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TERMINAL ASSEMBLY

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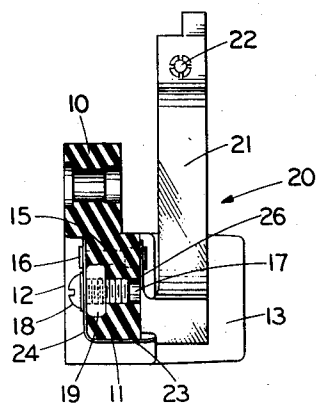


Fig. 2

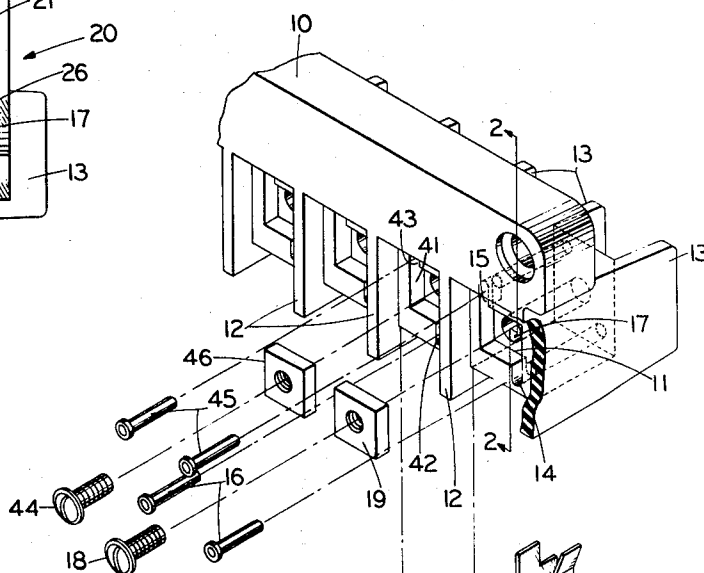


Fig. 1

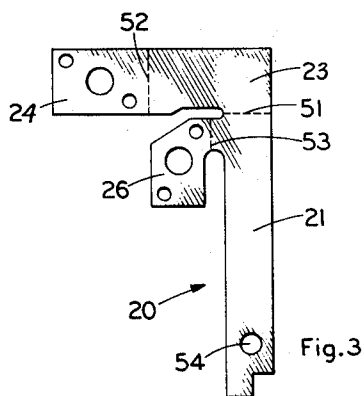
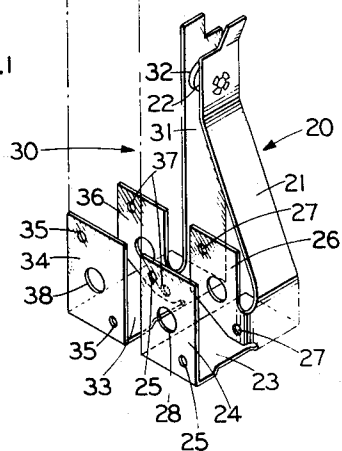


Fig. 3



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TERMINAL ASSEMBLY

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2 Claims. (Cl. 200-166)

Our invention pertains to a terminal assembly and particularly to a terminal assembly having utility in a switching apparatus.

In many applications, a terminal assembly comprises a terminal connector affixed to one side of a board member and a relatively inaccessible conductor element on the other. Circuit continuity is achieved between the two by some sort of interconnection, such as wiring, since it is impossible or inconvenient to make direct connection to the conductor element. Use of the interconnection introduces opportunity for error in fabrication and often-times results in lessened current carrying capacity. Reliability is diminished by a poor interconnection which can cause a high resistance at the point of connection which under overloading conditions will generate heat causing hot spots or actual burning out of the connection. In electrical switching devices where the conductor element is a deflectable blade member, overloading takes place under arcing conditions the magnitude of which may be substantially unpredictable. In addition the arcing may cause welding of contacts carried by the blade member especially in high current switching. Totally facile and accurate switching through deflection of the blade member is possible only if the weld can be broken. One manner of breaking welds between contacts to acquire improved switching operation is described in a copending application of William J. Schultz and Carl F. Van Bennekorn, Serial Number 556,683, filed December 30, 1955, now Patent No. 2,858,385, issued October 28, 1958, and assigned to the same assignee as the present application. Generally the weld between contacts is broken only after a mechanical force in excess of that normally necessary to deflect the blade member is applied thereto. Thus, the conductor blade member in the terminal assembly must be capable of withstanding substantial mechanical forces likely to cause separation of the deflectable blade member from the assembly.

It is therefore an object of the present invention to provide an improved terminal assembly in which greater reliability by elimination of burnouts and increased current carrying capacity is attained.

It is also an object to provide an improved terminal assembly in which a deflectable conductor blade member is more securely attached in the assembly to resist mechanical forces.

It is a further object of this invention to provide an improved terminal assembly in keeping with the above objects which is simple in construction, simple to fabricate, and has a minimum of parts.

In accordance with the above objects we provide a terminal assembly comprising a board member of insulating material and a blade member mounted thereon. The blade member is designed to have a deflecting portion extending generally along one side of the board member (where it may perform a switching function) and an integral terminal portion extending to the opposite side of the board member where connection to an external conductor is to be made. Thus, the need for a separate interconnection such as by internal wiring for example

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is eliminated and the possibility of burnout due to loose connection is eliminated. To achieve secure attachment to withstand mechanical forces applied to the blade member, the terminal portion is adapted to be secured to one side of the board member by means, preferably rivets in the form of eyelets, which also transfixes a flange means extending from the deflecting portion into engagement with the board member on the side opposite the terminal portion. Simplicity is achieved and the number of parts reduced to a minimum by providing a cavity in the board member with a screw receiving means, such as a nut, retained therein by the terminal portion which when adapted to extend to the opposite side of the board member also is adapted to overlay the cavity. An opening in the terminal portion is aligned with the screw receiving means and a terminal screw extends through the opening into the nut to coact therewith to attach a conductor in direct contact with the terminal portion and hence the deflectable member.

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself may be better understood as to organization and construction as well as to further objects and advantages by reference to the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is an exploded isometric view of the terminal assembly embodying our invention.

Figure 2 is a side elevational cross section taken along line 2-2 of Figure 1.

Figure 3 is a layout presentation of deflectable blade member illustrating details of fabrication.

In the drawing like numerals indicate like parts in the various figures.

Referring to Figures 1 and 2, there is illustrated a preferred embodiment of a terminal assembly having particular utility in a switching apparatus, comprising a board member 10, deflectable contact blade member 20 mounted thereon, and connector means in the form of terminal screw 18 and screw retaining nut 19. The entire assembly is preferably adapted for mounting in a switch apparatus as a unit as more fully disclosed in copending application Serial No. 556,683, filed December 30, 1955, now Patent No. 2,858,385, issued October 28, 1958, mentioned supra. Board member 10 which is of insulating material, is made in any well known manner but preferably by molding so that cavities 11 and insulating ridges 12 on one side of the board member and insulating ridges 13 on the opposite side are formed during the molding process. Openings 14 and 15 for receiving riveting eyelets 16 and opening 17 for receiving the extending end of terminal screw 18 may be provided in any well known manner preferably by boring after molding of the board member is complete. While blade member 20 is designed to have a deflecting portion 21 having a suitable contact proximate one end thereof and positioned on one side of board member 10 where it may be relatively inaccessible, an easily accessible electrical connection to an external conductor is provided by an integral terminal portion 23 which is adapted to extend in a generally horizontal plane from the base end of the deflecting portion 21. An up-turned extension 24 of terminal portion 23 presents itself on the side opposite the deflecting portion to which electrical contact is conveniently made. The terminal portion extension 24 likewise is adapted to serve as a means to anchor the blade member 20 to the board member 10 and for that purpose, openings 25 are provided to permit attaching means in the form of eyelets 16 to pass therethrough when in registry with openings 14 and 15 through board member 10. An increased capacity of the blade member to withstand mechanical forces tending to bend the deflecting portion 21 and terminal portion 23 so as to cause change in position relative to the board member 10

is provided by a flange means 26 extending from the inner edge of the deflecting portion 21 and arranged in a manner such that it is separated from and parallel with terminal portion extension 24. Suitable openings 27 are provided in flange means 26 which, when final shaping of the blade member takes place, are aligned with openings 25 on terminal portion extension 24 so as to permit eyelets 16 to pass therethrough from openings 14 and 15 in board member 10 to transfix both extension 24 and flange means 26 to opposite sides thereof. Terminal portion extension 24 serves an additional function of holding connector means on board member 10 when transfixed to the board member by eyelets 16. Extension 24 is adapted to be of sufficient length and is placed in proper position when assembled on board member 10 to overlay cavity 11 so as to retain nut 19 therewithin. Opening 28 in extension 24 is aligned with the nut 19 and permits terminal screw 18 to extend therethrough into threaded engagement therewith. Thus, a terminal connection is easily made by attaching an electrical conductor in direct contact with integral terminal portion extension 24 by screw 18 which is threadably held in position by nut 19 which in turn is retained on board member 10 by transfixed extension 24 of terminal portion 23.

In the embodiment of Figure 1 a second deflectable blade member 30 is provided similar to blade member 20 and cooperates therewith to perform a switching operation in a suitable manner. To fulfill a similar purpose, blade member 30 is provided with deflecting portion 31 having a suitable contact 32 near one end and extending generally in a vertical plane on one side of the board member 10 and an integral terminal portion 33 extending in a generally horizontal plane from the base end of the deflecting portion 31 to the opposite side of the board member 10 where a vertically upturned extension 34 engages the opposite side of board member 10 and overlays cavity 41 to retain nut 46 therein. Suitable opening 38 in extension 34 aligns with the nut 46 and permits screw 44 to extend therethrough. Attachment of extension 34 to board member 10 is accomplished by eyelets 45 which extend through suitable openings 35 in extension 34, openings 42 and 43 in board member 10 and corresponding aligned openings 37 in parallel and separated flange means 36 adapted to extend from the inner edge near base end of deflecting portion 31 into engagement with the opposite side of board member 10.

In fabrication a blade member may be cut in a single operation by suitable dies stamping a sheet of conducting material. Referring to Figure 3 it will be seen that the final shaping of the blade member 20 to have deflecting portion 21, terminal portion 23 and its extension 24, and flange means 26 is obtained after stamping by bending the respective portions along dotted lines 51, 52, and 53 respectively in any well known manner in single or consecutive operations. Attachment of contact 22 to the blade member may be made in a suitable fashion such as by staking in hole 54 of deflecting portion 21. Further bending of deflecting portion 21 may be had to bring contact 22 into position for switching with adjacently disposed contact 32 of blade member 30 as illustrated in Figure 1.

The parts are brought into assembled array by placing nut 19 in cavity 17 located between separating ridges 12. Blade member 20 is then mounted on the board member 10 so that the terminal portion extension 24 overlaps the cavity 11 thus retaining nut 19 therein. Extensions 24 and flange means 26 with opening 28 in alignment with nut 19 and openings 25 and 27 in alignment with openings 14 and 15 through board member 10 are attached thereto by transfixing eyelets 16 which when placed therethrough extend from opposite sides of the board member are deformed in conventional manner. Terminal screw 18 is then threaded through opening 28 into nut 19, whereupon an external conductor may be brought into contact with terminal portion 24 to form an efficient connection directly to the blade members. Blade member

30 is likewise assembled with nut 46 in cavity 41, eyelets 45 extending through openings 35 in extension 34, openings 37 in flange 36 having passed through openings 42 and 43 in board member 10. Terminal screw 44 is then placed through aligned opening 38 into threaded engagement with nut 46. Thus, blade members 20 and 30 are firmly secured to board member 10 in relatively simple manner with direct electrical connection to external conductors to be connected thereto.

Therefore, while a particular embodiment of the subject invention has been shown and described herein, it is in the nature of description rather than limitation, and it will occur to those skilled in the art that various changes, modifications, and combinations may be made within the province of the appended claims, and without departing either in spirit or scope from this invention in its broader aspects.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A terminal assembly for use in switching apparatus comprising a terminal board member having first and second parallel surfaces, an electrically conductive deflectable blade member mounted on said board member having a portion with an electrical contact attached proximate to one end thereof and integral means at the other end to secure said blade to said terminal board, said integral means comprising a terminal portion overlaying said first surface and a flange portion overlaying said second surface, a nut member interposed between said terminal portion and first parallel surface and retained by said terminal portion, attaching means transfixing said terminal portion and said flange portion to said board member, and a terminal screw extending through said terminal portion and coacting with said nut member for electrically connecting an external conductor between said screw and said terminal portion to provide an electrical connection between said electrical contact and said external conductor.

2. A terminal assembly for use in switching apparatus comprising a board member having first and second parallel surfaces and a cavity in said first surface, a deflectable blade member mounted on said board member having a deflecting portion adapted for deflection in a direction parallel to said surfaces of said board member and having an electrical contact attached proximate to the free end thereof, said deflecting portion having flange means adapted to overlay and engage said second surface, said blade member having an integral terminal portion having an opening therein, said terminal portion adapted to extend into engagement with said first surface so as to overlay said cavity whereby said opening is aligned therewith, attaching means transfixing said terminal portion and said flange means to said board member, a nut member retained in said cavity by said terminal portion, and a terminal screw for electrically connecting an external conductor thereto extending through said opening in said terminal portion and coacting with said nut member to hold said conductor in electrical contact with said terminal portion and provide an electrical connection between said external conductor and said electrical contact at the free end of said deflecting portion of said blade member.

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