

July 26, 1938.

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2,125,256

DETACHABLE TERMINAL BOARD FOR ELECTRICAL DEVICES

Filed June 8, 1935

FIG. 1.

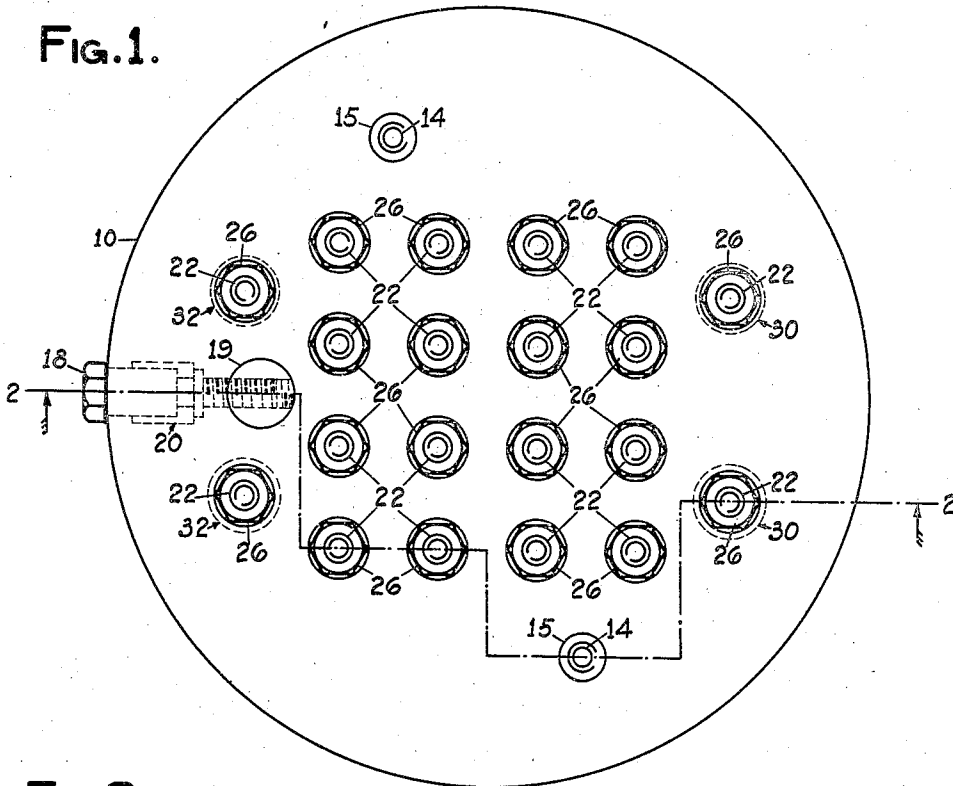


FIG. 2.

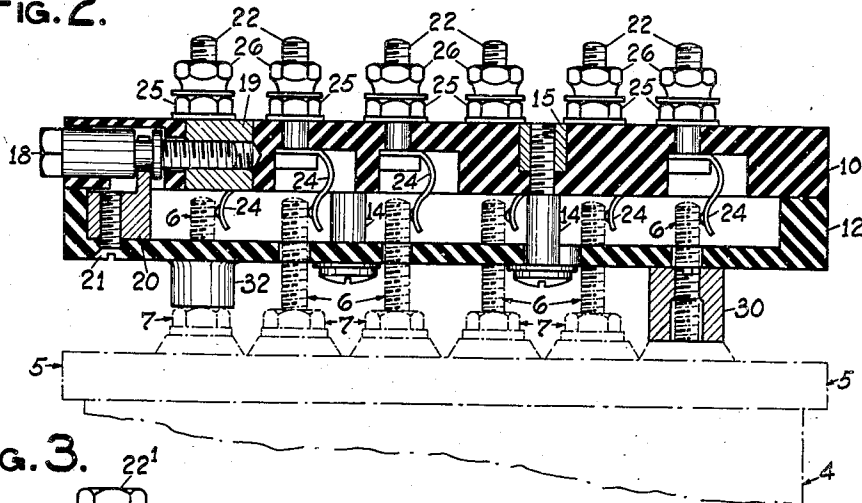
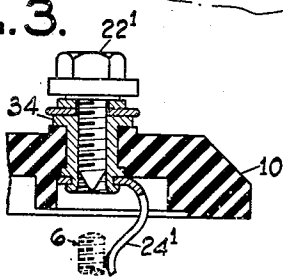


FIG. 3.



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2,125,256

DETACHABLE TERMINAL BOARD FOR ELECTRICAL DEVICES

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Application June 8, 1935, Serial No. 25,616

10 Claims. (Cl. 173—328)

This invention relates in general to electrical apparatus, and more particularly to a detachable terminal board for electrical devices such as employed in railway signalling systems or the like.

5 In railway signalling systems, certain electrical devices such as relays form a part of a rather complicated circuit arrangement, which makes it very important that the external electrical connections to these relays are always placed on the proper terminal posts and are so secured to these posts that a reliable low resistance electrical connection is formed. However, it is necessary to occasionally remove the relays from the system for replacement, repair or the like, and consequently the large number of circuits involved in making such a change often results in delaying normal operation of the signalling system for an undue length of time, and also there is a great possibility of improperly replacing the electrical connections with possible danger of improper operation or of further delay.

In view of the above and other considerations, it is proposed in accordance with the present invention to provide a terminal board upon which external electrical conductors are permanently secure and which can be installed on an electrical device or removed therefrom with a minimum of manual operation and yet which is arranged to provide a reliable low resistance connection between the electrical conductors and the associated parts of the electrical device. It is further proposed to provide such a terminal board which can be arranged on the electrical device to complete the electrical circuits involved only when the external electrical conductors are connected to the proper parts of the electrical device.

Other objects, purposes and characteristic features of the present invention will appear as the description thereof progresses, during which references will be made to the accompanying drawing, in which

Fig. 1 is a plan view of one form of a detachable terminal board constructed in accordance with the present invention.

45 Fig. 2 is an elevational sectional view of the terminal board shown in Fig. 1 taken substantially on line 2—2 and viewed in the direction indicated by the arrows, the terminal board being herein illustrated as applied to one form of a relay indicated by dot and dash lines.

50 Fig. 3 is a sectional view illustrating a modification which may be made in the terminal board shown in Fig. 1 and Fig. 2.

In the accompanying drawing, a detachable terminal board has been illustrated in one form

only which is to be employed on a relay of the type shown in Patent No. 1,766,665, granted to J. F. Merkel on June 24, 1930, but it is to be understood that a detachable terminal board embodying the features of the present invention may be constructed to cooperate with many other forms of electrical devices. In the relay illustrated in Fig. 2 by the dot and dash lines, it is merely necessary for an understanding of the present invention to know that an upright cylindrical relay housing 4 is provided with a cylindrical horizontal insulated top 5 upon which a plurality of upright terminal bolts 6 are assembled. The terminal bolts 6 are clamped to the relay top 5 by nuts 7, and these terminal bolts 6 are of course connected within the relay housing to various contacts, operating coils and the like in accordance with the usual practice.

The detachable terminal board of the present invention as shown in Fig. 1 and Fig. 2 is formed by two discs 10 and 12 of suitable insulating material which are assembled one above the other by two studs 14 as shown in Fig. 1, or as may be seen in Fig. 2, these studs 14 extend upwardly through a slot in the lower disc 12 with reduced ends threaded into metal inserts 15 either molded or otherwise held in the top disc 10. The top disc 10 thus assembled above the lower disc is permitted to slide horizontally through a limited distance relative to the lower disc 12 as allowed by the slots in the lower disc 12 which receive the body portions of the assembling studs 14.

A horizontal stud 18 is provided in the upper disc 10 with a protruding hexagonal head and a reduced diameter inner end threaded into a metal insert 19 molded or otherwise secured in the top disc 10. The larger diameter portion of the stud 18 is provided with an annular groove receiving a forked upwardly extending end of a metal block 20 clamped within a hollow center portion of the lower disc 12 by a screw 21. This arrangement obviously permits the upper disc 10 to be moved to the right from its position shown in Fig. 2 relative to the lower disc 12 by turning the stud 18 in a counter-clockwise direction which forces the threaded insert 19 and the top disc 10 to the right relative to the stud 18 which is held stationary by the block 20 attached to the lower disc 12, the motion of the top disc 10 upon the lower disc 12 being guided by the slots in the lower disc 12 which receive the assembling studs 14.

The discs 10 and 12 assembled in this manner are normally supported above the top 5 of the relay, and holes are provided in the lower disc

12 which are spaced to receive the body portions of each of the relay terminal bolts 6. The top disc 10 carries terminal bolts 22 arranged above these holes in the lower disc 12 and corresponding to each of the terminal bolts 6 of the relay.

The square heads of the terminal bolts 22 rest in rectangular depressions in the top disc 10 with one side of these heads engaging a side of the depression to prevent turning. Spring contacts 24 of a substantial S-shape have their upper ends clamped between the heads of the terminal bolts 22 and the top discs 10, the terminal bolts 22 and contacts 24 being clamped on the top disc 10 by nuts 25.

The S-shaped spring contacts 24 extends downwardly into the hollow center portion of the lower disc 12 with their lower ends engaging the sides of associated relay terminal posts 6 as shown. A contacting surface may be formed in the lower ends of the spring contacts 24 by a pressed-out portion as shown, and when the detachable terminal board thus formed is arranged on the relay as shown in Fig. 2, the spring contacts 24 will be biased with considerable force against the sides of their associated relay terminal posts 6, this biasing force being provided by the left-hand position of the disc 10 relative to the disc 12.

In other words, before installing the terminal board assembly upon the relay, the top disc 10 is operated to the right relative to the lower disc 12 by a counter-clockwise turning of the stud 18, thereby operating the spring contacts 24 to the right relative to the holes in the lower disc 12 which receive the relay terminal bolts 6, and in this manner the terminal board assembly may be easily applied as the spring contacts 24 will not engage the top portion of the relay terminal bolts 6. When the terminal board assembly is in place, the stud 18 may be turned in a clockwise direction to provide and retain the desired contacting pressure between the spring contacts 24 and the relay terminal posts 6. In the present arrangement, the resiliency of the spring contacts 24 assures that a good electrical connection will be made with the associated relay terminal posts 6 regardless of slight differences between the spacing of the relay terminal posts 6 and the posts 22.

Flexible electrical conductors for connecting the relay to the external circuits are to be permanently connected to the terminal posts 22 on the top disc 10, and one or more clamping nuts 26 may be provided for this purpose so that low resistance electrical connections are made from these conductors on the terminal posts 22 to the relay terminal posts 6 through the contact springs 24. When it is necessary to remove the relay from the system, the horizontal stud 18 is turned in a counter clockwise direction thereby moving the top disc 10 to the right relative to the lower disc 12 which relieves the biasing force of the spring contacts 24 against the relay terminal posts 6 and permits the terminal board assembly to be easily removed from the relay.

In the form of the relay to which the present detachable terminal board is applied, the terminal posts form a symmetrical arrangement, and consequently it is obvious that the terminal posts 22 would align with terminal posts 6 of the relay in either of two positions, or that is, the detachable terminal board assembly might be rotated 180 degrees from its proper position with respect to the relay, and in such a position the terminal posts 22 would still align with certain terminal posts 6 of the relay. If the present terminal board assembly could be thus improperly applied

to the relay, it is clear that posts of the relay would be connected to improper electrical circuits, thereby preventing proper operation of the system and possibly providing a dangerous condition.

In the present arrangement however, this improper replacement of the detachable terminal board assembly is prevented by the provision of two spacing bushings 30 (see Fig. 1) which are threaded over two extreme right-hand terminal posts 6 thus being a permanent part of the relay, and two bosses 32 are provided on the bottom disc 12 around the holes receiving the two extreme left-hand relay posts 6, which bosses 32 may be integral or otherwise permanently attached to the detachable terminal board assembly. These spacing bushings and bosses 32 incidently serve to space the terminal board assembly a proper distance about the relay top 5, but also prevent the completion of electrical circuits if the terminal board is improperly replaced on the relay inasmuch as the bosses 32 would then engage the top of the spacers 30 carried by the relay and prevent the spring contacts 34 from engaging the relay posts 6.

In Fig. 3, a modified form of terminal means is illustrated which may be employed on the top disc 10 in place of the terminal bolts 22. In this form, bushings 34 having upper and lower flanged ends are molded into the top disc 10 at the same spaced locations as the terminal bolts 22 in Fig. 1 and Fig. 2. Contact springs 24¹ similar to the contact springs 24 of Fig. 2 are placed on the lower ends of the bushings 34 against the lower flanges and the extending lower ends of the bushings 34 are flared or spun over the contact springs 24¹ thereby rigidly attaching the contact springs 24¹ to the bushings 34. Stud bolts 22¹ are threaded into the bushings 34 for clamping external electrical conductors against the upper flanged end of bushings 34, and it may be desirable to provide stud bolts 22¹ which have heads insulated from their body portions whereby to prevent short circuits from occurring in the event metal objects are accidentally placed upon the relay terminal bolt assembly.

A terminal board for electrical devices has thus been provided having means for permanently securing flexible electrical conductors thereto and which may be easily and quickly installed on an electrical device and by a single manual operation, the terminal board may be manipulated to provide a reliable low resistance connection between the electrical conductors and the associated parts of the device. Likewise, a single manual operation manipulates the present terminal board in a manner to permit it to be easily and quickly removed from the electrical device, and the present terminal board is arranged to prevent replacement upon the electrical device in a manner to improperly complete electrical circuits. In other words, a detachable terminal board has been provided for electrical devices which permits a device to be removed from an electrical system and a replacement made in a minimum length of time and which assures that the replaced device is properly connected into the electrical system.

The above rather specific description of one form of the present invention is given solely by way of example, and is not intended, in any manner whatsoever, in a limiting sense. It will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from those illustrated

without departing from the spirit of the invention defined in the following claims.

What I claim is:

1. A terminal board for electrical devices having extending terminal posts, comprising a lower insulating member receiving the terminal posts of the electrical device, an upper insulating member movably assembled on the lower insulating member, wire terminal means on the upper insulating member, contact springs attached to the wire terminal means and extending downwardly to engage sides of the terminal posts of the electrical device, and a threaded manually operable means for moving the upper insulating member transversely to the posts and relative to the lower insulating member, whereby to engage or disengage the contact springs and the terminal posts of the electrical device.

2. A terminal board for electrical devices having extending terminal posts, comprising a lower insulating member receiving the terminal posts of the electrical device, an upper insulating member movably assembled on the lower insulating member, wire terminal means on the upper insulating member, resilient contact springs attached to the wire terminal means and extending downwardly to engage sides of the terminal posts of the electrical devices, and means for moving the upper insulating member transversely to the posts and relative to the lower insulating member.

3. In a terminal board for electrical devices having extending terminal posts, a first insulating member receiving the terminal posts, a second insulating member having wire terminal means, resilient contact members carried by the wire terminal means of the second insulating member, and means for moving the second insulating member transversely to the posts and relative to the first insulating member in a manner to engage the contact members with the terminal posts.

4. In a detachable terminal board for electrical devices having extending terminal posts, a first insulating member having holes receiving the terminal posts, a second insulating member having wire terminal means, resilient contact members carried by the wire terminal means of the second insulating member, and means for moving the second insulating member transversely to the posts and relative to the first insulating member whereby to engage the contact members with the terminal posts.

5. In a detachable terminal board for electrical devices having extending terminal posts, a first insulating member having holes fitting over the extending terminal posts, a second insulating member slidably mounted on the first insulating member, metal bushings in the second insulating member, screw means threaded into the metal bushings for attaching electrical conductors, re-

silient spring contacts attached to the metal bushings and extending into the first insulating member, and means rotatably carried by the first insulating member and threaded into the second insulating member for engaging the spring contacts with the terminal posts.

6. In an electrical system, a device having parallel extending terminal posts, a first member fitting longitudinally over the terminal posts, a second insulating member having permanent wire connections, and contacts attached to the wire connections and engagable with the terminal posts by a movement of the second member relative to the first member and transversely to the terminal posts.

7. In an electrical system, a device having extending terminal posts, a first member fixed transversely with respect to the alignment of the terminal posts, a second member having wire terminal means engagable with the terminal posts by a movement of the second member relative to the first member transversely with respect to the alignment of the terminal posts.

8. A detachable wire connecting means for terminal posts, comprising a first member fitting over the terminal posts, a second member mounted to move on the first member in transverse relation to the terminal posts, and wire terminal means on the second member having resilient contacts biased against the terminal posts in accordance with the position of the second member of the first member.

9. In an electrical system, a device having parallel extending terminal posts, a first member fitting longitudinally over the terminal posts, a boss on the first member fitting longitudinally over one of the terminal posts, a second insulating member having permanent wire connections, contacts attached to the wire connections and engagable with the terminal posts by a movement of the second member transversely to the extending terminal posts and relative to the first member, and a bushing carried by a terminal post of the device and cooperating with the boss on the first member to permit installation of the first member over the terminal posts only in one relative position.

10. A detachable wire connecting means for terminal posts, comprising a first member fitting over the terminal posts, a second member mounted to move on the first member in transverse relation to the terminal posts, wire terminal means on the second member having resilient contacts biased against the terminal posts in accordance with the position of the second member on the first member, and means on a terminal post engagable with means on the first member for preventing improper installation of the first member over the terminal posts.

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