Oct. 7, 1952 E. F. GEIGER 2,613,287

CROSS CONNECTING BOARD

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Fig. 1.

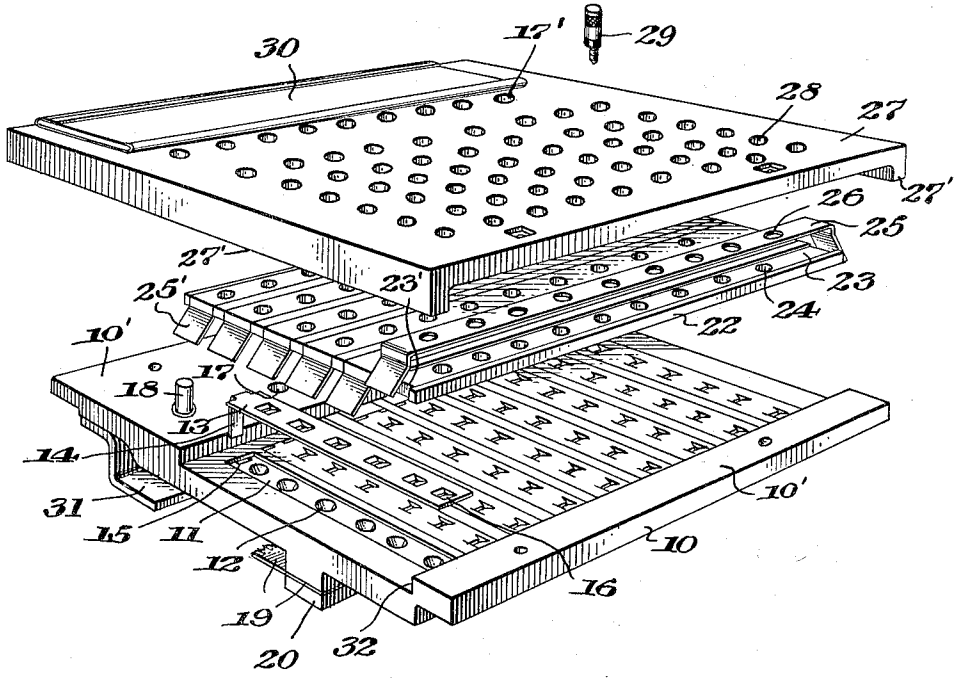
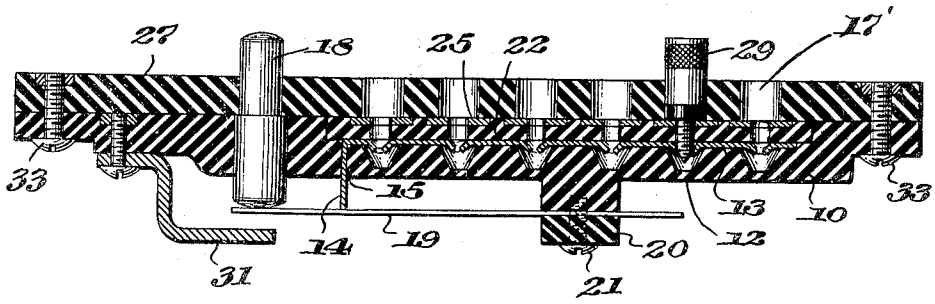


Fig. 2.



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CROSS CONNECTING BOARD

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6 Claims. (Cl. 200—1)

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This invention relates to a cross-connecting board to be used in controlling signal systems and the like.

A general object of this invention is to provide an improved cross-connecting board having simple and improved construction.

A particular object of this invention is to provide a cross-connecting board that shall have particular ease of manufacture and assembly, and with provision made whereby the metallic strips constituting electrical elements of the cross-connecting board structure, may be arranged in fixed interfitting positions with respect to their supporting insulating sheets or members and with said strips restrained from lateral movements in their interfitting position, thereby facilitating proper and speedy assembly of the several elements of said cross-connecting board without the use of conventional fastening means.

In the drawings:

Figure 1 is a view of the cross-connecting board exploded, and showing the method of assembling, and

Figure 2 is a cross sectional side view of the cross-connecting board in its assembled relation of parts.

The cross-connecting board comprises a sheet of insulating material 10 constituting a base plate and having the general shape illustrated in Fig. 1, which insulating sheet or member 10 upon its top surface is provided with a plurality of spaced shallow recesses 11, each recess so shaped as to receive and support with a neat fit a metallic strip 13 and with the upper face of each strip flush with the top surfaces of the depressed portion 32 of said insulating sheet 10. These metallic strips 13 at one end thereof are provided with bent down end portions 14, which end portions, in the assembled positions of the strips 13 within the recesses 11, are projected through notches or holes 15 formed in the insulating sheet 10 and located at one end of the recesses 11, said bent down end portions 14 after passing through the holes 15 depending to such an extent that the extreme end of each depending portion 14 makes electrical contact with one of a series of contact straps 19 constituting a part of the signal system to be referred to hereinafter. Furthermore, each shallow recessed portion 11 of said insulating sheet 10 is provided with a series of equally spaced conical recesses or cavities 12, and this for a purpose to be hereinafter pointed out.

Each metal strip 13 has a series of spaced slitted openings 16 equal in number to the series of circular recesses or cavities 12 and coinciding

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therewith, it being noted in this connection that the circular recesses or cavities are provided especially for the purpose of allowing space for the reception of the depending portions forming the slitted openings 16, and also the entry of the screw end of a connecting plug member 29 for making the desired electrical connections to be referred to more in detail hereinafter.

A second sheet of insulating material 22 is so formed as to neatly fit within a grooved or depressed portion 32 of the insulating sheet 10, said insulating sheet 22 resting directly upon the top face of each metal strip 13 and also upon the top surfaces of the depressed portion 32 of the insulating sheet 10, it being noted in this connection that the said top faces and surfaces referred to are flush with one another as heretofore pointed out. It is well to also note here that this second sheet of insulating material 22, neatly fits within the depressed portion 32 of the insulating sheet 10 and that its top faces are flush with the opposite end top surfaces 10' of the insulating sheet 10.

This second insulating strip 22 is also provided with a series of spaced longitudinal grooves 23, which grooves in the assembled relation of the parts of the cross connecting board are arranged at right angles to the series of shallow recesses formed within the insulating sheet 10. These grooves 23 are adapted to neatly receive a series of metallic strips 25, and in this connection the top face of each strip 25 is, in its assembled position, flush with the top surfaces of the insulating sheet 22.

Furthermore, each metallic strip 25 is provided at each end thereof with a depending portion 25' to facilitate in making electrical connection between each of said metallic strips 25 and a suitable program device, not shown. It is also well to note at this point that a series of side recesses 23' are formed in opposite edges of the second insulating sheet 22, and in line with the grooves 23, each recess adapted to receive the upper part of one of the depending portions 25', at each end of each strip 25, and in a flush relationship with the opposite side edges of said second sheet 22.

Furthermore, this second insulating sheet 22 is provided with a plurality of perforations 24, the perforations being located in rows beneath the metallic strips 25, and each strip 25 is provided with a series of perforations 26 equal in number to the number of metal strips 13 as located in the insulating sheet 10. In this connection, each of the perforations 26 registers with a perforation

24 in the sheet 22, and furthermore these registering perforations coincide with the slitted openings in the metallic strips 13 and their associated circular recesses or cavities 12 in the insulating sheet 10, the purpose intended being to have the perforations of each metallic strip 25 equally spaced apart and with each perforation in each strip in vertical alignment with a particular slitted opening 16 located in a particular metallic strip 13, and this with the ultimate end in view of being able to electrically connect any one of the metallic strips 25 with any one of the metallic strips 13, at the intersection points between said strips, the electrical connection being made by means of a screw plug 29 placed at the discretion of the person operating the cross-connecting board. This screw plug in use and after passing through aligned perforations in the metallic strip 25 and the insulation sheet 22, makes contact by means of its screw end with an aligned slitted opening of a particular metallic strip 13 selected.

A third sheet of insulating material 27 serves as a cover plate, and formed therein is a series of enlarged perforations 26, each perforation positioned to coincide with a particular set of aligned perforations 26 and 24, slitted opening 16, and circular recess or cavity 12. This insulating cover sheet or plate has flush engagement with the top face of the metallic strips 25 and also the top surfaces of the insulated sheets 10 and 22, the several insulating sheets, when in assembled position, adapted to be bolted together by means of four bolts 33. It is also to be noted that at opposite sides of this cover sheet 27, depending flanges 27' are provided for covering the end spaces formed by the depressed portion 32 of the insulating strip 10, thereby assuring a completely covered cross-connecting board in its assembled relation of parts.

The insulating sheet 10, at one side thereof, is also provided with a series of holes 17 cut through the sheet, each hole being in line with one of the shallow recesses 11 as formed in said sheet 10, the number of said holes being equal to the number of shallow recesses employed. In this connection, the function of the holes 17 is to receive a series of push buttons 18, projecting up through similar holes 17' formed in the cover sheet, each push button being supported in its installed position, by a contact strap 19 which is fastened to sheet 10 by an insulating strip 20, a separate contact strap 19 underlying each push button, and the several contact straps being held in fastened position by means of screws 21 or any other suitable fastening means.

Furthermore, a metal strip 31 running the full width of the cross-connecting board, is bolted to the underside of sheet 10, and serves as a common contact element for contact straps 19.

Also a paper tab holder 30 is riveted to the top face of cover sheet 27 at the position shown in the drawings, and this for labeling purposes.

It will be manifest from the drawing and the description of parts so far referred to, that the elements of this device are of simple construction, and that said elements are assembled merely by fitting one to another, the use of bolts or other fastening means being employed only in the final assembly operation, it being further noted that the two sets of metallic strips are especially designed to have interfitting relation with their insulating supporting sheets or plates as outlined herein.

The principles of operation of this device are

not new but compare to the operation of any conventional cross-connecting board. In this connection the contact straps 19 are electrically connected to a series of signal devices or buzzers, and the strips 25 are electrically connected to a suitable program device. When the operator inserts a screw plug 29 in any one of the holes 28 of sheet 27, an electrical connection is made between one of the strips 25 and one of the strips 13, so that when an impulse is emitted from the program device it will be directed to the signal device or buzzer through this particular strip 25, connecting screw plug 29, the particular strip 13, and the contact strap 19 having electrical contact with the strip 13 just referred to, it being understood that each of the strips 13 are normally in electrical contact with a separate and distinct contact strap 19. Consequently a plurality of bells or buzzers placed in a building such as a school may be automatically caused to ring at a specified time of day by inserting the connecting screw plugs into predetermined desired positions on the board, and this in accordance with the impulses emitted from the program device.

The bells or buzzers may be manually caused to ring at any time by pushing down on the push buttons 18, thereby making contact between common strip 31 and any one of the contact straps 19, said common strip 31 being electrically connected to a suitable source of power.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A cross connecting board comprising in combination as a unitary device a multi-part insulating structure rigidly connected together and including a base plate of insulating material, a series of detachable electrical conducting strips arranged upon said base plate in insulated relation one with respect to the other, each of said strips having one end thereof projecting through the base plate and depending therefrom to a predetermined position, a second series of detachable electrical conducting strips also arranged within said structure in crossed relation to the first mentioned series of strips and insulated therefrom and also each other, each of said second mentioned strips having both ends thereof projecting from the insulating structure and adapted for electrical connection to a program device, a series of spring metal electrical contact straps fastened to the base plate and extending in a direction toward and beyond the depending ends of the first mentioned strips, each contact strap of said series being positioned to lie directly beneath a depending end of a strip of said first mentioned series of strips and with each of the straps biased in a direction to normally make contact with the depending end of its cooperating strip, means for electrically connecting each of the contact straps to a signal device or buzzer, and individual plug means insertable within the insulating structure through aligned perforations formed therein and also the second mentioned conducting strips at the points of intersection between the two sets of strips for electrically connecting any one of the first mentioned series of strips with any one of the second mentioned series of strips at said points of intersection between said strips, whereby upon operation of the program device certain signal devices will be operated according to the electrical connections made.

2. A cross connecting board comprising in combination as a unitary device an insulating struc-

ture including a base plate, a series of electrical conducting strips arranged within said structure in insulated relation one with respect to the other, each of said strips having one end thereof projecting through the base plate and depending therefrom to a predetermined position, a second series of electrical conducting strips also arranged within said structure in crossed relation to the first mentioned series of strips and insulated therefrom and also each other, each of said second mentioned strips having both ends thereof projecting from the insulating structure and adapted for electrical connection to a program device, a series of spring metal electrical contact straps fastened to the base plate and extending in a direction toward and beyond the depending ends of the first mentioned strips, each contact strap of said series being positioned to lie directly beneath a depending end of a strip of said first mentioned series of strips and with all of the straps biased in a direction to normally make contact with the depending end of its cooperating strip, means for electrically connecting each of the contact straps to a signal device or buzzer, plug means for electrically connecting any one of the first mentioned series of strips with any one of the second mentioned series of strips at the points of intersection between said strips, whereby upon operation of the program device certain signal devices will be operated according to the electrical connection made, and manually operated means permanently carried by the insulating structure and adapted for moving any one of the contact straps to break electrical circuit between said strap and the depending end of its cooperating strip.

3. A cross connecting board comprising in combination as a unitary device an insulating structure including a base plate, a series of electrical conducting strips arranged within said structure in insulated relation one with respect to the other, each of said strips having one end thereof projecting throgh the base plate and depending therefrom to a predetermined position, a second series of electrical conducting strips also arranged within said structure in crossed relation to the first mentioned series of strips and insulated therefrom and also each other, each of said second mentioned strips having both ends thereof projecting from the insulating structure and adapted for electrical connection to a program device, a series of spring metal electrical contact straps fastened to the underside of the base plate and extending in a direction toward and beyond the depending ends of the first mentioned strips, each contact strap of said series being positioned to lie directly beneath a depending end of a strip of said first mentioned series of strips, with said straps biased in a direction to normally make contact with the depending end of its cooperating strip, means for electrically connecting each of the contact straps to a signal device or buzzer, means for electrically connecting any one of the first mentioned series of strips with any one of the second mentioned series of strips at the points of intersection between said strips whereby upon operation of the program device certain signal devices will be operated according to the electrical connections made, a power strip supported upon said base plate and in cooperative relation with each of the contact straps, and a series of selectively operated devices carried by and projecting through the base plate, each engaging a contact strap and when operated adapted to break electrical contact between said contact strap and the projecting portion of its cooperating strip and to thereafter move the free end of said strap for making electrical connection between the strap and the power strip, whereby any one of the signal devices may be operated at the will of the operator and regardless of the electrical connections made in the automatic set up including the program device.

4. A cross-connecting board comprising in combination an insulating base plate, a series of detachable metallic strips having interfitting relationship upon said base plate and maintained out of contact one with the other, each strip having an end thereof projecting through the base plate to depend therefrom to a predetermined position beneath the base plate, a second insulating plate having a face thereof in flush engagement with the base plate and its series of interfitting strips, a second series of detachable metallic strips having interfitting relationship upon the opposite face of said second insulating plate so as to maintain them out of contact one with the other and in crossed relation to those of the first mentioned strips, an insulating cover plate having a face thereof in flush engagement with the second insulating plate and its interfitting strips, said cover plate having a series of perforations corresponding with aligned perforations formed in said second series of metallic strips and the second insulating plate at the points of intersection between the two sets of strips, means for holding all three insulating plates in fixed assembled relation, one with the other, plug means insertable at will within any of the aligned perforations for electrically connecting any one of the first mentioned series of strips with any one of the second mentioned series of strips at the points of intersection between said strips and for the purposes intended, and a series of spring metal straps fastened to the under side of the base plate and extending in a direction toward and beyond the depending ends of the first mentioned series of strips and with one of the extended ends of each strap beneath each of said first mentioned strips, each strap being biased in a direction toward the lower depending edge of its cooperating metallic strip to make electric contact between said elements, and each of said straps so mounted on the base plate as to be capable of movement away from said depending ends of said strips to break electrical contact between said elements when required.

5. A cross connecting board comprising in combination as a unitary device an insulating structure including a base plate, a series of electrical conducting strips arranged within said structure in insulating relation one with respect to the other, each of said strips having one end thereof projecting through the base plate and depending therefrom to a predetermined position, a second series of electrical conducting strips also arranged within said structure in crossed relation to the first mentioned series of strips and insulated therefrom and also each other, each of said second mentioned strips adapted for electrical connection to a program device, a series of spring metal electrical straps fastened to the base plate and extending in a direction toward and beyond the depending ends of the first mentioned strips, each contact strap of said series of straps being positioned to lie directly beneath a depending end of a strip of said first mentioned series of strips and with each of said straps biased in a direction to normally make contact with the depending end of its cooperating strip, means for

electrically connecting each of the contact straps to a signal device or buzzer, means for electrically connecting any one of the first mentioned series of strips with any one of the second mentioned series of strips at the points of intersection between said strips whereby upon operation of the program device certain signal devices will be operated according to the electrical connections made, and a series of selectively operated push devices loosely carried by and projecting through the insulating structure, each push operated device supported upon and held in place upon the insulating structure by one of the spring biased straps, said push devices when operated serving to break electrical contact between any particular strap and the depending end of its cooperating strip for the purposes intended and as required.

6. A cross connecting board comprising in combination as a unitary device an insulating structure including a base plate, a series of detachable metallic strips having interfitting relationship upon said base plate and maintained out of contact one with the other, each of said strips adapted for electrical connection to a signal device or buzzer, a second insulating plate having a face thereof in flush engagement with the base plate and its series of interfitting strips, a second series of detachable metallic strips having interfitting relationship upon the opposite face of said second insulating plate so as to maintain them out of contact one with the other and in crossed relation to those of the first mentioned strips, each of said second mentioned strips adapted for electrical connection to a program device, an insulating cover plate having a face thereof in flush engagement with the second insulating plate and its interfitting strips, said cover plate having a series of perforations formed therein corresponding with aligned perforations formed in the second mentioned metallic strips and the second insulating plate at the points of intersection between the two sets of strips, means for holding all three insulating plates in a rigid assembled relation, and plug means insertable at will within any of the aligned perforations for electrically connecting any one of the first mentioned series of strips with any one of the second mentioned series of strips at the points of intersection between said strips, whereby upon operation of the program device certain signal devices will be operated according to the electrical connections made.

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