April 30, 1963 R. L. LINN 3,088,091

ELECTRICAL TERMINAL BLOCK CONNECTION AND TERMINAL MEMBERS THEREFOR

Filed May 6, 1959

Fig. 1

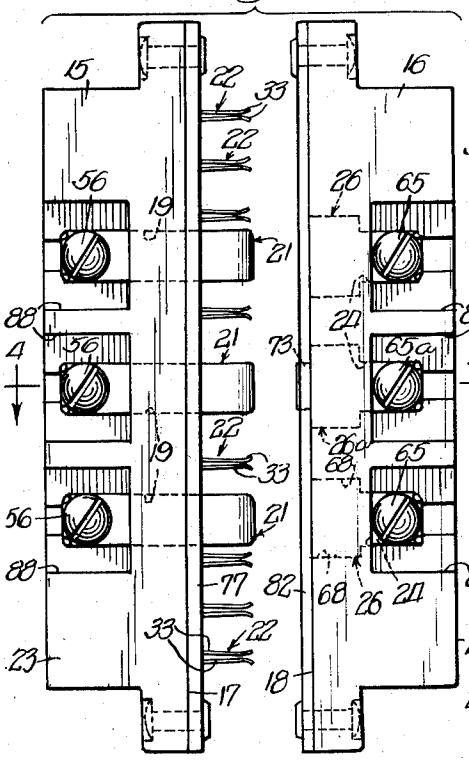


Fig. 2

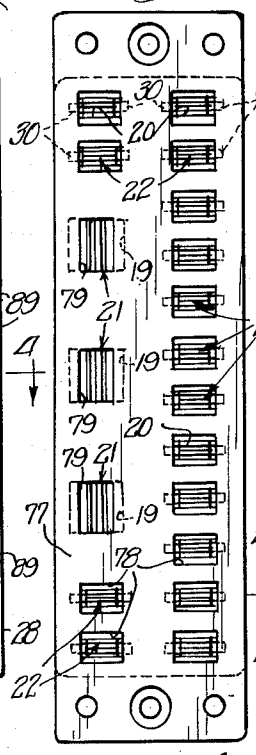


Fig. 3

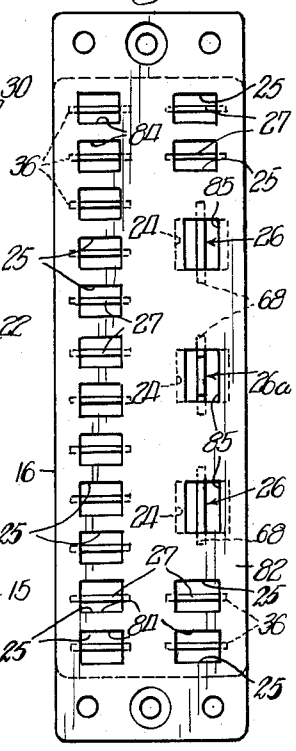


Fig. 4

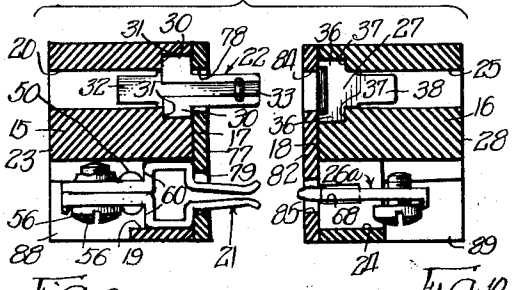


Fig. 5

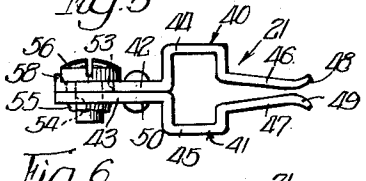


Fig. 6

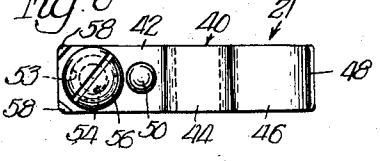


Fig. 8

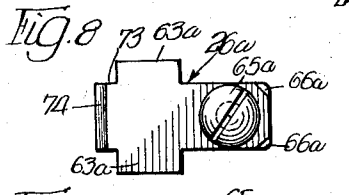


Fig. 10

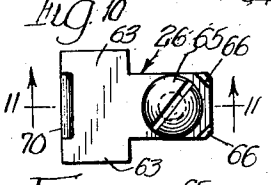


Fig. 11

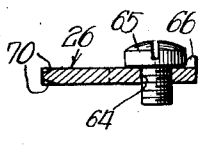


Fig. 7

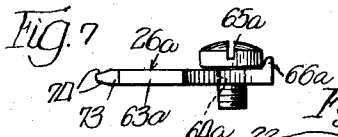


Fig. 9

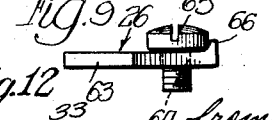
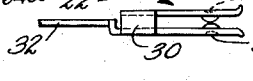


Fig. 12



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United States Patent Office 3,088,091 Patented Apr. 30, 1963

3,088,091

ELECTRICAL TERMINAL BLOCK CONNECTION AND TERMINAL MEMBERS THEREFOR

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Filed May 6, 1959, Ser. No. 811,324
3 Claims. (Cl. 339—192)

This invention relates to an electrical terminal block connection and, more particularly, to new and improved terminal members used in forming the block connection.

It is the general object of the invention to provide a new and improved terminal block connection which results from the utilization of new and improved terminal members.

An important object of the invention is to provide a new and improved electrical connection in the form of a pair of terminal blocks one of which carries a plurality of specially designed terminal clips and the other of which carries a plurality of specially designed terminal blades whereby when the terminal blocks are connected and disconnected a ground contact is made before any power contact is made and all power contacts are broken before the ground contact is broken.

Another important object of the invention is to provide a new and improved terminal clip which may be easily and economically mass produced and which is formed of two substantially identically shaped members which are secured together adjacent one end of each with the opposite ends being adapted for resilient gripping engagement with a terminal blade.

Certain other objects of the invention will, in part, be obvious, and will in part appear hereinafter.

For a more complete understanding of the nature and scope of the invention reference may now be had to the accompanying drawings wherein:

FIG. 1 is a side elevational view of a pair of terminal blocks characterizing the invention and showing them positioned for interconnection;

FIG. 2 is a view looking toward the face of the female terminal block shown in FIG. 1;

FIG. 3 is a view looking toward the face of the male terminal block shown in FIG. 1;

FIG. 4 is a horizontal section taken generally on the line 4—4 of FIG. 1;

FIG. 5 is an enlarged side elevational view of one of the heavy duty terminal clips carried on the female terminal block;

FIG. 6 is a top plan view of the same;

FIG. 7 is an enlarged side elevational view of the heavy duty terminal blade utilized for the ground connection and carried on the male terminal block;

FIG. 8 is a top plan view of the same;

FIG. 9 is an enlarged side elevational view of one of the heavy duty terminal blades utilized for a power connection and carried on the male terminal block;

FIG. 10 is a top plan view of the same;

FIG. 11 is a horizontal section taken generally on the line 11—11 of FIG. 10; and

FIG. 12 is a side view of the terminal clip shown in plan view in FIG. 4.

In FIG. 1, a female terminal block **15** and a male terminal block **16** are shown as positioned to be interconnected. The terminal blocks **15** and **16** are formed of non-conducting material with the block **15** having a flat face **17** and the block **16** having a flat face **18**. Three recesses **19** and a plurality of smaller recesses **20** are provided in the terminal block **15** for receiving, respectively, three heavy duty terminal clips **21** and a plurality of smaller terminal clips **22** with all of the recesses **19** and **20** extending through the block **15** between the flat face **17** and the opposite surface **23**. The terminal block **16** is

provided with three recesses **24** and a plurality of smaller recesses **25** for receiving, respectively, three heavy duty terminal blades **26** and **26***a* and a plurality of smaller terminal blades **27** with all of the recesses **24** and **25** extending through the block **16** between the flat face **18** thereof and the opposite surface **28**. All of the terminal members **21**, **22**, **26**, **26***a* and **27** are preferably formed of brass.

The illustrated embodiment of the invention is typical of the terminal block connection utilized in the electrical circuitry of an electric range or stove. In such an installation, the terminal block **15** is adapted to be secured on a rigid portion of the frame of the range and the terminal block **16** is adapted to be secured to a panel which is removable by the housewife in order to permit safe access to the interior of the range for cleaning purposes. The terminal blades **26**, **26***a* and **27** on the block **16** are adapted to be connected by suitable conductors to a plug which is connected in a well-known manner to a wall receptacle to supply current to the range. The terminal clips **21** and **22** on the block **15** are adapted to be connected in a well-known manner to various heating elements of the range, such as the oven and different burners thereof. Thus, when the cleaning panel is removed, the blocks **15** and **16** are disconnected automatically in order to cut off all electrical connections to the heating elements of the range for safe contact by a person cleaning the range with any element or conductor forming a part thereof. This terminal block connection thus acts as a safety device and provides current connection and disconnection convenience.

The terminal clips **22** (FIG. 4) are of the type disclosed in my co-pending application, Serial No. 513,663, filed June 7, 1955, now U.S. Patent No. 2,965,872, dated December 20, 1960, and are formed of a single stamping bent in a prescribed manner. Briefly, the clips **22** each include flange portions **30** which are seated against suitable shoulders **31** associated with each of the recesses **20** whereby the outer edges of the flange portions **30** are substantially flush with the flat face **17** of the block **15**, an inner projecting tab **32** adapted to be engaged by a conductor having a clip of a well-known type on the end thereof and inserted through the other end of the recess **20**, and a pair of spring-like arms **33** adapted to engage one of the terminal blades **27**. Each terminal blade **27** (FIG. 4) is provided with flange portions **36** which are engageable with suitable shoulders **37** formed in each of the recesses **25** whereby the outer edge of the blade **27** is substantially flush with the flat face **18** of the block **16** and an inner projecting tab **38** adapted to be engaged by a conductor having a clip of a well-known type on the end thereof and inserted through the opposite end of the recess **25**. The recesses **19** and **20** in the terminal block **15** are aligned, respectively, with the recesses **24** and **25** in the terminal block **16** whereby when the two blocks are interconnected each one of the three heavy duty terminal clips **21** is grippingly engaged with one of the three heavy duty terminal blades **26** and **26***a* and each one of the terminal clips **22** is grippingly engaged with one of the terminal blades **27**.

The invention is particularly concerned with the heavy duty terminal members **21**, **26** and **26***a* (FIGS. 5 through 11) which may be easily and economically mass produced using known production machines. Each heavy duty terminal clip **21** is fabricated from two substantially identically formed elongated gripping jaw members **40** and **41**. Each of the members **40** and **41** is provided with a flat end portion **42** and **43**, respectively, an offset portion **44** and **45**, respectively, adjacent thereto, and an opposite end portion **46** and **47**, respectively, which is inclined or tapered from its respective offset portion toward the plane of its flat end portion with a tip or lip **48** and **49**, respec-

tively, thereof being bent slightly whereby to be inclined or tapered slightly away from the plane of the flat end portion.

The members 40 and 41 are adapted to be positioned side by side with the offset portions 44 and 45 opening toward each other whereby to define an enlarged central portion for each terminal clip 21. The end portions 46 and 47 converge toward each other with the tips 48 and 49 diverging apart for a reason which will be evident hereinafter. The tips 48 and 49 may, if desired, be beveled. The members 40 and 41 are secured together by a rivet 50 which extends through the flat end portions 42 and 43 immediately adjacent to the offset portions 44 and 45. Any spreading force exerted between the converging end portions 46 and 47 is resisted by the offset portions 44 and 45 whereby each terminal clip 21 is adapted to resiliently grip one of the terminal blades 26 and 26*a* when the terminal blocks 15 and 16 are interconnected. In a preferred form of the invention, the arms 46 and 47 are disposed at an angle of 5° to a plane passing through the meeting surfaces of the flat end portions 42 and 43 with the tips 48 and 49 being disposed at an angle of 15° to the same plane.

An unthreaded bore 53 is formed in the flat end portion 42 of the member 40 adjacent the end thereof and a threaded bore 54 is formed in the flat end portion 43 of the member 41 in axial alignment with the bore 53. In forming the bore 54, the material from which the member 41 is formed may be extruded somewhat in a direction away from the member 40 whereby to provide an increased thread length for the bore 54. This extruded portion is identified by the reference numeral 55. A terminal screw 56 is passed through the bore 53 in the member 40 and threadedly engaged in the bore 54 in the member 41 in order to provide for connecting the end of an electrical conductor to the terminal clip 21 in a well-known manner. The corners of the end portion 42 of the member 40 are turned upwardly, as viewed in FIG. 5, to define a pair of ears 58 which are adapted to confine or limit unnecessary movement of a conductor connected to the terminal clip 21 by means of the screw 56.

Each terminal clip 21 is adapted to be inserted into one of the recesses 19 in the block 15 from the flat face 17 thereof with the innermost end of the enlarged central portion defined by the offset portions 44 and 45 abutting against flanges 60 (FIG. 4) which are formed in the recesses 19 so that the outer end of the enlarged portion of the clip 21 is disposed generally flush with the flat face 17 of the block 15.

The two terminal blades 26 are each formed of a flat piece of metal having a pair of widened shoulder portions 63 at one end thereof and a threaded bore 64 formed in the opposite end thereof. The terminal blades 26 can be described as being generally T-shaped. Each terminal blade 26 is provided with a terminal screw 65 which is threadedly engaged in the bore 64 and a pair of upturned ears 66, as viewed in FIG. 9, at the corners of the leg portion of the T which are for the same purpose as the ears 58 on the terminal clips 21.

Each of the recesses 24 in the terminal block 16 is provided with a pair of slots 68 which are formed approximately in the center of opposite sides of the recesses 24 in alignment with each other. The two terminal blades 26 are adapted to be inserted in the outer two of the three recesses 24 with the shoulder portions 63 fitted in the slots 68 and abutting against the ends of the slots 68 whereby the outer edges of the blades 26 are disposed substantially flush with the flat face 18 of the block 16. As best shown in FIGS. 10 and 11, the central portion of the outer edge of each terminal blade 26 is beveled on opposite faces thereof, as at 70, to facilitate engagement therewith by the terminal clips 21.

The terminal blade 26*a* is very similar to the terminal blades 26 in that it is generally T-shaped and is provided with shoulder portions 63*a*, a threaded bore 64*a*, a terminal screw 65*a*, and ears 66*a*. The terminal blade 26*a* is adapted to be inserted in the center one of the three recesses 24 with the shoulders 63*a* abutting against the ends of the slots 68. However, the terminal blade 26*a* differs from the terminal blades 26 in that the central portion 73 of the outer edge thereof projects outwardly beyond the flat face 18 of the terminal block 16 for a purpose which will be fully explained. The edge of the projecting portion 73 is beveled along opposite faces thereof, as at 74, to facilitate engagement with its associated terminal clip 21.

In the illustrated embodiment of the invention, the two outside terminal clips 21 and the two terminal blades 26 are adapted to be connected in a circuit with the positive side of a source of electrical energy with the center one of the three terminal clips 21 and the terminal clip 26*a* being connected in the ground portion of the circuit. Thus, when the terminal blocks 15 and 16 are connected, the ground contact is completed through the center terminal clip 21 and the terminal blade 26*a* before the power contacts are completed between the other two terminal clips 21 and the two terminal blades 26. When the terminal blocks 15 and 16 are disconnected, the power circuits are broken between the two outer terminal clips 21 and the two terminal blades 26 before the ground contact is broken between the center terminal clip 21 and the terminal blade 26*a*. This feature obviously provides a very important safety feature for this terminal block connection.

To retain the terminal clips 21 and 22 in their respective recesses 19 and 20 in the terminal block 15, a backing strip 77 is secured by suitable fasteners against the flat face 17 of the terminal block 15. The backing strip 77 is provided with a plurality of apertures 78 and three apertures 79 which are aligned, respectively, with the recesses 20 and 19 in the block 15. However, the apertures in the backing strip 77 are somewhat smaller than the recesses in the terminal block 15 whereby the edges of the apertures in the backing strip 77 are adapted to abut against the flange portions 30 of the terminal clips 22 and against the outer end of the enlarged portions of the terminal clips 21 in order to retain the terminal clips 22 and 21 in their recesses in the terminal block 15.

Likewise, to retain the terminal blades 26, 26*a* and 27 in the recesses 24 and 25 formed in the terminal block 16, a backing strip 82 is secured by suitable fasteners against the flat face 18 of the terminal block 16. The backing strip 82 is provided with a plurality of apertures 84 which are aligned with the recesses 25 and three apertures 85 which are aligned with the three recesses 24. However, the apertures 84 and 85 are somewhat smaller than the recesses 25 and 24 whereby the edges of the apertures in the backing strip 82 abut against the flange portions 36 of the terminal blades 27 and the shoulder portions 63 and 63*a* of the terminal blades 26 and 26*a*, respectively, in order to retain the terminal blades 27, 26 and 26*a* in the recesses in the terminal block 16.

The side of the terminal block 15 is provided with cut away portions 88 to permit access to the terminal screws 56 for connecting the ends of electrical conductors to the terminal clips 21. Similarly, the side of the terminal block 16 is provided with cut away portions 89 to permit access to the terminal screws 65 and 65*a* for connecting the ends of electrical conductors to the terminal blades 26 and 26*a*.

It will be understood that certain changes may be made in the structures shown and described herein without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. An electrical connection comprising, a pair of terminal blocks formed of non-conducting material and having mating flat faces, said flat faces each having three recesses formed therein with the recesses in one terminal

block being aligned with the recesses in the other terminal block, three identical, heavy duty terminal clips fitted one in each of the recesses formed in said one terminal block with two of said terminal clips adapted to be connected to the positive side of a power supply and with the third terminal clip adapted to be grounded, each of said terminal clips having an enlarged outer shoulder portion disposed generally flush with the flat face of said one terminal block and a pair of converging arms which project from the flat face of said one terminal block and are adapted for gripping engagement with a terminal blade, a backing strip secured to the flat face of said one terminal block and having three apertures formed therein in alignment with said three terminal clips whereby said converging arms of said terminal clips project therethrough, said apertures being smaller than the enlarged outer shoulder portions of said terminal clips whereby the edges of the apertures abut against said outer shoulder portions to retain said terminal clips in the recesses in said one terminal block, three terminal blades mounted one in each of the recesses formed in the flat face of said other terminal block with each of said terminal blades having outer shoulder portions disposed generally flush with the flat face of said other terminal block, a backing strip secured against the flat face of said other terminal block and having three apertures formed therein alignment with said three terminal blades, said apertures being small enough whereby the edges thereof abut against the outer shoulders of said terminal blades whereby to retain said terminal blades in the recesses formed in said other terminal block, the outer ends of the terminal blades which are aligned with said power supply terminal clips being substantially flush with said flat face of said other block and the outer end of the terminal blade which is aligned with said grounded terminal clip projecting beyond the flat face of said other block whereby when said terminal blocks are connected and disconnected the ground contact is made before the power contact is made and the ground contact is broken after the power contact is broken, the outer ends of said terminal blades being beveled and said converging arms of said terminal clips having slightly diverging tips in order to facilitate interconnecting said pair of terminal blocks.

2. A terminal member comprising, a black of non-conducting material having at least one flat face, said flat face having a terminal-clip-receiving recess formed therein, a two-piece terminal clip formed of a pair of separate identically shaped elongated gripping jaw members disposed side-by-side and secured together at one end and fitted in said recess with the secured ends of said jaw members being disposed inwardly of said recess, said terminal clip having an enlarged portion intermediate its ends with the outer end of said enlarged portion being disposed substantially flush with said flat face, and a gripping end portion extending from said outer end of said enlarged portion and outwardly from said flat face, said gripping end portion being defined by the unsecured ends of said pair of elongated jaw members which converge generally toward each other with the tips thereof diverging slightly away from each other to facilitate gripping engagement of said terminal clip with a terminal blade, said secured ends of said pair of elongated jaw members having aligned bores formed therein at least one of which is internally threaded, a terminal screw threadedly engaged in said bores for connecting an electrical conductor to said terminal clip, and a backing strip secured to the flat face of said block and having an aperture formed therein in alignment with said terminal-clip-receiving recess, said aperture being large enough to permit said gripping end portion of said terminal clip to project therethrough and small enough whereby the edges of the aperture abut against said outer end of the enlarged portion of said terminal clip whereby to retain the terminal clip in said recess.

3. A terminal member comprising, a generally rectangular block of non-conducting material having at least one flat face, said flat face having a terminal-clip-receiving recess formed therein with said recess being provided with outwardly facing flange means spaced from the flat face of said block, and a two-piece terminal clip formed of a pair of separate identically shaped, elongated gripping jaw members, each of said members having a flat end portion, an offset portion adjacent thereto and defined by four substantially rectangular bends in said member, and an opposite end portion which tapers from said offset portion toward a plane passing through said flat end portion, said pair of elongated jaw members being positioned side by side with said offset portions opposing each other, and means passing through said flat end portions of said pair of elongated gripping jaw members for securing said members together, said two-piece terminal clip being fitted in said recess in said block with said oppositely facing offset portions supporting the terminal clip on said outwardly facing flange means in said recess so that the secured end of the terminal clip extends into the recess beyond said flange means and so that said tapered opposite end portions project from the flat face of said block and converge generally toward each other with the tips thereof diverging slightly away from each other to facilitate gripping engagement of said terminal clip with a terminal blade.

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