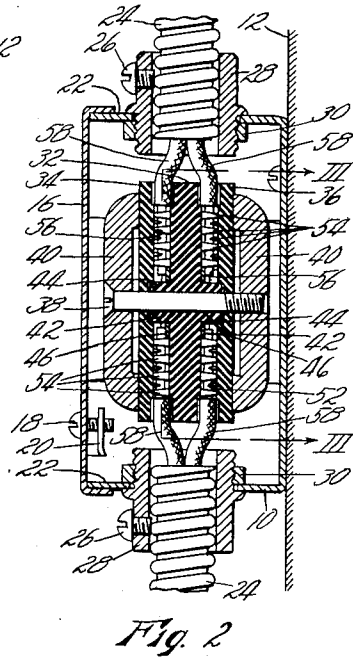
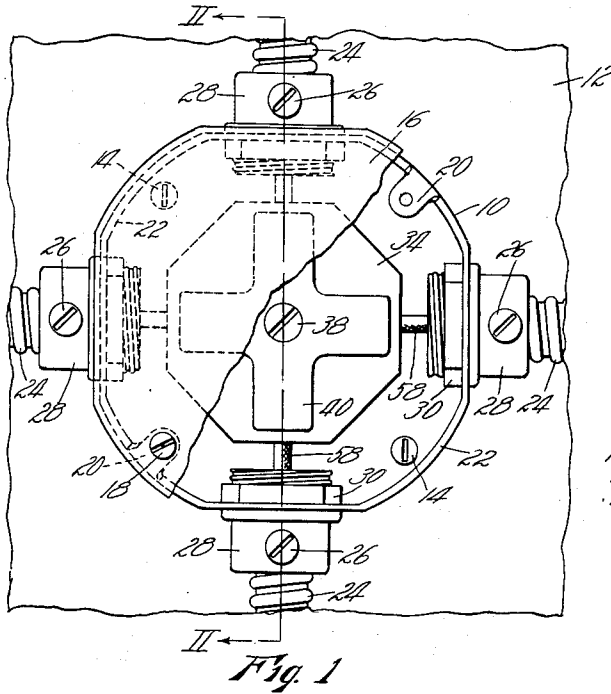
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A. H. ZIPH

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ELECTRICAL JUNCTION BOX CONNECTOR

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INVENTOR,
Andrew H. Ziph.
BY
Roy L. Hamilton,
Attorney.

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ELECTRICAL JUNCTION BOX CONNECTOR

Andrew H. Ziph, St. Joseph, Mo.

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This invention relates to new and useful improvements in an electrical connector, and has particular reference to a connector for use in an electrical junction box. At present it is customary, particularly in household or other small electrical installations, to make junction box connections by twisting and taping the bare ends of the wires, or by soldering the ends. Twisting damages the wires, and prevents easy disassembly. Soldering of course requires special tools, and is very inconvenient in many places connections must be made. Many attempts have been made to provide a connector overcoming these and other objections, but they have not been greatly successful because the devices have been too cumbersome and expensive, or difficult to apply, or required special tools, or provided inadequate contact surface, thus causing an undue voltage drop.

The principal object of the present invention is, therefore, the provision of a solderless, tapeless, electrical connector causing virtually no deformation of the wires, insuring adequate contact surface, and requiring no special tools for installation.

Another object is the provision of an electrical connector comprising a central insulating wafer having recesses formed in opposite surfaces thereof for receiving a conductor plate having radial arms with serrations formed therealong, said serrations being bent to project outwardly from the surface of the wafer to form channels for receiving electrical wires, and an outer wafer adapted to be drawn into clamping contact with each surface of said central wafer, thereby forcing said serrations into clamping and gouging contact with said wires to form a secure electrical connection.

Another object is the provision of an electrical connector which is completely enclosed so that no uninsulated wire or other conductor projects from the connector, thereby eliminating the possibility of short circuits to the junction box and making it unnecessary to fasten the connector securely within the box.

Other objects are simplicity and economy of construction, there being a small number of parts all adapted for high speed automatic production, and ease and efficiency of operation, the turning of a single screw securing as many wires as desired into the connector.

With these objects in view, as well as other objects which will appear during the course of the specification, reference will be had to the drawing, wherein:

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Figure 1 is a plan view of a junction box with the cover partially broken away, and containing an electrical connector embodying the present invention.

Fig. 2 is a vertical section taken on line II—II of Figure 1, with parts left in elevation.

Fig. 3 is a section taken between two of the insulating wafers, on line III—III of Figure 2.

Fig. 4 is an enlarged section taken on line IV—IV of Figure 3, with the insulating wafers shown separated as before assembly.

Fig. 5 is a view of the parts shown in Figure 4, with the connector completely assembled.

Like reference numerals apply to similar parts throughout the several views, and the numeral 10 applies to an electrical junction box of standard type, being substantially octagonal in shape adapted to be secured to a wall 12 or other structural unit by means such as screws 14, and having a cover 16 removably fixed thereto by screws 18 which engage threaded tabs 20 struck out from the side walls 22 of box 10. Metallic conduits 24 to be introduced into the box are secured by set screws 26 in sleeves 28, said sleeves being secured in side walls 22 at spaced intervals around the junction box by means of nuts 30. The structure so far recited is common and no claim is made thereto. The sole purpose of its recitation here is the disclosure of a representative application of the connector device hereinafter described.

The connector includes a central wafer 32 and two outer wafers 34 and 36, said wafers being formed of plastic or other suitable insulating material and adapted to be assembled in a pile and to be clamped together by a central screw 38. Said screw engages a clamp plate 40 at each end, said clamp plates having radially extending arms by means of which the force of screw 38 is distributed evenly over the outer surfaces of wafers 34 and 36. Central wafer 32 is provided with outwardly extending bosses 42 on each side thereof concentric with screw 38, and adapted to fit within correspondingly shaped recesses 44 formed in the inner surfaces of outer wafers 34 and 36, thus maintaining said wafers in axial alignment as they are drawn together by screw 38.

A conductor plate 46 formed to present a central annular ring 48 adapted to fit around bosses 42 and a plurality of radial arms 50 extending from said ring as shown in Figure 3, is molded or placed in a recess 52 cut in each of the opposite faces of wafer 32. Arms 50 do not extend to the edges of the wafer. A plurality of staggered teeth 54 are formed along both edges of

each of said arms, said teeth being bent upwardly and then inwardly to cross to form an elongated channel into which wires may be pushed, as shown in Figure 4. Conductor plate 46 may be quickly and rapidly formed by a punch press operation, its thickness to be determined by the current carrying capacity of the wires to be attached thereto. Grooves 56 of semi-circular cross-section are formed in the inner surfaces of wafers 34 and 36, to correspond to the arms of recess 52 of central wafer 32.

In installation, insulated wires 58 entering junction box 10 through conduits 24 are stripped of their insulation for a distance from their ends somewhat less than the length of arms 50, and the bare end portion of each wire is pushed through the channel formed by teeth 54 of one of arms 50, as shown in Figures 3 and 4. Each wire is pushed inwardly till the insulation thereof touches the outer end of the associated arm 50. The outer end portions of grooves 52 and 56 are rounded to a diameter large enough to receive said insulation.

Wafers 34 and 36 and clamp plates 40 are then positioned as shown in Figure 4 and screw 38 is inserted, said screw being countersunk in upper clamp 40 and threaded into lower clamp 40. As the screw is turned the wafers are drawn together and the outer crossed ends of teeth 54 contact the outer wafers in grooves 56. As the screw is drawn still tighter, the ends of said teeth are turned downwardly and forced into clamping, gouging contact with wires 58, thus making a secure, permanent connection with ample contact area, which nevertheless may be assembled and disassembled repeatedly without materially affecting the ends of the wires or necessitating that they be cut back.

Thus it is apparent that an electrical conductor having numerous advantages has been produced. No solder or tape is necessary, the only tool necessary for easy and rapid assembly is a screwdriver, the parts are few and easily adapted to mass production, a wide, intimate contact area is provided, all possibility of short circuits through screw 38 is eliminated by bosses 42, conductor plates 46 may be produced having a greater or lesser number of arms, and the connector may be easily disassembled. Clamp plates 40 may be provided with the number and disposition of arms required to apply pressure precisely over each arm 50, thus decreasing the thickness and rigidity required of the insulating wafers. Furthermore, the connector is completely enclosed, there are no projecting binding posts or other electrically live parts which could short the circuit to the junction box or other metallic members. For this reason it is unnecessary to fasten the connector securely in the junction box. It may be left "floating" in the box, unattached save by wires 58, and may thus be pulled out of the box for easy accessibility while assembling.

What I claim is:

1. An electrical connector comprising a central insulating wafer and two outer insulating wafers adapted to be assembled in a pile, a deformable conductor carried between each of said outer wafers and said central wafer and adapted to engage loosely wires inserted while said wafers are disassembled, and an axial screw extending through said pile for drawing said wafers forcibly together, whereby said conductor is permanently deformed to cause clamping contact between said conductor and said wires, said cen-

tral wafer being provided with outwardly extending bosses of uniform transverse area concentric with said screw and adapted to be contained in matching recesses provided in said outer wafers, said bosses being extended sufficiently to engage said outer wafers during the entire clamping operation.

2. An electrical conductor comprising a plurality of planar insulating members adapted to be assembled in a pile, a plastically deformable conductor plate disposed between successive insulating members, each of said plates being formed to present a plurality of teeth, said teeth being bent upwardly and inwardly to form a plurality of radial channels each adapted to retain loosely a wire inserted when the insulating members are disassembled, and means for drawing said insulating members forcibly together to permanently deform said teeth to force them into biting contact with said wires.

3. An electrical conductor comprising a plurality of planar insulating members adapted to be assembled in a pile, a plastically deformable conductor plate disposed between successive insulating members, each of said plates being formed to present a plurality of teeth, said teeth being bent upwardly and inwardly to form a plurality of radial channels each adapted to retain loosely a wire inserted when the insulating members are disassembled, and an axial screw extending through said pile for drawing said insulating members forcibly together to permanently deform said teeth to force said teeth into intimate contact with said wires, said screw engaging clamping plates at the top and bottom of said pole.

4. An electrical connector comprising a central insulating wafer and two outer insulating wafers adapted to be assembled in a pile, said central wafer having a centrally disposed boss on each side adapted to be contained in correspondingly shaped recesses formed in said outer wafers; a conductor plate disposed between each of said outer wafers and said central wafer, each of said conductor plates comprising a central annular ring adapted to fit around said boss, and a plurality of radially extending arms each having teeth formed in staggered relation along the edges thereof, said teeth of each arm being bent upwardly and inwardly to form a channel adapted to retain loosely an electrical wire inserted therein while the wafers are disassembled, and means including a screw extending axially through said bosses for drawing said wafers together to force said teeth into close engagement with said wires.

5. An electrical conductor comprising a central insulating wafer and two outer insulating wafers adapted to be assembled in a pile, said central wafer being recessed on each side to receive a plastically deformable conductor plate having radially extending arms each having teeth formed along both edges thereof, said teeth being bent to form a channel adapted to retain loosely an electrical wire inserted therein while the wafers are disassembled, said teeth extending outwardly from the surfaces of said central wafer, and said outer wafers having radially extending semi-circular grooves corresponding with said arms, and means for drawing said wafers together, said teeth entering said semi-circular grooves and being bent downwardly by said outer wafers into permanent clamping contact with said wires.

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6. An electrical conductor comprising a central insulating wafer and two outer insulating wafers adapted to be assembled in a pile, said central wafer having a centrally disposed boss on each side adapted to be contained in recesses formed in said outer wafers, said central wafer being recessed on each side to receive a conductor plate having a central annular ring adapted to fit around said boss and radially extending arms each having teeth formed along both edges thereof, said teeth being bent to form a channel adapted to retain loosely an electrical wire inserted therein while the wafers are disassembled, said teeth extending outwardly from the surfaces of said central wafer, and said outer wafers having radially extending semi-circular grooves corresponding with said arms, and means including a screw extending axially through said bosses for drawing said wafers together, said teeth entering said semi-circular grooves and being bent downwardly by said outer wafers into clamping contact with said wires.

7. An electrical connector comprising a plurality of insulating layers adapted to be assembled in a pile, a plastically deformable conductor plate carried between successive layers in recesses formed therefor in one of each pair of layers, each of said plates having radially extending arms carried in branches of said recesses, each of said arms having clamping members formed integrally therewith adapted to be engaged in corresponding grooves formed in the

other of said pair of layers to be forced into permanent clamping contact with a wire having its end portion stripped of insulation, said wire being inserted from the edge of said insulating wafers before the layers are drawn together, said grooved recesses in said layers extending to the edges of said layers and the arms of said conductor plates not extending to said edges, thereby leaving a portion of said grooves clear for receiving an insulated portion of said wire, and means for clamping said insulating layers together.

ANDREW H. ZIPH.

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