

[54] **TERMINAL RETAINING CONNECTOR BLOCK**

[75] Inventors: **Anthony J. Taormina**, Detroit;
Willard B. McCardell, Jr., Madison Heights, both of Mich.

[73] Assignee: **Essex International, Inc.**

[22] Filed: **Mar. 8, 1968**

[21] Appl. No.: **711,675**

[52] U.S. Cl. **339/59 R**

[51] Int. Cl. **H01r 13/48**

[58] Field of Search 339/59-63, 217

[56] **References Cited**
UNITED STATES PATENTS

3,012,159	12/1961	Druessedow	310/71
3,085,220	4/1963	Sitz	339/18
3,430,185	2/1969	Sitzler et al.	339/59 M
3,289,145	11/1966	Ruehleman et al.	339/176

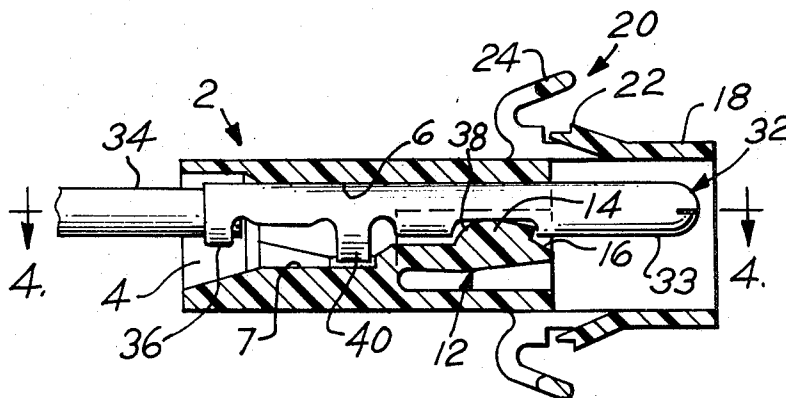
3,440,596 4/1969 Frompovicz 339/206

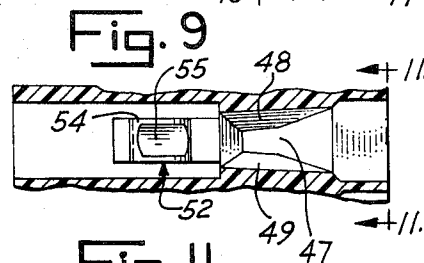
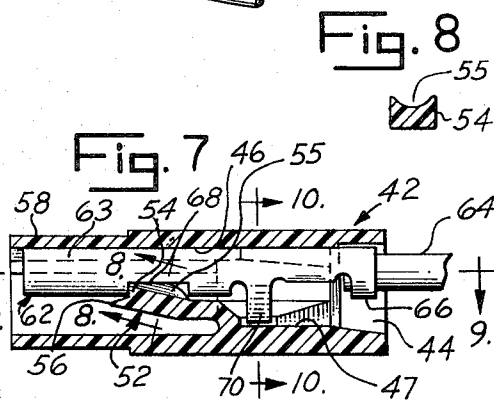
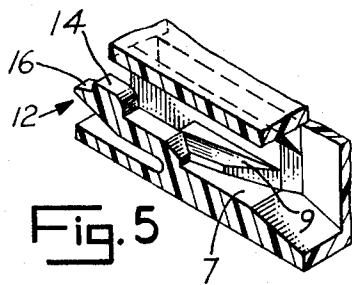
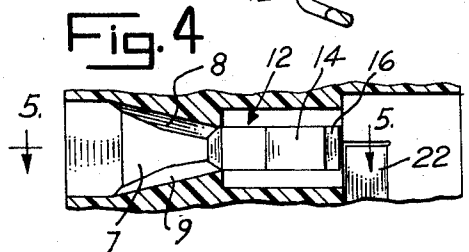
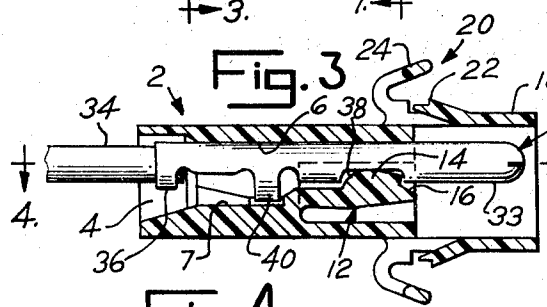
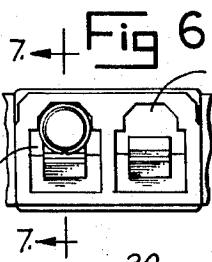
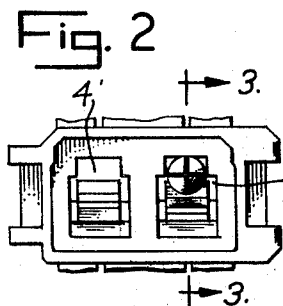
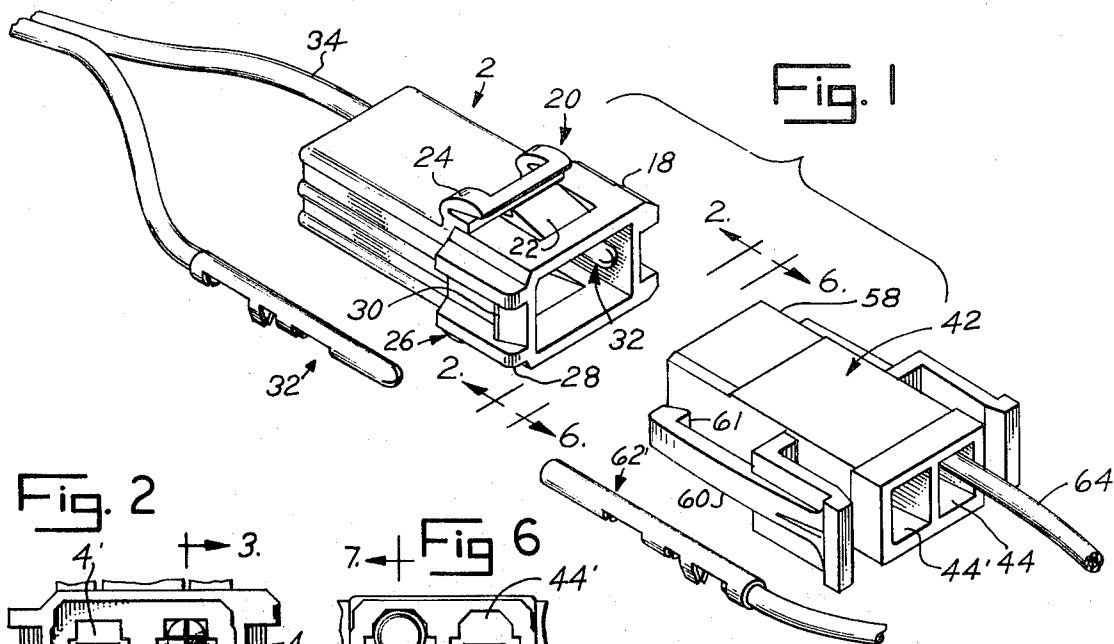
Primary Examiner—Joseph H. McGlynn
Attorney—Molinare, Allegretti, Newitt & Witcoffe

[57] **ABSTRACT**

A new and improved terminal retaining connector block. A resilient tang is provided in a housing passage of the block. When an electrical terminal is inserted in the passage, the tang is depressed by the terminal and then snaps back into a recess in the terminal, locking the terminal in the passage and urging the terminal into firm contact with a wall of the passage shaped to fit the terminal. The terminal further includes projections which orient the terminal to provide for both the initial and final alignment of the recess and the tang. The tang may be depressed to remove the terminal. Another housing similar in structure and including a mating terminal is coupled to the first housing whereby the terminals are connected to complete an electrical circuit.

19 Claims, 11 Drawing Figures





INVENTORS
ANTHONY J. TAORMINA &
BY WILLARD B. Mc CARDELL, JR.
*Bair, Freeman &
Molinaro* ATTORNEYS

TERMINAL RETAINING CONNECTOR BLOCK

BACKGROUND OF THE INVENTION

This invention relates to a new and improved electrical terminal retaining connector block.

Various terminal retaining connector blocks exist but, all suffer from various disadvantages. Frequently, the insertion of a terminal in pre-existing blocks is difficult and when the terminal is finally inserted in its final operating position, the terminal is not firmly and rigidly held by the block. Thereby, the terminal assembly is subjected to breaking, bending or disengagement when the wire to which the terminal is connected is pulled, twisted, extensively moved or subjected to other stresses. Moreover, in many of the previous blocks, once the terminal has been inserted in the block, the subsequent removal of the terminal is impossible without severely damaging or destroying the block. Also, many of the pre-existing blocks are constructed of a plurality of elements thus necessitating additional fabrication and assembly steps thereby resulting in increased costs.

It is accordingly an object of the present invention to provide a new and improved terminal retaining connector block in which the insertion of an electrical terminal in the block is facilitated and in which the terminal is firmly engaged and locked in place in the block thereby reducing the possibility of failure of the terminal assembly when stress is placed on the assembly.

It is a further object of the invention to provide a new and improved terminal retaining connector block wherein a previously installed terminal may be easily unlocked, removed and replaced if desired without damage to the block or the terminal.

It is also an object of the present invention to provide a new and improved terminal retaining connector block which is simple in construction and which is easily fabricated and assembled.

Other objects of our invention will become apparent as it is more fully described hereinafter.

BRIEF DESCRIPTION OF THE DRAWING

Reference will frequently be made hereinafter to the drawing in which:

FIG. 1 is an exploded view of the terminal retaining connector block of the preferred embodiment of the present invention;

FIG. 2 is an end cross-sectioned view of one of the block housing portions of the preferred embodiment of the invention taken along line 2—2 of FIG. 1;

FIG. 3 is an elevational cross-sectioned view of the block housing shown in FIG. 2 taken along line 3—3 of FIG. 2;

FIG. 4 is a plan cross-sectioned view of the block housing shown in FIGS. 2 and 3 with the terminal removed taken along line 4—4 of FIG. 3;

FIG. 5 is an isometric cross-sectioned view of the block housing shown in FIGS. 2—4 taken along line 5—5 of FIG. 4;

FIG. 6 is an end cross-sectioned view of the other block housing portion of the preferred embodiment of the present invention taken along line 6—6 of FIG. 1;

FIG. 7 is an elevational cross-sectioned view of the block housing shown in FIG. 6 taken along line 7—7 of FIG. 6;

FIG. 8 is a cross-sectioned view of the resilient tang of the preferred embodiment of the present invention taken along line 8—8 of FIG. 7;

FIG. 9 is a plan cross-sectioned view of the block housing shown in FIGS. 6 and 7 with the terminal removed taken along line 9—9 of FIG. 7;

FIG. 10 is a cross-sectioned view of the terminal projections of the preferred embodiment of the present invention taken along line 10—10 of FIG. 7; and

FIG. 11 is a cross-sectioned view of the recessed notched tang of the preferred embodiment of the present invention taken along line 11—11 of FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the preferred embodiment of the present invention generally includes a pair of interfitting housings 2 and 42. Each of the housings is preferably of one piece construction and constructed of molded nylon or other suitable synthetic polymeric material. Each of the aforementioned housings has at least one passage therethrough which carries an electrical terminal firmly inserted therein.

As shown in FIGS. 2—5 of the drawings, the housing 2 includes a pair of elongated passages 4 and 4'. Since both of the passages 4 and 4' are substantially identical to each other, only the construction of passage 4 will be hereinafter described. Passage 4 is bounded by a top wall 6, a bottom wall 7, and a pair of side walls 8 and 9 as shown in FIGS. 3 and 4.

The bottom wall 7 has a resilient tang 12 integrally molded thereon. By integrally molding the tang 12 within housing 2, the tang is protected from damage from sources external of the housing. Carried on the end of the tang opposite its connection with bottom wall 7, is a latching abutment 14, the purpose of which will be later described. Beyond the latching abutment 14, a flange 16 is carried by the tang for facilitating depression of the tang to allow removal of a previously inserted terminal.

At one end of housing 2, a housing extension 18 is integrally attached to the housing for protecting the ends of the terminals inserted therein and for connecting the housing 2 to another housing. The housing 2 may also include a panel locking assembly 20 for fixing the assembled terminal retaining connector block to a panel as desired. As shown in FIG. 3, the panel locking assembly 20 includes a notched inclined member 22 and a resilient backup member 24. When inserted on the desired panel, the notched inclined member 22 is disposed on one side of the panel and the resilient backup member 24 on the other side of the panel, thereby locking the assembly in place on the panel. The construction of a preferred panel locking assembly is fully described in copending U.S. Pat. Application Ser. No. 711,682, filed Mar. 8, 1968.

As shown in FIG. 1, the housing 2 may also include a part of a coupling assembly for connecting the two housings 2 and 42 together. The coupling assembly includes a coupling member 26 having a pair of raised ribs 28 with a locking shoulder 30 therebetween. The operation of the coupling assembly will be more fully described later.

A pair of generally cylindrical male terminals 32 and 32' are inserted in housing 2 and its associated passages 4 and 4', respectively. Since both terminals 32 and 32' are substantially identical, only terminal 32 will be

hereafter described. The terminal 32 includes a male fitting end 33 which is adapted to be connected to an electrically conducting wire 34 by pressed end sleeves 36 or other suitable means. The terminal 32 further includes a recess 38 adapted to receive the latching abutment 14 of the resilient tang 16. The terminal also includes integral projections 40 extending outwardly from its generally cylindrical surface. The resilient tang 12 is operative, by way of its latching abutment 14, to both lock the terminal into housing 2 and its associated passage 4 and force the terminal against the top wall 6 of the passage. The integral projections 40 on the terminal, orient the terminal during insertion and prevent the rotation of the terminal during or after insertion in the block by their coaction with side walls 8 and 9. Thus, the recess 38 is maintained in a downwardly facing direction so that the recess will align with and be engaged by the tang 12 and its latching abutment 14. It should be noted that both the top wall 6 and the side walls 8 and 9 include inclined or shaped surfaces whereby they generally conform to the size and shape of terminal 32. Thus, these walls are shaped to direct the movement of the terminal during its insertion in the passage as well as to firmly confine movement of terminal 32, in either a lateral direction or in a rotative direction, by engaging the projections 40, once the terminal has been inserted in the passage 4 and locked into position by the tang 12.

A second housing 42, similar to the previously described housing 2, is also provided, having passages 44 and 44' therethrough. Since passages 44 and 44' are also substantially identical, only passage 44 will be described in detail. Passage 44 includes a top wall 46, a bottom wall 47, and a pair of side walls 48 and 49, as shown in FIGS. 6, 7 and 9.

The bottom wall 47 of passage 44 also includes a resilient tang 52 preferably molded in a one piece construction with the bottom wall. Again, since the tang is integrally molded within the housing 42, it is protected from external damage. A latching abutment 54, for latching the terminal in the housing 42, is carried on resilient tang 52. As shown particularly in FIG. 8, the latching abutment further includes a recessed notch 55 which generally provides for the ease of inserting the cylindrical terminal into the passage 44 past the latching abutment 54. Resilient tang 52 also includes a flange 56 which serves the same purpose as the aforementioned flange 16.

Housing 42 also includes a housing extension 58 carried at one end thereof. The purpose of extension 58 is substantially the same as that previously described with reference to housing extension 18 on housing 2. The housing 42 also carries the remaining portion of the coupling assembly including a pair of coupling fingers 60 having barbs 61 at their ends. The barbs are adapted to couple with the aforementioned coupling member 26 and its associated locking shoulder 30. When coupling housing 2 and 42 are moved together, barb 61 is slidably moved between ribs 28 and along the inclined portion of locking shoulder 30 until the barbs slip over the end of locking shoulder 30 whereby the coupling assembly holds the two housings together.

Inserted in each of the passages 44 and 44', are generally cylindrical female terminals 62 and 62' respectively. Since each of the terminals 62 and 62' are substantially identical, only terminal 62 will hereafter be described. Disposed at one end of terminal 62 is a gen-

erally tubular female fitting end 63. An electrical conductor 64 is attached to the other end of the terminal by pressed end sleeves 66 or other suitable means. The terminal includes a recess 68 for receiving the latching abutment 54 of resilient tang 52, the purpose being identical with that previously described for terminal 32. Terminal 62 also includes integral projections 70 extending from its generally cylindrical surface, for aligning and preventing rotation of the terminal member 63 and its recess 68, as previously described with respect to projections 40 on terminal 32. Preferably, the top wall 46 and the side walls 48 and 49 of passage 44 are also shaped, as shown in FIGS. 6, 7 and 9, to conform with the shape of terminal 62 for the reasons mentioned earlier with respect to terminal 32.

MANNER OF ASSEMBLY

In assembling the terminal retaining connector block of the invention, terminals 32 and 32' are inserted in passages 4 and 4' respectively as viewed in FIGS. 1 - 3. The male fitting end 33 of terminal 32 is inserted into passage 4 and is moved axially to the right as viewed in FIGS. 1 and 3, between top and bottom walls 6 and 7 respectively, and side walls 8 and 9; its movement being guided by the shape of the walls. The fitting end 33 continues to move past the latching abutment 14 of resilient tang 16. As the generally cylindrical fitting end 33 moves over latching abutment 14, resilient tang 12 is depressed in a downward direction. As fitting 33 continues to be moved to the right, recess 38, which has been maintained in a downwardly facing direction by integral projections 40, is finally disposed directly over abutment 14, allowing latching abutment 14 to return toward its original generally undepressed disposition. Thereby, the latching abutment 14 enters the recess 38 of the terminal and the terminal 32 is now locked in place. Thus, further axial movement of the terminal to the right or the left is prevented. Since tang 12 is resilient, its movement in an upward direction urges terminal 32 into firm contact with the shaped upper wall 6, firmly seating the terminal in its passage. The terminal's projections 40 continue to prevent rotative disengagement of the recess 38 from the latching abutment 14.

Terminal 32' is inserted into its associated passage 4' in a manner substantially identical to that described with respect to terminal 32.

A pair of terminals 62 and 62' are similarly disposed in passages 44 and 44' of housing 42. As viewed in FIGS. 1 and 7, terminal 62 is inserted into passage 44 from the right and is moved in an axial direction toward the left. The female fitting end 63 enters passage 44 and passes between top wall 46, and bottom wall 47 and side walls 48 and 49. As movement to the left continues, the terminal passes between top wall 46 and the latching abutment 54 of resilient tang 52 thereby depressing the tang. As the generally cylindrical fitting end 63 continues to move to the left, it is moved past the abutment 54 and the recess 68, which has been prevented from rotating from its downwardly facing disposition by the projections 70, is also finally disposed directly over abutment 54. Abutment 54 then moves in an upward direction tending to return to its original undepressed disposition thereby locking terminal 62 into place. Thus, further axial movement of the terminal to the right or to the left is prevented and the terminal 62 is urged into firm contact against the shaped top wall 46. Projections 70 continue to prevent the terminal

from rotating which would result in the possible disengagement of the recess 68 and abutment 54.

Terminal 62' is inserted into its associated passage 44' in a manner substantially identical to that described with respect to terminal 62.

It will be observed when considering the preceding description, that the insertion of the terminals in their respective housings requires little effort. The only force opposing the insertion of the terminals is the relatively small frictional force between the terminals and the block structure. But once the terminals have been inserted in their final operative position, they are firmly locked in place and can be removed only by exerting a destructive force upon the assembly, with the exception which will hereinafter be described.

If it is desired to remove or replace a previously installed terminal, a small screwdriver or other suitable tool may be inserted through either of the housing extensions 18 or 58 and brought to bear in a downward direction on the top of flanges 16 and 56. Thus, resilient tangs 12 and 52 are depressed and their associated latching abutments 14 or 54 are withdrawn from their latching engagement with their respective terminal recesses 38 or 68. With the latching abutments 14 or 54 depressed, the terminal may now be axially withdrawn from its passage.

The two housings 2 and 42 with their associated inserted terminals are then coupled together. To couple the housings together, housing extension 58 is inserted into housing extension 18. Such insertion causes the coupling fingers 60 and their barbs 61 to move to the left as viewed in FIG. 1. As barbs 61 move to the left, they pass between the raised ribs 28 on coupling member 26. As they continue to move to the left, barbs 61 ride up the inclined surface of locking shoulder 30 and finally pass over the edge of the locking shoulder thereby locking the housing members 2 and 42 together. Also as housing extension 58 is inserted into housing extension 18, the generally cylindrical male fitting end 33 of terminal 32 enters the tubular female fitting end 63 of terminal 62, thus coupling the two terminals together and providing for a continuous electrical circuit between the terminals. Similarly, male terminal 32' fits into female terminal 62'.

It should be understood that in the preferred embodiment hereinabove, it is not necessary that the male terminals be inserted in housing 2 and the female terminals in housing 42. The disposition of those terminals may be reversed. Thus, either housing 2 or 42 may carry either the male or the female terminals as desired. Also, even though notch 55 is shown only in connection with female terminal 62, the notch may be either entirely eliminated or both tang members 12 and 52 may be notched to accommodate the passage of either the male terminal 32 or female terminal 62. Moreover, it is anticipated that each of the housings may if desired, have one or several terminals and passages, it not being intended to limit the invention to only a pair of passages and terminals as disclosed in the preferred embodiment. Further, the terminals may be cylindrical as described or any other suitable shape.

It is to be understood that the embodiment of the invention which has been described is merely illustrative of one application of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. A terminal retaining connector block comprising a housing,

at least one passage defined by said housing and extending through the length thereof and adapted to receive an electrical terminal, said passage having at least first and second opposed walls substantially facing each other,

said first wall being shaped to receive the terminal and hold the terminal immobile when it is inserted, and

said second wall including resilient tang means integral therewith and extending therefrom for locking the terminal against axial movement thereof in said passage and urging the terminal into firm contacting relationship with said one shaped wall to prevent lateral movement of the terminal when the terminal is inserted in said passage.

2. The terminal block of claim 1, wherein said resilient tang means includes flange means for releasing the locked terminal to provide for removal of the terminal after it has been inserted into and locked in the passage.

3. The terminal block of claim 1 wherein said resilient tang means is an integrally molded portion of said housing.

4. The terminal block of claim 1 wherein said resilient tang means includes a latching abutment carried thereon;

a terminal inserted in said passage, and

a recess on said terminal receiving said latching abutment whereby said terminal is locked in said passage and said terminal is urged into firm contact with said shaped first wall.

5. The terminal block of claim 4 wherein said terminal further includes projecting means for aligning said recess with said latching abutment.

6. The terminal block of claim 1 further including a first housing extension on the aforementioned housing at one end of said passage,

a second housing having at least one passage defined by said second housing and extending through the length thereof and adapted to receive a second electrical terminal, said passage having at least third and fourth walls facing each other,

said third wall being shaped to receive the second terminal and hold the terminal immobile when it is inserted,

said fourth wall including resilient tang means extending therefrom for locking the second terminal against axial movement thereof in said last mentioned passage and urging the terminal into firm contacting relationship with said third wall to prevent lateral movement of the terminal when the terminal is inserted in the last mentioned passage, and

a second housing extension on said second housing at one end of its passage, said first and second housing extensions being coupled to each other joining the first mentioned and second housings together into an integral assembly with their respective passages in substantially axial alignment with each other.

7. The terminal block of claim 6 wherein each resilient tang means includes a latching abutment carried thereon;

7

8

a pair of terminals in electrical contact with each other, one of said terminals being inserted in each of said aforementioned passages,
and a recess on said terminals receiving said latching abutment whereby each of said terminals is locked in each of its respective passages and is urged into firm contact with its respective first and third shaped walls.

8. The terminal block of claim 7 wherein at least one of said terminals further includes projecting means for aligning the recess of said one of said terminals with its associated latching abutment.

9. The terminal block of claim 7 wherein one of said terminals is male and the other is female.

10. The terminal block of claim 9 wherein said terminals are substantially cylindrical.

11. The terminal block of claim 10 wherein at least one of said abutments includes a recessed notch facilitating insertion and removal of its associated substantially cylindrical terminal.

12. The terminal block of claim 1 wherein said second wall is imperforate and said tang means is mounted on said second imperforate wall and moveable relative thereto.

13. The terminal block of claim 1 including means in said passage for engaging the terminal when the terminal has been fully received in said passage for

preventing rotation of the terminal in said passage.

14. The terminal block of claim 1, said resilient tang means including a recessed notch for facilitating insertion and removal of the terminal into and out of said passage.

15. The terminal block of claim 1 including latching means for engaging and locking the terminal against axial movement in said passage, and cam means positioned in said passage for engagement with the terminal as the terminal is moved axially in said passage, said cam means moving said latching means away from the terminal when the terminal is moved axially in said passage.

16. The terminal block of claim 15 wherein said latching means and said cam means are spaced apart.

17. The terminal block of claim 15 wherein said latching means and said cam means are located on said resilient tang means.

18. The terminal block of claim 15 wherein said latching means is positioned further into said passage than said cam means in the direction of movement of the terminal as the terminal is inserted in said passage.

19. The terminal block of claim 15 wherein said latching means locks the terminal against axial movement when the latter has been fully inserted in said passage.

* * * * *

30

35

40

45

50

55

60

65