

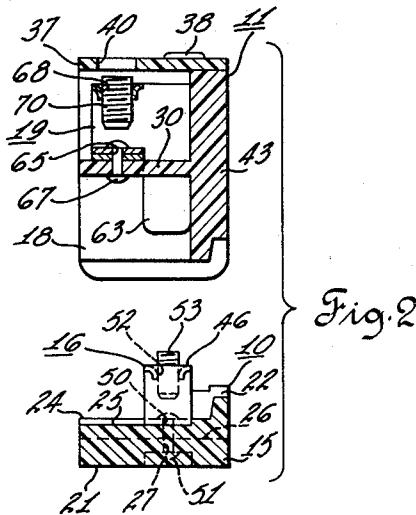
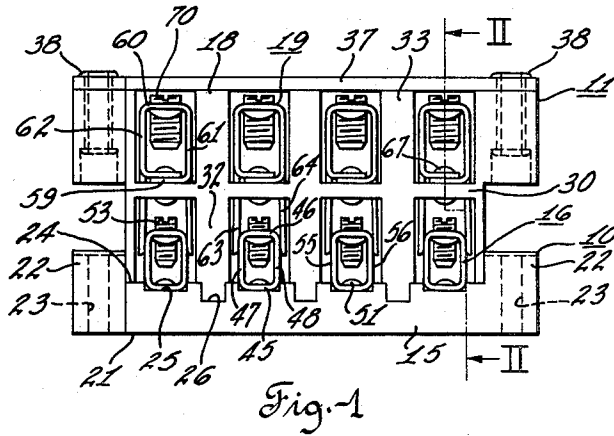
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PLUG IN TERMINAL BLOCK

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PLUG IN TERMINAL BLOCK

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This invention relates in general to electrical connectors. More specifically, this invention relates to a plug in terminal block.

A terminal block is an assembly of electrical connectors that are mounted on an insulating base and join the ends of the conductors of one electrical system to the ends of corresponding conductors of an associate electrical system. For example, a terminal block is frequently used to connect a group of electrical control devices to a system of electrically controlled apparatus. If necessary, the conductors can be disconnected at the terminal block to separate the control devices and the system.

A plug in terminal block divides the electrical connectors into two sections that each have electrical contacts that easily connect or disconnect the two groups of conductors. The contacts complicate the plug in terminal block, and increase its size in comparison with a terminal block that does not plug in. The size of a plug in terminal block is particularly significant where a plug in terminal block is required for an application that was originally intended for a terminal block of the type that does not plug in.

The plug in terminal block of this invention combines in one compact space the two functions of connecting to the end of a conductor and making contact between the two sections of the terminal block. The contacts of one section of the terminal block are each a generally rectangular frame. Two of the sides of the frame are parallel and are the contact making surfaces of the contact. The contacts are aligned on an insulating base with the frame open in the direction orthogonal to the direction of plugging in and unplugging and to the direction of the alignment of the contacts. Thus, the space between the parallel contact surfaces is unobstructed in one direction and the contact receives the end of a conductor in this space. A suitable means such as a screw threaded through the connecting member in the direction of plugging in and unplugging secures the conductor in electrical contact with the inside surface of the contact.

One advantage of this plug in terminal block is that each contact has two contact surfaces. This increases the current rating of the terminal block considerably without appreciably increasing the size of the terminal block.

One object of this invention is to provide a new and improved electrical connector.

Another object of this invention is to provide a new and improved plug in terminal block.

Another object of this invention is to provide a new and improved plug in terminal block that is very compact, particularly in the direction of plugging in and unplugging the two sections of the terminal block.

Another object of this invention is to provide a new and improved plug in terminal block with increased contact area in relation to the size of the terminal block.

The drawing and the detailed description of the invention will suggest other objects and advantages.

In the drawing, FIG. 1 is a front view of the plug in terminal block of this invention. FIG. 2 is an exploded end view of the plug in terminal block of FIG. 1 along line II-II.

The two figures in the drawing define a generally orthogonal system of coordinates that are important in understanding this invention. FIG. 1 is in the plane of the direction of plugging in and unplugging the terminal

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block and the direction of alignment of the contacts of the terminal block. FIG. 2 is in the plane of the direction of plugging in and unplugging and the direction of receiving a conductor.

5 The plug in terminal block of this invention has two sections 10, 11, that connect two groups of conductors. The first section 10 has an insulating base 15 and a set of contacts 16 that are spaced apart in the direction of contact alignment. The second section 11 has an insulating base 18 and a corresponding set of contacts 19. The two insulating bases 15, 18, are adapted to support the contacts 16, 19, and to fit together in a predetermined form (FIG. 1) that properly matches the two sets of contacts.

15 The first insulating base 15 is a generally rectangular solid of suitable insulating and supporting material. One side 21 of the base is flat for mounting the base on a flat surface of an associated electrical apparatus. Raised end portions 22 of the base 15 are provided with holes 23 for receiving screws or other suitable means for mounting the base on the apparatus.

20 The opposite side 24 of the first base 15 has, between the two end portions 22, a series of shallow depressions 25 that receive the contacts 16 and intervening depressions 26 that cooperate with the second base to align the two sections in a proper plugged in position. The base 15 has an opening 27 in the region of each contact receiving depression 25 for riveting the contacts 16 to the base.

25 The second insulating base 18 has an insulating and supporting member 30 that is generally parallel to the contact receiving surface 24 of the first insulating base 15. Insulating members 32, 33, extend from the opposite sides of the supporting member in the direction of plugging in and unplugging the terminal block. The ends of the insulating members 32 that extend toward the first base 15 fit in the depressions 26 of the first base 15. An insulating cover 37 is mounted over the ends of the members 33 by suitable means such as rivets 38. The cover 37 has an opening 40 in the region of each contact 19 to provide access for connecting and disconnecting a conductor to the contact 19. The second base 18 also preferably has an insulating member 43 that insulates the contacts 19 along only one side in the direction of receiving a conductor. Thus, when the two terminal block sections 10, 11, are in the plugged in position (FIG. 1), each contact 16, 19, is obscured from the direction of plugging in and unplugging and from the direction of contact alignment, but each contact is freely accessible from the direction of receiving a conductor.

30 The first set of contacts 16 are each generally rectangular closed frame having four sides 45, 46, 47, 48, of a suitable conducting material. Two of the sides 45, 46, are generally perpendicular to the direction of plugging in, and these sides cooperate to retain and electrically contact a conductor. One of these sides 45 has an opening 50 that is aligned with an opening 27 in the first base 15 and a rivet 51 or other suitable means through the two openings 27, 50 secures the contact 16 to the base 15. The opposite side 46 of the contact has an opening 52 that is threaded to receive a screw 53 that is adjustable to secure a conductor between the screw and the side 45. The other two parallel sides 47, 48, are generally perpendicular to the direction of contact alignment and make electrical contact along their outside surfaces 55, 56, with the corresponding contacts 19 of the other section. The frame is open in the direction of receiving a conductor.

35 The contacts 19 of the second set 11 are each adapted to receive a conductor and to engage the contacts 16 of the first section 10 on the outside surfaces 55, 56, of both of the contact making sides 47, 48. The contact making function and the conductor receiving function are physically separate in the contacts of the second set.

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A generally rectangular frame of conducting material having four sides 59, 60, 61, 62, receives the conductor. Two of the sides 59, 60 of the frame are perpendicular to the direction of plugging in, and these sides are generally similar to the sides 45, 46, of the first set of contacts 16. One of these sides 59 has an opening 65 that is aligned with an opening in the second base 18 for receiving a rivet 67 to mount the contact 19 on the support 30. The opposite side 60 has an opening 68 that is threaded to receive a screw 70 that can be positioned to secure the end of a conductor inside the rectangular frame. The other two sides 61, 62 complete the rectangular figure, and two partial extensions 63, 64, of these sides project through the support 30 to engage the contacts 16 of the first set when the terminal block is plugged in.

In summary, the plug in terminal block of this invention has advantages that are very important. The terminal block is very compact. The contacts of the terminal block receive a conductor in an unobscured direction that is perpendicular to the two obscured directions of contact alignment and plugging in. The contacts 16 of the first set engage the contacts 19 of the second set in the same general region that they receive a conductor. This overlap significantly reduces the size of the terminal block in relation to its current carrying capacity. Each pair of contacts 16, 19, makes contact along two pairs of surfaces to further increase the current carrying capacity of the terminal block in relation to its size.

Those skilled in the art will recognize various changes in the specific terminal block that has been described, and the claims are intended to cover various terminal blocks that are within the spirit of the invention.

Having now particularly described and ascertained the nature of my said invention and the manner in which it is to be performed, I declare that what I claim is:

1. A plug in terminal block comprising first and second insulating bases that fit together in a predetermined form, a first set of contacts each having two spaced apart oppositely facing parallel contact making surfaces and having an opening for receiving the end of a conductor between said contact making surfaces, a second set of contacts mounted on said second base and each having pairs of spaced apart means to engage said two contact making surfaces of a corresponding first contact therebetween and to at least partially overlap the region of receiving and securing the conductor to said first contacts, and means mounting said first contacts in a line on said first base with said conductor receiving openings facing in a direction that is orthogonal to the line of said first contacts and to the direction of fitting together said first and second bases.

2. A plug in terminal block comprising a first insulating base, a first set of contacts mounted on said first base in a line, each of said first contacts having two sides spaced apart in the direction of contact alignment to receive the end of a conductor therebetween and having two parallel outer contact surfaces facing in the direction of contact alignment, means for securing the end of the conductor in the space between the sides of its associated contact in conductive relationship with the two contact making surfaces, a second insulating base, a second set of contacts positioned on said second base to each correspond to a contact of said first set, each said second contact having means to electrically contact the contact making surfaces of the corresponding first contact in the region of said securing means when the terminal block is plugged in.

3. A plug in terminal block comprising first and second insulating bases, a set of first contacts each comprising a four sided rectangular frame of conducting material that is open between said sides to receive the end of a con-

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ductor, means mounting said first contacts on said first base in a line with said conductor receiving openings each facing in a direction that is generally orthogonal to the direction of contact alignment and the direction of plugging in and unplugging the terminal block, and a set of second contacts mounted on said second base and each having means to engage two of the sides of a contact of said first set.

4. A plug in terminal block for electrically connecting the ends of pairs of conductors, comprising first and second insulating bases that fit together in a predetermined form, a first set of contacts spaced apart in a line on said first base, each said first contacts having a four sided generally rectangular frame that is closed in the direction of contact alignment to provide two parallel contact making surfaces and closed in the direction of plugging in and unplugging the terminal block to provide means for securing the end of a conductor between said sides of said frame and open in the direction generally orthogonal to the direction of contact alignment and the direction of plugging in and unplugging the terminal block, and a second set of contacts positioned on said second base, each of said second contacts having two contact elements for engaging said two contact making surfaces of one of said first contacts.

5. A plug in terminal block comprising first and second insulating bases, a set of first contacts, each of said first contacts comprising a rectangular frame of four spaced apart conductive sides, said contacts mounted on said first base in a line with a first pair of said sides generally perpendicular to said line and a second pair of said sides generally perpendicular to the direction of plugging in the terminal block, a set of second contacts each having two contact making elements and each mounted on said second base in position to releasably engage said first pair of sides of a corresponding first contact between said two contact making elements, said first and second bases fitting together in a predetermined form to plug in said sets of contacts and to partially enclose said contacts, said bases being partially open for said first contacts to receive a conductor in the space between said sides.

6. A plug in terminal block according to claim 2 in which the conductor securing means for each contact of the first set comprises a screw threadably received between the two sides of an associated contact and accessible from the direction of plugging in the terminal block when said two bases are separated; and the contacts of the second set have securing means for a conductor comprising a screw threadably received in a region remote from said means to contact the surfaces of the first contacts.

7. A plug in terminal block according to claim 5 in which the contacts of said first set each have means to secure the conductor in the open space between said sides and said securing means is positioned at least partially between the two contact making elements of the corresponding contact of said second set when the terminal block is plugged in.

References Cited in the file of this patent

UNITED STATES PATENTS

2,688,123	Benham	Aug. 31, 1954
2,875,422	Young	Feb. 24, 1959
2,882,513	Olashaw	Apr. 14, 1959
2,885,652	Rowe	May 5, 1959

FOREIGN PATENTS

944,494	France	Nov. 2, 1959
1,205,732	France	Aug. 17, 1959
1,212,439	France	Oct. 19, 1959
693,924	Great Britain	July 8, 1953