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L. W. HAERTHER ETAL
SAFETY CLASP ELECTRICAL CONNECTOR

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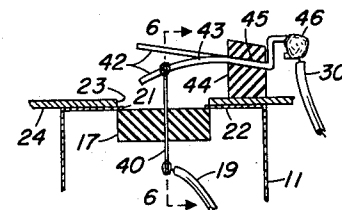
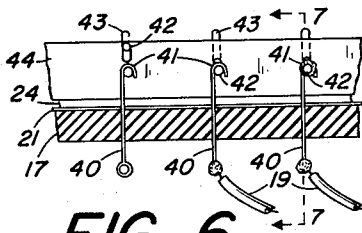
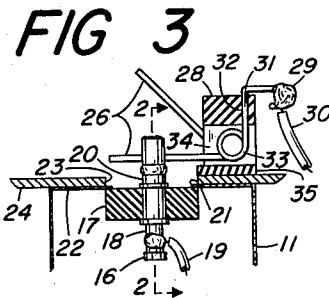
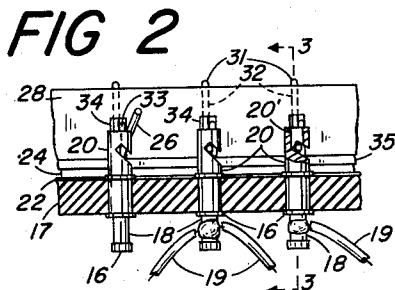
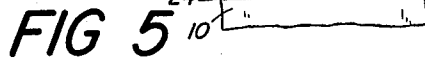
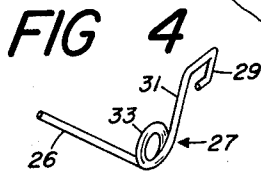
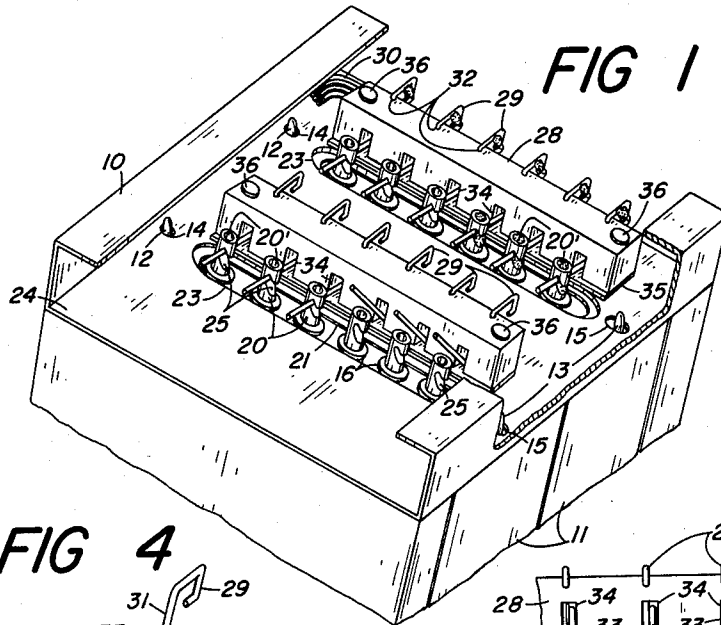


FIG 6

FIG 7

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1

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SAFETY CLASP ELECTRICAL CONNECTOR

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1 Claim. (Cl. 339—198)

This invention relates to the connecting of wires and is particularly concerned with a safety clasp connector for connecting the wiring of modules of electronic gear into the wiring of chassis.

Jack and plug connectors and many other connector arrangements are used for connecting electrical apparatus such as for connecting modules to the wiring of a chassis. Many of these connectors depend upon sliding engagement of spring element contacts. Another wire connecting arrangement uses spring loaded abutment connections. These may perform useful service but are not as reliable generally as soldered connections and frequently impose excessive space requirements as well. Soldered connections between the ends of module circuit wires and chassis circuit wires can also present problems of reliability and space requirements. Such wire soldering may require the service of highly trained technicians and still, as a general rule, there is no safety measure provided against inadequate soldering or against occasional separation of a soldered connection.

It is, therefore, a principal object of this invention to provide a safety connection for two wires wherein the wires may be positively connected and are capable of remaining connected even though they are unsoldered or, if after having been soldered, the soldering should prove inadequate.

Another object is to simplify soldering and unsoldering of connections between a module and the wiring of a chassis and for these operations to be so simplified that an unskilled technician may satisfactorily perform the operations involved in connecting or disconnecting a module into or from a chassis.

A further object is to provide safe connecting means which is readily adaptable to considerable variation in position between terminals of the connection.

Another object is to provide good, safe and neat multiple connections for a module to the wiring of the chassis with minimum space and weight requirements.

Features in the accomplishment of these objects are the provision of multiple terminals mounted in a panel of insulating material used to close an elongated opening in the base of a module and with the terminals projecting to the outside as well as to the inside of the panel. The portions of the module terminals projecting to the outside extend through an elongated opening in the chassis and are provided with slots for receiving arms of chassis mounted connection elements. These elements are formed from spring wire and are conveniently mounted in blocks of insulating material, a battery of the connection elements on each block for cooperative connection with respective module terminals. The arm of each of the spring wire terminals is resiliently biased in one direction and may be easily inserted in the slot of its respective module terminal. The resilient bias of the spring wire chassis terminals effectively maintains the seating of each terminal arm in its respective module terminal slot as in a clasp. In addition, a module terminal soldering sleeve extending from a terminal end to the slot therein greatly facilitates soldering a chassis terminal arm seated in the slot.

Specific embodiments representing what are presently regarded as the best modes of carrying out the invention are illustrated in the accompanying drawings.

2

In the drawings:

FIG. 1 represents a perspective fragmentary view of a chassis mounting multiple modules showing the safety connector arrangement for connecting module terminals into wiring of the chassis;

FIG. 2, a fragmentary view taken from line 2—2 of FIG. 3 showing connector arrangement detail;

FIG. 3, a fragmentary view taken from line 3—3 of FIG. 2 showing connector detail;

FIG. 4, a perspective view showing the spring wire chassis terminal of one of the safety connectors of FIG. 1;

FIG. 5, a fragmentary view showing spring wire terminals from the rear mounted in a block of insulating material in a chassis;

FIG. 6, a fragmentary sectioned view taken from line 6—6 of FIG. 7 showing another safety connector embodiment; and

FIG. 7, a fragmentary sectioned view taken from line 7—7 of FIG. 6.

Referring to the drawings:

Electronic gear chassis 10, which is shown upside down in FIGURE 1, mounts multiple modules 11 which are held in position thereon by locating pins 12, key pins 13 which are received in chassis openings 14 and 15 respectively and by screws or rivets not shown. Referring also to FIGURES 2 and 3, each module 11 is shown to be equipped with a battery of terminals 16 which are mounted in a sheet or plate 17 of insulating material. Each of the terminals 16 has an extension to the inside of the module as a terminal portion 18 to which internal wiring 19 is fastened as by soldering. In addition, each terminal 16 also has a portion 20 extending to the outside of plate 17 and to the outside of its module 11. Elongated slot 21 in the base 22 of module 11, which is closed by plate 17 and a corresponding slot 23 in base plate 24 of chassis 10, enables extension of the outwardly extended portions 20 of terminals 18 to the interior of chassis 10.

Portion 20 of each terminal 16 is advantageously provided with a clasp slot 25 which is slanted relative to the vertical axes of the terminal 16. Each clasp slot 25 is adapted as by spacing between slot walls and its angle of slant to receive a spring arm 26 which may be resiliently spring biased for seating therein as in a clasp. Spring arms 26 are arm extensions of respective chassis terminal elements 27 (see FIGURE 4). Portions 20 of terminals 16 are formed with sleeve openings 20' extending from ends thereof to slots 25 for convenient application of solder to arms 26 seated in clasp slots 25.

Chassis terminal elements 27 are mounted in batteries, one battery on each insulating block 28 for cooperative connection with the terminals 16 of respective modules 11. Chassis elements 27 are each provided with a terminal end 29 which is looped or formed for soldered connections with chassis wires 30 and to present a low height profile. On the other hand, chassis elements 27 could have terminal posts adapted for connection with printed circuit wafers or cable. Stem portion 31 of each element 27, which is firmly held in an opening 32 of insulating block 28, extends to a spring coil 33 which terminates in a spring arm 26.

Referring also to FIGURE 5, insulating blocks 28 are conveniently provided with slots 34 for receiving the spring coils 33 of terminal elements 27 mounted thereon. Each spring coil 33 effectively biases its arm 26 upwardly, as shown in FIGURES 1—4, and away from contact with the respective terminal 16 when the arm is not inserted in a clasp slot 25. When an arm 26 has been inserted, the resilient biasing action of its spring coil 33, and, in some small degree, in the arm 26 itself, advantageously seats the arm 26 in its respective clasp slot 25 and establishes good electrical contact with respective terminals 16. Plates 35

of insulating material, which prevent shorting of terminal elements 27 to chassis base plate 24, and the insulating blocks 28 are conveniently mounted on the chassis by rivets or screws 36.

With this connection, arms 26 may be easily inserted into slots 25 for resiliently biased seating therein and good electrical connection, whether soldered therein or not, and may be easily soldered by heating the portions 20 of the terminals 16 and holding solder to the sleeve openings 20'. Arms 26 may be easily disconnected from their seated and soldered connections with terminals 16 by applying a hot soldering iron to heat the portion 20 of a terminal 16 to be unconnected until the solder therein liquidifies and then pushing the arm 26 down and out of the clasp slot 25 after which the resilient force of spring coil 33 lifts the arm 26 up and away from its terminal 16. Such spring biased seating in a clasp connection, soldering, unsoldering and disconnection may be quickly and easily accomplished by the unskilled technician. In addition, this connection permits considerable variation in terminal spacing and positioning without adversely affecting the efficiency of electrical connection between the modules and wiring of a chassis. Such advantages are inherent in the resiliently biased seating of the arms in the clasp slots and in the great range of resilient movement and deflection permissible in the arms themselves and particularly through the spring coils of the chassis terminal elements.

With reference to the embodiment of FIGURES 6 and 7, members substantially the same as the corresponding members of the other embodiment are numbered the same. In this embodiment a battery of terminals 40, which extend through a module plate 17 of insulating material, are connected to wires 19 within a module 11. Outside the module, terminals 40 are formed with clasp or hook ends 41 for receiving spring arms 42 of chassis terminal elements 43. Terminal elements 43 are mounted in batteries on respective insulating blocks 44 of the chassis. Each terminal element 43 is mounted with its spring arm 42 extending through and closely fitted or molded in an insulating block 44. Terminal connections 46 to which chassis wires 30 are soldered extend to one side of each insulating block 44 and spring arms 42 extend outwardly from the other side of each insulating block. Each arm 42 may be easily inserted in the cooperating hook or clasp 41 of its cooperating terminal

40 to be resiliently seated therein after which it may be soldered in place. Here again, just as with the other embodiment, the soldered connection may be heated and the arm 42 pushed out of its resiliently biased seat in the hook or clasp 41. The arm 42 may then be permitted to spring up and away from any connection with the respective terminal 40. With this arrangement, since all the spring deflection is taken up in arm 42 itself, spacing between terminals 40 and the respective insulating block 44 is likely to be greater than such spacing in the other embodiment.

Whereas this invention is here illustrated and described with respect to two specific embodiments thereof, it should be realized that various changes may be made without departing from the essential contributions to the art made by the teachings hereof.

We claim:

A connector for establishing a circuit connection between two wires comprising, a substantially fixed-position terminal connected to one of the wires, said terminal formed with a clasp having a bottom seat, an element connected to the other wire, said element having an arm, and means resiliently biasing said arm substantially along the longitudinal axis of said terminal and toward the clasp bottom seat when the arm is in the clasp and maintaining resiliently biased seating of said arm in said clasp, means resiliently biasing the arm away from said terminal when the arm is not in said clasp; wherein said terminal has a sleeve portion extended from a terminal and to the clasp formed in the terminal, and wherein said sleeve portion is adapted for the feeding of molten solder from the terminal end to said clasp.

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CERTIFICATE OF CORRECTION

Patent No. 3,155,447

November 3, 1964

Lester W. Haerther et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 59, for "of of" read -- of an --; column 3, line 14, for "liquidifies" read -- liquifies --; column 4, line 29, for "and" read -- end --.

Signed and sealed this 30th day of March 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents