Aug. 9, 1949. R. B. JOHNSON 2,478,274

CIRCUIT CONNECTING DEVICE

Filed March 17, 1945

FIG. 1.

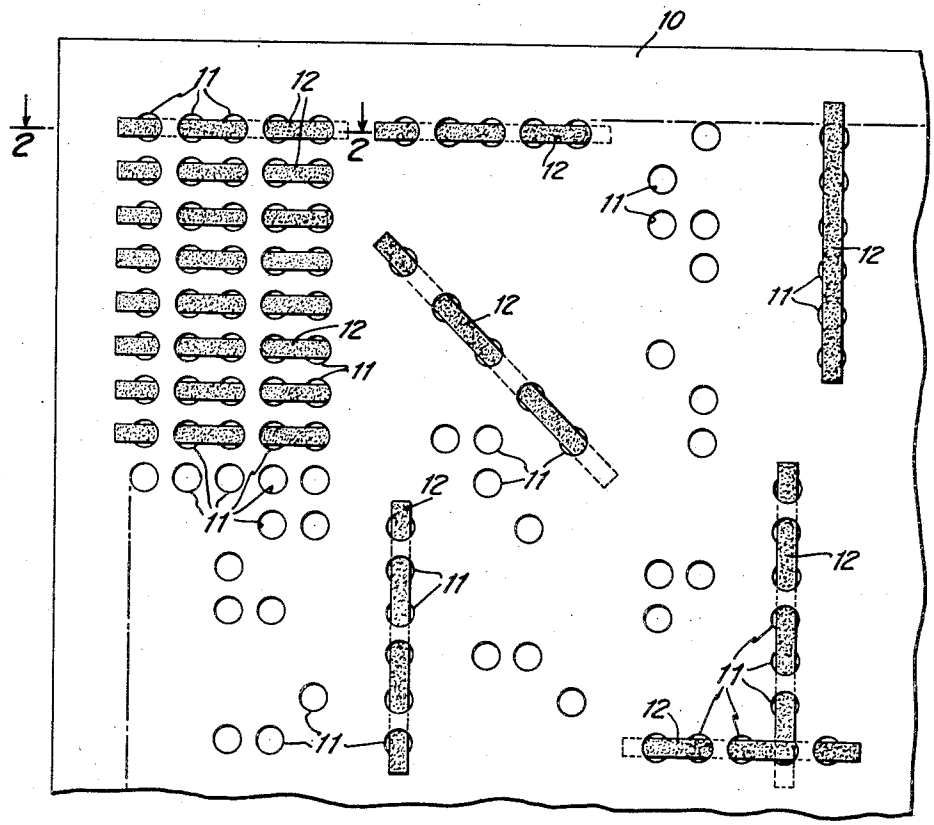
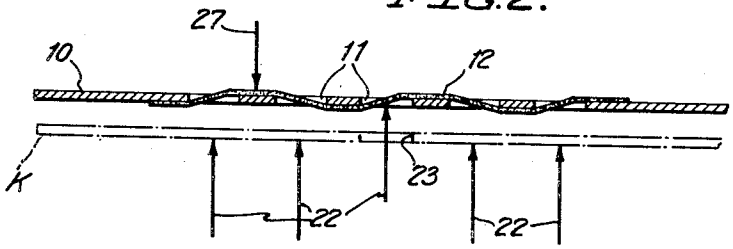


FIG. 2.



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CIRCUIT CONNECTING DEVICE

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4 Claims. (Cl. 173—328)

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This invention relates to a circuit connecting device which is simple in construction and consists of card stock, across and through which current is conducted by means of paths formed by strips or ribbons of graphite-sheathed paper woven through perforations in the card, to variously connect terminals of circuit connections.

In Oldenboom Patent 2,353,061, granted July 4, 1944, there is shown a circuit connecting device of the type which the device of the present invention has improved. In such prior device a sheet of card stock is provided with lines of conductive material in the form of ink containing graphite, with the lines connecting variously located contact positions, so that current impressed on the line at one point is carried to another point. Such manner of placing conductive lines on a sheet is of an inflexible nature in that, if it should become desirable to alter the circuit paths, a new sheet must be employed with the differing arrangement.

It is the principal object of the present invention to provide a circuit connecting device of the type and for the purpose indicated in the Oldenboom patent, in which the circuit paths across the face of the card may be readily altered. This object is carried out by providing a sheet in which all possible contacting positions (which are usually arranged in transverse lines) are perforated and by providing ribbons or strips of paper or card stock sheathed in graphite, which ribbons are placed across the surface of the card to connect selected positions. The ribbon is held in place by threading through perforations or by suitable adhesive at the ends thereof.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a fragment of the connecting sheet with several graphite ribbons inserted.

Fig. 2 is a section through a row of holes to show in a diagrammatic manner the relationship between the sheet and external contacting elements.

In the drawings, 10 represents a sheet of thin, flexible insulating material, preferably card stock with a thickness of about ten thousandths of an inch. This sheet is provided with perforations 11, preferably circular, arranged in vertical columns and horizontal rows, so that there is a perforation in each possible contacting position of the machine in which the device is utilized.

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Graphite coated or sheathed ribbons 12 having about the same thickness as the sheet 10 and a width slightly less than the diameter of perforations 11 are provided and these serve to effect an electrical connection between any series of perforations lying in a straight line. For example, in the upper left hand corner, a row of five perforations have a ribbon 11 threaded therethrough and by virtue of such threading the ribbon is held in position against displacement. In the center of the sheet is shown an example of a ribbon connecting an oblique series of perforations and a vertical series of perforations. In the lower right hand corner, a vertical and horizontal series are both interconnected by a pair of crossing ribbons.

From the foregoing examples, it is seen that by a selective threading of one or more ribbons variously located perforations may be joined together or "commoned" to meet various circuit connecting requirements, and that there is thus provided an inexpensive and simple connection panel on which the connections are readily interchangeable, enabling the same sheet and ribbons to be used for a multiplicity of purposes.

Threading of the ribbons is the preferable method of retaining the ribbons on the sheet, but other means may be employed such as applying an adhesive at the ends or intermediate points. Thus, in the upper right hand corner, a ribbon 12 is laid over a series of perforations and held there by an adhesive. This latter method may be employed where the panel is to retain its setting indefinitely. Also, where a threaded setting is not to be changed, the ends of the ribbons may be glued to the sheet to guard against accidental displacement of the ribbons during handling of the sheet.

A particular application in which a "commoning" sheet such as described is especially useful is in the wellknown "International test scoring machine," illustrated and described in my Patent 2,310,437, granted February 9, 1943, to which reference may be made for a detailed explanation of the manner in which a "commoning" sheet and a "key" sheet conjointly select and direct circuits for controlling counting mechanism.

This patent shows a key sheet (designated K in Fig. 9 thereof) with columns and rows of perforation positions and a commoning sheet (designated C in Fig. 10 thereof) which requires that a separate commoning sheet be provided for each different key sheet. With the use of the present

invention, one of the prior key sheets is used as the panel 10 and ribbons 12 threaded therethrough to produce a commoning sheet replacing that of the patent. When a circuit change is to be made, this same sheet is again employed with the ribbons rearranged to suit the new requirements.

Fig. 2 shows in a diagrammatic manner the cooperative relationship of sheet 10 with the key sheet K of the patent. Briefly, a number of contactors 22 engage the key sheet K at points coinciding with the perforation positions of sheet 10. A hole 23 (which is present in certain selected positions) permits the corresponding contactor to pass through sheet K and engage the ribbon 12. A contactor 27 is in engagement with ribbon 12 at a point along the length of the ribbon, so that there is a circuit path extending from the projected contactor 22 to ribbon 12 and then to contactor 27.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A circuit connecting device comprising a card having columns and rows of index point positions, each of which is provided with a perforation, and a bare flat electrically conductive ribbon extending across a plurality of perforated positions in a straight line, said ribbon being retained in position by weaving the same through the perforations in said line whereby current applied to said ribbon at one perforation will be conducted to each of the perforations across which the ribbon extends, for completion of a circuit at any said other perforations.

2. The invention set forth in claim 1, in which the ribbon comprises a strip of paper tape sheathed in graphite.

3. A circuit connecting device comprising a sheet of flexible insulating material having a plurality of spaced perforations therein, and a bare conductive element superimposed upon a plurality of said perforations whereby electrical contact made with the surface of the sheet will transmit current to said element only at the perforated positions across which the element extends whereby current applied to said element at one perforation will be conducted to each of the perforations across which the element extends, for completion of a circuit at any said other perforations.

4. A circuit connecting device comprising a sheet of insulating material having a plurality of spaced perforations therein, and a bare conductive ribbon threaded through a series of said perforations in a line, whereby each of said series of perforations is covered by the ribbon and forms an area of conductive material at each perforated position of the series whereby current applied to said ribbon at one perforation will be conducted to each of the perforations across which the ribbon extends, for completion of a circuit at any said other perforations.

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