Aug. 29, 1961 E. R. KULKA 2,998,589

TERMINAL BLOCK ASSEMBLY

Filed June 16, 1958

FIG. 1.

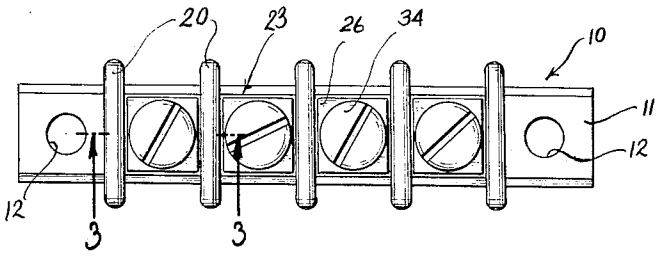
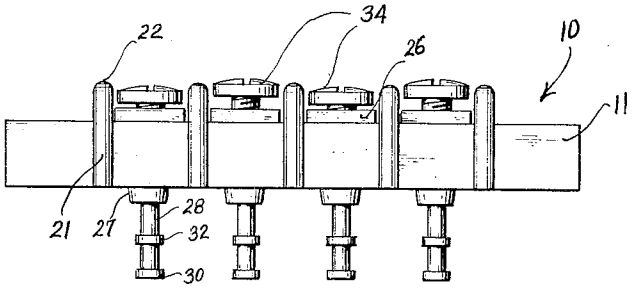
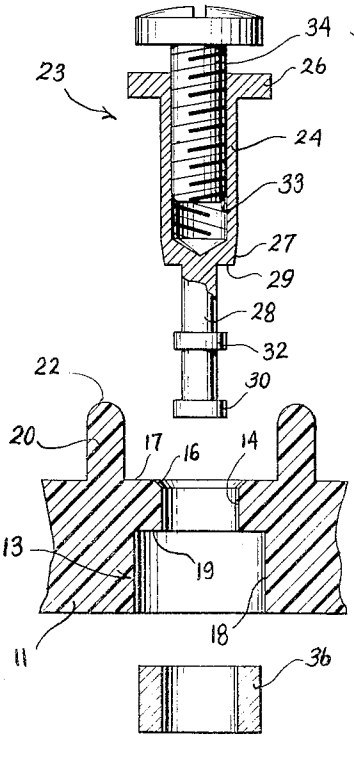


FIG. 2.





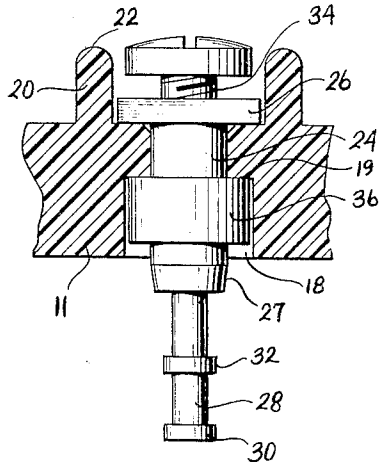


FIG. 3.

FIG. 4.

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TERMINAL BLOCK ASSEMBLY

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The present invention relates generally to improvements in electrical connectors, and more particularly to an improved terminal block construction.

Terminal blocks are widely used in all forms of electrical and electronic equipment, and are made in a variety of sizes and types. The conventional terminal block usually includes a body member formed of insulating material upon which a row or rows of terminals are mounted. The terminals are made of conductive metal and in some instances consist of threaded body members adapted to receive a binder screw or nut for receiving the circuit terminal networks. The mounting of the terminals on the insulating block has heretofore presented a difficult problem since the terminal must present a flat contact surface flush with the top of the block and its lower body portion is normally recessed within the bottom of the block. It has been customary to provide the terminal body portion with a flange which is peened over a recessed surface of the block, but such procedure is costly and time-consuming and has resulted in a finished article in which the terminals originally are or soon become loose. This problem is particularly prevalent in the manufacture of miniature terminal blocks in which the metal terminal bodies are very small and the flanges to be peened over cannot be made of sufficient thickness to properly support the terminal against the stresses to which it is subjected. In addition, in such miniature terminal blocks, the bores receiving the terminal bodies are of very small diameter, making it difficult to insert a tool for properly peening over the terminal flange.

It is an object of the present invention to provide a terminal block assembly having improved means for mounting the terminal body portions within the insulating block body.

In accordance with the invention, the improved terminal block assembly includes an insulating block body provided with a plurality of through bores, a conductive metal terminal body portion insertible within each of the bores, and a metal collar adapted to be rigidly connected to the bottom portion of the terminal body portion and engaging a shoulder within the bore to secure the terminal in mounted position.

Another object of the invention is the provision of a terminal block assembly of the character described in which the metal collar is sized to be force fitted on the terminal body portion in a simple and economical manufacturing step, while at the same time, providing a strong and rugged mount for the terminal.

Additional objects and advantages of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a top plan view of an improved terminal block embodying the present invention;

FIG. 2 is a side elevational view thereof;

FIG. 3 is an enlarged detailed sectional view taken along line 3—3 of FIG. 1; and

FIG. 4 is an enlarged detailed sectional view similar to FIG. 3, but showing the parts in exploded form.

In accordance with a preferred embodiment of the present invention the terminal block includes an elongated body member or strip formed of an electrically

insulating material and having a plurality of longitudinally spaced bores formed therein separated by parallel upstanding walls, each of the bores having an enlarged bottom portion. Registering with each bore is the shank of a connector terminal, the shank being provided with a rectangular top flange which is disposed between adjacent walls and abuts the upper border of the bore, and is also provided with an inwardly tapered lower portion disposed below the upper portion of the bore. A collar under radial compression and circumferential tension, achieved by a force fit, engages the shank and rests in the enlarged bore portion in abutment with a shoulder separating the enlarged bore portion from the upper bore portion. The collar and top flange of the shank cooperate to secure the terminal member in mounted position within the block.

Referring now to the drawings which illustrate a preferred embodiment of the present invention, the reference numeral **10** designates a terminal block which is of the "single screw" type, or in other words has a single row of terminal elements mounting binder screws. Miniature terminal blocks are customarily made of this type. The terminal block **10** includes an elongated body member or strip **11** formed of any suitable electrically insulating material such as synthetic organic thermosetting materials or the like. The body member **11** is of substantially rectangular transverse cross section and has a pair of circular end mounting holes **12** formed therein to receive mounting bolts or screws (not shown) for mounting the terminal block on a support structure. A longitudinal row of regularly spaced through bores **13** is also formed in the body member **11** between the end openings **12**. Each of the bores **13** includes an upper portion **14** of circular transverse cross section, having a beveled top edge **16** and surrounded by an upper peripheral, horizontal border **17**. Each through bore **13** also includes a lower portion **18** of circular transverse cross section registering and communicating with the upper bore portion **14**. The lower bore portion **18** is of larger diameter than the upper portion **14** and forms therewith at its junction an annular horizontal shoulder **19**.

Located between successive through bores **13** and formed integral with the body member are transversely-extending upstanding parallel partition walls **20** which project beyond the edges of the body member **11** and are provided with depending sections **21** along the sides of the body member **11**. The edges of the walls **21** are rounded off as at **22**. The partition walls **20** serve in the usual manner as barriers to separate the block terminals and divide the block into individual stations for receiving individual wiring, which stations are well insulated from each other. As can be seen in FIG. 1, the top surface of the block body member **11** between each adjacent pair of partition walls **20** forms an upper peripheral, lateral border **17** for each of the through bores **13**. These upper peripheral borders **17** are squared or rectangular in shape, and are used in the mounting of the conductive terminals, as will presently be described.

The connector terminal members are designated by the numeral **23** and each includes a longitudinal cylindrical body or shank **24** having an upper peripheral flange **26** of substantially square outline, the distance between opposing edges of the flange **26** being slightly less than the distance between confronting faces of the partition walls **20**. The lower portion **27** of the shank **24** has a downwardly tapering wall. Depending from the bottom of shank **24** and coaxial therewith is a soldering post **28** delineated from the bottom of the shank **27** by an annular shoulder **29**. The soldering post **28** terminates in the

usual manner in an outwardly directed lip 30 and is provided with an intermediate peripheral flange 32.

A tapped axial bore 33 is formed in the shank 24 extending from the top to a point immediately above the bottom thereof. A headed screw 34 engages the tapped bore 33 to complete the connector terminal member. It is to be understood that the particular type of terminal member shown is presented by way of illustration only and that other conventional types of terminals may be employed in accordance with the invention. For example, the terminals may be made without soldering posts, or various types of soldering lugs may be substituted. In addition, the terminal may be of the well-known "navy" type having an upstanding threaded shaft receiving a binder nut.

Associated with each of the terminal members 23 is a locking collar 36 of circular cross section having an inner diameter which in its unstressed condition is slightly less than the outer diameter of the main portion of the shank 24 by an amount of the order of 1 to 5 mils and greater than the diameter of the underface of the tapered shank lower portion 27. The outer diameter of the collar 36 is appreciably greater than the diameter of the upper bore portion 14 and slightly less than the diameter of the lower bore portion 18.

In assembling the terminal the shank 24 is inserted through the top of a respective bore 13 until its upper flange 26 nests between adjacent partition walls 20 and rests upon the upper peripheral border 17 surrounding said bore 13. The shank 24 is snugly received within the upper bore portion 14, the lower tapered shank portion 27 being located below the underface of the block body member 11. The collar 36 is force fitted onto the shank 24 and is under radial compression and circumferential tension being extended by the tapered portion of the shank. The collar 36 nests within the enlarged lower bore portion 18 with its upper face abutting the shoulder 19. The collar 36 is pressed tightly against the shoulder 19 so that it clamps the flange 26 against the marginal portion 17 of the block body top surface and securely holds the terminal member 23 in mounted position. The straight edges of the flange 26 engage the bottom edges of the partition walls 22 to prevent the terminal body from rotating when the screws 34 are turned therein.

The assembly of the terminal block 10 is preferably effected by inserting the shank of the terminal member 23 into a corresponding aperture 13, locating a collar 36 on the tapered lower end of the shank 24 and thence force fitting the collar 36 onto the shank 24 by means of a tubular tool having an inner diameter slightly greater than the inner diameter of the collar 36 and an outer diameter approximately equal to the outer diameter of the collar 36. This may be performed economically by applying the collars simultaneously to a plurality of the shanks by means of a suitable jig and ganged tool.

An example of the dimensions and configuration of a commercial form connector terminal member 23 formed of brass and which has been successfully employed is as follows: The shank 24 has an overall length of .314 inch and the diameter of its upper portion is between .151 and .152 inch. The lower portion 27 of the shank 24 has a height of .062 inch and a taper of approximately 1 degree. The flange 26 is square having sides .250 inch long and is .045 inch thick. The height of the soldering post is approximately .281 inch and is of a diameter of .062 inch. The collar 36, when in normal unstressed condition, has an inner diameter of between .149 inch and .150 inch, and an outer diameter of between .235 inch and 2.38 inch, and a height of approximately .125 inch. The depth of the tapped bore 33 is approximately .312 inch.

While there has been described and illustrated a preferred embodiment of the present invention, it is apparent that numerous alterations and omissions may be made without departing from the spirit thereof.

What I claim is:

1. An improved terminal block comprising an elongated body member of electrically-insulating material and having a longitudinal row of spaced through bores, said body member having a flat upper border surface surrounding each of said bores, each of said bores having an upper bore portion and a lower bore portion of enlarged transverse cross section separated from said upper bore portion by a peripheral shoulder, said body member having a plurality of upstanding transversely extending partition walls located between each of said bores and separating each of said bores from each other, the flat upper border surfaces of said body member being located between said partition walls and the upper peripheral edge of said upper bore portion being beveled and contiguous with the flat upper border surface circumjacent with said respective bores, the outermost bores adapted to receive securing means for securing said body member to a support, a metal terminal member for each of said bores that are intermediate of said outeremost bores, each of said terminal members comprising a shank portion extending through and positioned in the upper bore portion of each of said bores, a flat rectangular shaped flange extending laterally from the upper end of each of said shanks, overlying the border surface of said body member and abutting the partition walls defining the flat upper border surface that is in circumjacent relation to the respective bores, connector means at the upper end of each of said shanks extending above said flat flange for attachment of a lead wire to each of said terminal members, said connector means comprising a threaded axial bore in each of said terminal members, each of said axial bores being provided with an upwardly directed opening in each of said shanks and a screw engaging the opening in each of said threaded bores and projecting upwardly above each of said flanges, a locking collar having an internal diameter slightly smaller than the external diameter of each of said shanks force fitted under circumferential tension and radial compression upon each of said shanks below each of said upper bore portions, each of said collars resting in each of said lower bore portions and abutting each of the peripheral shoulders separating said upper bore portions and said lower bore portions, each of said collars clamping each of said flanges against their respective border surfaces to prevent said lead wires from pulling said terminal members upwardly out of their respective bores.

2. An improved terminal block as in claim 1, wherein a soldering post is formed integral with the lower end of each terminal member in coaxial alinement therewith, each of said shanks having an inwardly tapered lower end projecting below each of said upper bore portions and providing an annular shoulder that delineates said shank from said soldering post, a circular outwardly directed terminal lip portion on the lower end of each of said soldering posts and a circular flange integral with and positioned on each of said soldering posts intermediate of each of said tapered shoulders and each of said terminal lips.

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