

Jan. 8, 1963

E. C. CROWTHER

3,072,879

TERMINAL BLOCK

Filed April 8, 1960

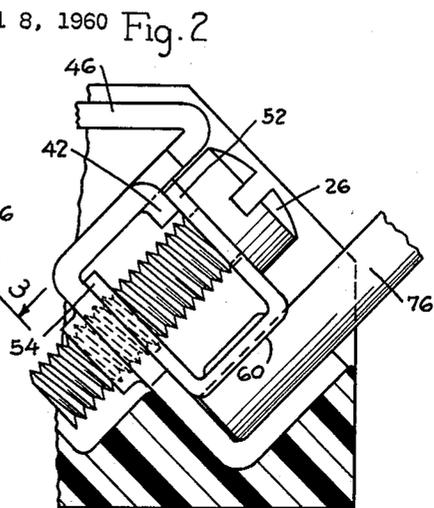
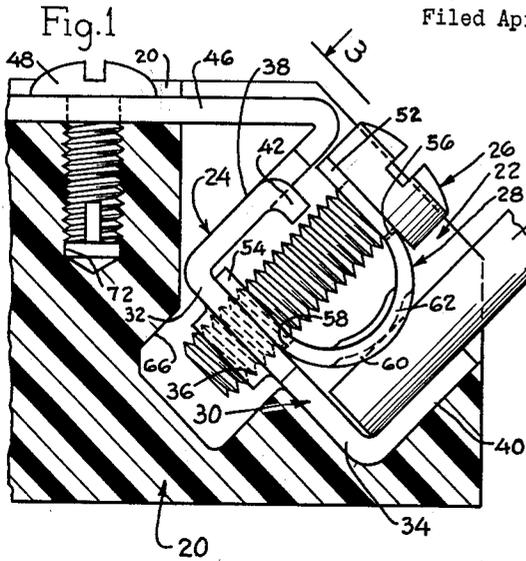


Fig. 5

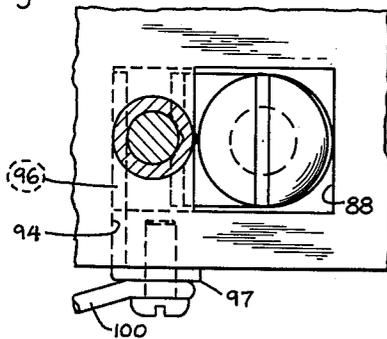


Fig. 3

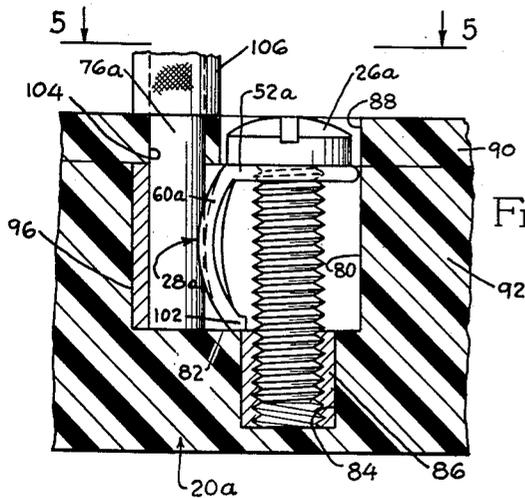
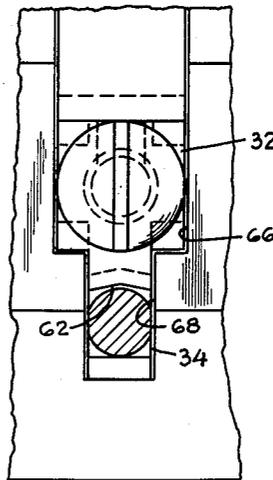


Fig. 4

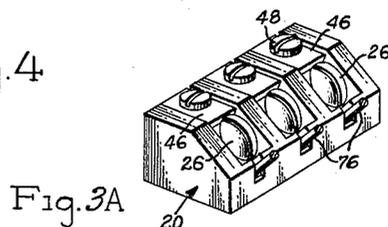


Fig. 3A

INVENTOR.
 Edmond C. Crowther
 BY
 Olson & Trexler
 Atty's.

1

3,072,879

TERMINAL BLOCK

Edmond C. Crowther, North Hampton, N.H.

Filed Apr. 8, 1960, Ser. No. 21,045

5 Claims. (Cl. 339-198)

This invention relates to an electrical connector for removably securing the end of a conductor to a workpiece. More specifically, it relates to those types of connectors which are adapted to be utilized either with what are known in the trade as terminal blocks or as an adjunct to bus bars.

It is an object of this invention to provide an improved electrical connector, which will releasably retain the bared end of a conductor without physically distorting or damaging same.

Another object of this invention is to provide an electrical connector having excellent conductive qualities but which is simple in conformation and ideally adapted for mass production techniques.

Further objects will become more apparent when the specification is read on the accompanying drawing, wherein:

FIG. 1 is a partial sectional view of a preferred embodiment of this invention;

FIG. 2 is a partial sectional view of the embodiment shown in FIG. 1, when the connector is in its fully engaged position relative to a conductor;

FIG. 3 is a partial view taken along line 3-3 of FIG. 1;

FIG. 3A is a perspective view of a plurality of the connectors shown in FIGS. 1-3 mounted in a terminal block;

FIG. 4 is a partial sectional elevation of another embodiment of this invention;

FIG. 5 is a top view taken along line 5-5 of FIG. 4.

Referring now to the drawings and specifically FIGS. 1 through 3, the connector 22 disclosed is a preferred embodiment of the invention and is well adapted for use with what are known in the trade as terminal blocks. Such a block includes a dielectric base 20 and one or more proposed connectors 22. In the present instance the base or block 20 is of a molded phenolic resin, as is well known in the art, and is provided with one or more cavities 66 adapted to accept the connector 22.

In the preferred embodiment, connector 22 includes a cage 24, a screw 26 and a spring member 28. The cage 24 is a metallic conductor and can be manufactured as a sheet metal stamping. It includes a polygonal base 30, which in this embodiment is square at one end as at 32 connected to a reduced in width portion 34 at the opposite end. A threaded aperture 36 is located centrally of the square end 32 and is adapted to telescopically receive the screw 26.

Extending upwardly from opposite end edges are a pair of walls or flanges 38 and 40, which are substantially perpendicular to the base 30 and have a width complementary to the adjacent ends of the base 32 and 34 respectively. Extending inwardly from wall 38 in spaced relation to the base 30 is a shoulder means or stop 42, which may, for conservation of space and material, be struck out of and bent inwardly from the parent material of wall 38. The purpose of this shoulder means 42 will be more thoroughly set forth hereinafter. Extending angularly and laterally outwardly from the upper extremity of wall 38, is connector tab or extension 46. Tab 46 is apertured intermediate its length and adapted to telescopically accept a screw 48 which has its free extremity seated in bore 72 within the top of block 20.

Screw 26, which is telescopically associated with the threaded aperture 36, has mounted thereon a spring member 28. Spring 28 may be formed from flat strip stock into a bowed or U-shaped member 28 having a pair of

2

opposed apertured arms 52 and 54. Arms 52 and 54 are each provided with an aperture or slot 56 and 58 respectively, which are substantially in register with one another whereby screw 26 can be telescopically associated therewith. Bight portion 60, which interconnects arms 52 and 54, has in its initial condition the form of a semi-circle and is positioned in spaced convex relation to the wall 40. Bight portion 60, in the present instance, is provided with a groove 62, which extends longitudinally through a substantial portion of its length and opens concave outwardly towards wall 40, for purposes best set forth hereinafter. The spring member 28 can be rotatably pre-assembled to screw 26 by known means, as for example, by providing an unthreaded portion on the shank of screw 26 adjacent the head and by making the aperture 56 greater than the unthreaded shank portion, but less than the threaded shank portion, whereby it is axially captured relative to the screw. Other assembly methods can be utilized, for example, a slot can be substituted for aperture 56, and the spring member can be radially associated with the screw. The spring member 26 further can be fabricated from strip stock of varying widths, in which the arms 52 and 54 are substantially complementary in width to the square end 32 of the polygonal base 30 and the bight portion 60 being provided with the same width as the reduced end 34, for purposes set forth herein after.

To accommodate the connector 22 the block 20 is cored out during its formation to provide a square bore 66 complementary to the square end 32 of the connector and a rectangular bore 68 of lesser width adapted to accept the reduced end 34 and the bight portion 60. The upper portion of the block is grooved as at 70 to accept the connector tab 46 and further is bored as at 72 to accept the thread cutting connector screw 48. It will be noted in FIG. 1 that the square bore 66 has a greater depth of penetration than bore 68 to provide a recess for accepting the free end of screw 26 as it is moved axially downwardly through the threaded aperture 36.

In the operation of the present device, a conductor 76 is moved axially between the grooved bight portion 60 and the arm 40, which are in spaced opposition to one another. Axial rotary movement of the screw 26 results in a closer proximal positioning of arms 52 and 54. This causes a lateral movement in the bight portion 60, towards the arm 40, and produces a deformation of said bight portion, particularly at its juncture with the side arms 52 and 54, until such time as it assumes the substantially flat position shown in FIG. 2. The conductor 76 is thus securely but releasably captured by the deformed resilient spring. To prevent total collapse or fatigue failure, and possible release of the wire, shoulder means 42 engages the underside of upper arm 52 and limits its axial movement.

A second embodiment of the invention is shown in FIGS. 4 and 5, wherein similar numerals are utilized to designate similar parts with the addition of the suffix "a." In this embodiment, the cage is basically formed by an undercut cavity in the block 20a. The cavity 80 has a base 82, which is bored as at 84. Since most of the resinous materials which are utilized to make the terminal blocks have a low tensile strength, it is often desirable to provide an insert, such as threaded insert 86, adapted to receive the screw 26a. The cavity 80 is further provided with an aperture 88 which communicates with the upper surface of block 20a. Aperture 88 is much smaller than cavity 80, but is substantially larger than the head of screw 26a for purposes of access and assembly. For convenience in manufacture, block 20a can be made in two parts, 90 and 92 respectively, with said two parts being suitably joined by adhesives, by screws, or any other standard method.

A slot 94 communicates with the side of block 20a and is aligned with one wall of cavity 80. It is adapted to accept a connector bar 96, which forms and lines one wall of cavity 80. The outer end of connector 96 is bent to form an apertured flange 97 which is secured to the side wall of block 20a by a suitable screw 98. Screw 98 can be axially moved outwardly to receive an end of a conductor 100. Mounted on screw 26a is a resilient metallic spring member 28a, which, in the present instance, assumes a substantially L-shaped formation. One leg 52a of member 28a is apertured and positioned adjacent the underside of the head of the screw. Preferably it is rotatively captured on the shank by known methods. The second leg or bight portion 60a is bowed outwardly away from the screw shank and is positioned within the cavity 80 so that it is in opposition to but spaced from connector bar 96, with its lower free end 102 abutting the base 82 of the cavity.

A second aperture 104 opens through the top of block 20a and communicates with the cavity 80. It is positioned so that it is substantially in register with the space between bight portion 60a and connector bar 96. In assembling this device, the resilient spring 28a, which is pre-assembled to the screw 26a, collapses radially inwardly toward the screw shank as the sub-assembly is axially inserted through the aperture 88. The screw 26a is threaded into the insert 86 until the lower free end 102 of spring 28a abuts the base 82.

In the operation of this device, a conductor 76a is inserted downwardly through aperture 104 with its free end positioned between the bight 60a and the connector bar 96. Axial movement of the screw 26a into the insert 86 results in a lateral deformation of the bight portion 60a in the same fashion as was previously described for the first embodiment. It is possible with the present embodiment to have a completely insulated connection by controlling the amount of protruding bared wire and by having the insulation 106 on conductor 76a act as a stop or shoulder means at its terminal point by abutting the upper surface of block 20a. Thus, a releasably retained connection is made with a complete electric circuit between the conductor 76a, connector bar 96, and the terminal connection to wire 100.

It is believed that the present invention has set forth in its embodiments a simple and efficient connector, capable of being produced by mass production methods and resulting in a simple, economical fastener, adaptable to a multiplicity of uses.

I am certain that other embodiments of this invention will be apparent to those skilled in the art and it is my intent that I be limited only by the appended claims.

I claim:

1. A terminal block for removably retaining a plurality of discrete conductors, including a dielectric base and a plurality of metallic connectors, said base having a plurality of polygonal shaped bores angularly disposed relative to the top face of said base and opening outwardly relative to the top face of said base adapted to accept said connectors, each of said connectors including a metallic U-shaped cage, a screw, a metallic spring, said cage having an aperture polygonal base complementary to and non-rotatably acceptable within one of said bores, a pair of arms extending upwardly from opposite margins of said base, said cage base aperture being adapted to complementarily accept said screw in threaded relation, said spring initially being a flat bowed strip having a pair of apertures adjacent opposite free ends which are

substantially in register when the strip is in its initial bowed condition, said apertured spring being adapted to be telescopically and rotatably assembled with said screw but captured as to axial movement, said bowed spring being substantially U-shaped in spaced opposition to one of said caged arms, the bight portion of said spring adapted to be moved laterally as the free ends are moved into closer proximal relationship when the screw is advanced into the threaded aperture, said bight portion of the spring and the arm with which it is in opposition being of lesser width than the other arm, said dielectric base bore being complementary to the narrowed bight and arm, whereby a conductor positioned between said bight and said arm will be releasably retained as the bight is laterally moved and will be restricted against lateral movement by the narrowed base bore.

2. A device of the type claimed in claim 1, wherein shoulder means are provided on the other arm of the cage, said means extending into the cage in spaced relation to the cage base and adapted to engage the underside of the upper free end of the spring member, whereby total collapse thereof from compression stress failure is prevented.

3. A device of the type claimed in claim 1, wherein laterally extending apertured tab means is angularly attached to the other arm of said cage, screw connector means traversing the aperture in said tab, a threaded bore in said dielectric base adapted to accept said screw connector to secure said tab to said dielectric base.

4. A device of the type claimed in claim 1 having a U-shaped sheet metal cage adapted to be complementary to said cavity including an apertured base and outstanding arms cooperatively engaged with said sidewalls, one of said arms being the conductive means in opposition to said spring means, the other of said arms being joined at its free end by a laterally extending conductive tab means, said tab means having means for connection to a second conductor, screw engaging means surrounding the aperture in said cage base, means extending from said other arm intermediate its length toward the first arm and adapted to engage the underside of the screw head to limit the axial compression of the spring arm.

5. A device of the type claimed in claim 4 wherein said cage and cavity are angularly disposed relative to the top of said dielectric base to facilitate insertion of said conductor, said tab being parallel and in juxtaposition to the top of said dielectric member, said base of the cage having a substantially square portion including said threaded aperture and a reduced width portion from whence the first arm extends, the bight portion of said spring having a width complementary to said reduced base portion and acceptable within the restricted portion of said cavity.

References Cited in the file of this patent

UNITED STATES PATENTS

1,531,816	Russell	Mar. 31, 1925
1,635,256	Carter	July 12, 1927
2,906,990	Cain et al.	Sept. 29, 1959
2,953,771	Kussy	Sept. 20, 1960
2,957,157	Carter	Oct. 28, 1960
2,988,726	Agron et al.	June 13, 1961

FOREIGN PATENTS

336,612	Great Britain	Oct. 16, 1930
---------	---------------	---------------