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PUNCH-CARD PROGRAMMER

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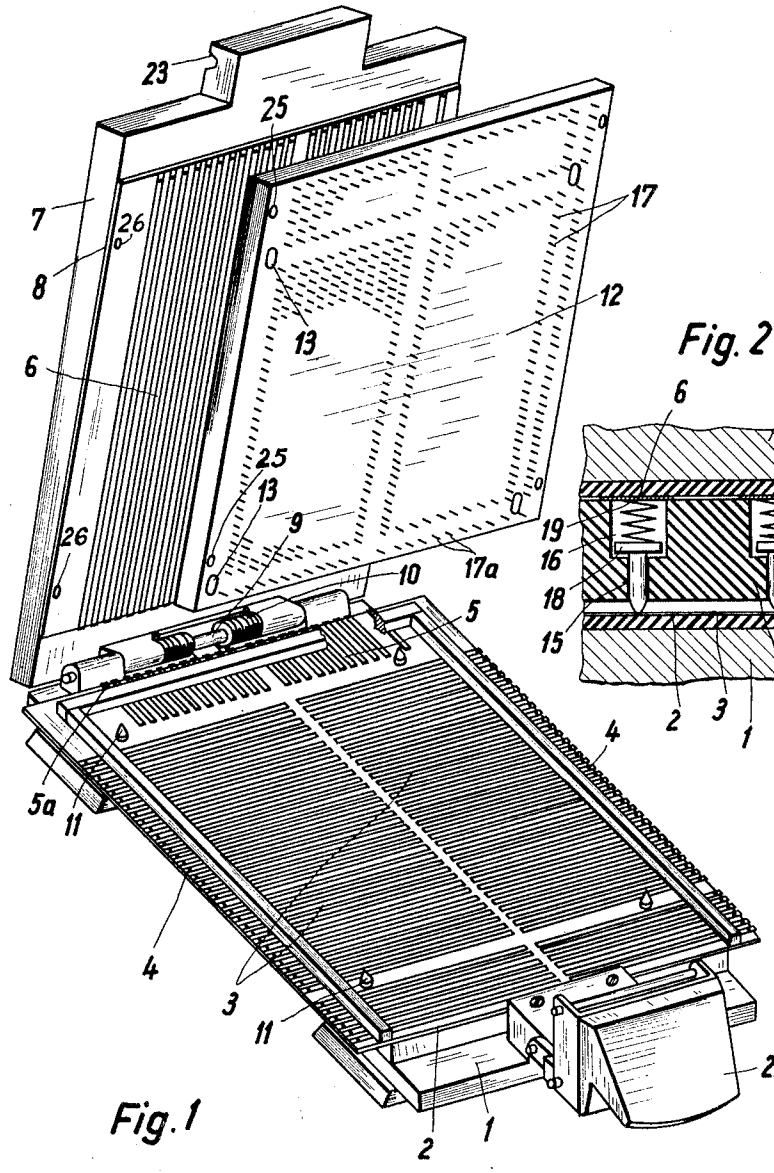



Fig. 1




Fig. 2

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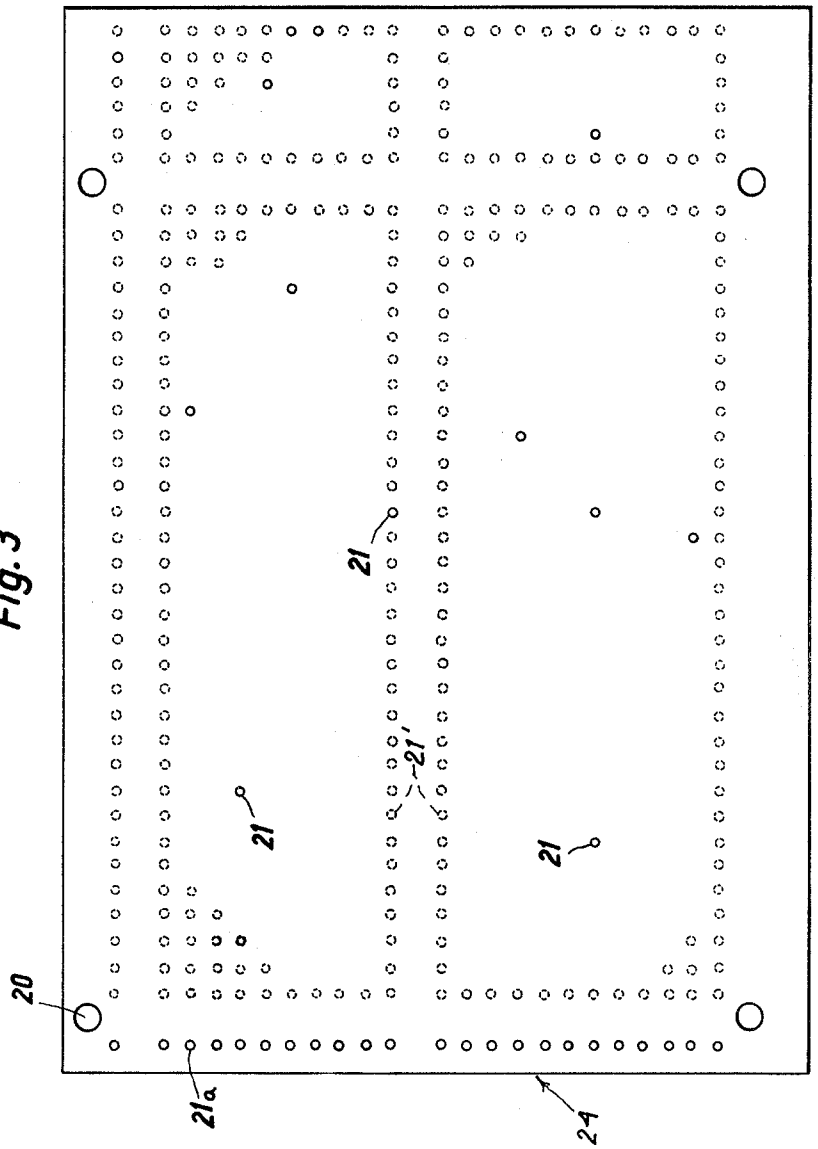
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Fig. 3




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# PUNCH-CARD PROGRAMMER

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6 Claims. (Cl. 339—18)

Our present invention relates to a programmer in which punch cards with different patterns of perforations are used for the selective establishment of circuit connections between sets of input and output terminals.

It is known to construct such programmers on the crossbar principle, i.e. with two orthogonally intersecting arrays of conductor strips carried on respective supports that can be closely juxtaposed, with interposition of a selected punch card, to permit the establishment of conductive connections between certain strips of the two arrays by way of the perforations present in the card. Since one of the supports must be at least partly removed from the other (e.g. swung out) to enable the withdrawal and insertion of punch cards, inconveniences have resulted from the necessity of attaching external leads to the terminals of the conductor strips carried by the movable support.

The general object of this invention is to provide a simple and compact device of this type in which this drawback is avoided.

In accordance with our present invention we mount both the input and output terminals on the same (preferably horizontal) support and also provide on the latter a further array of conductor strips which are positioned to register with respective strips on the other support whereby, with the aid of suitably resilient connectors traversing a carrier plate interposable between these supports adjacent a punch card, circuits are completed from selected input terminals via associated strips of one array on the first support, respective strips on the second support and corresponding strips of the other array on the first support to certain output terminals when the two supports are operatively juxtaposed. In a preferred embodiment the supports are hingedly interconnected, the movable support being urged upwardly into an inclined position by one or more springs overcoming the weight of that support. It will be convenient to align the conductor strips of the additional array on the first support with respective strips on the second support and to mount the two arrays of the first support on different parts thereof at right angles to each other.

The invention will be described hereafter in greater detail, reference being made to the accompanying drawing in which:

FIG. 1 is a perspective view of a programmer according to the invention in open position;

FIG. 2 is a fragmentary cross-sectional view of the closed programmer; and

FIG. 3 is a plan view of a punch card adapted to be used with the programmer of FIGS. 1 and 2.

In FIGS. 1 and 2 we have represented a programmer comprising a horizontal first support 1 which, by means not further illustrated, may be fixedly secured to a base plate carrying associated units such as a source of electric current and one or more loads (not shown). Support 1 is essentially a flat rectangular plate covered at its upper surface with a dielectric layer 2 on which an array of transverse conductor strips 3 are spacedly disposed so as to be insulated from one another. A set of terminals 4, serving for example as the input terminals of the system, are integral with respective conductors 3 and adapted to be connected, e.g. by soldering, to corresponding external leads from the power source or controller. A second set of terminals 5*a*, serving for example as output terminals individually connectable to external leads for the energization of the load or loads, constitute the extremities of another array of conductor strips 5 which extend transversely to the strips 3 on a narrow marginal zone of support 1 spaced from the main part of that support which carries the array 3.



A second support 7, of the same rectangular outline as support 1, is hinged to the latter by a pivot pin 9 and is provided with a dielectric layer 8 having an array of longitudinally extending conductor strips 6 disposed thereon. It will be noted that the strips 6 are perpendicular to the strips 3 but parallel to and respectively aligned with strips 5 when the two supports 1, 7 are in their juxtaposed operative position. A pair of coil springs 10 tend to lift the support 7 from this operative position into the withdrawn position thereof, illustrated in FIG. 1, against the weight of this support and of a carrier plate 12 which can be attached to it with the aid of screws (not shown) passing through aligned bores 25 and 26 in plates 7 and 12, respectively. Locating pins 11 on supporting plate 1 register with recesses 13 in carrier plate 12 and also pass through holes 20 in a punch card 24 (FIG. 3) which can be removably placed on the support 1 while the programmer is in its open position. To hold the programmer closed against the force of springs 10, supporting plate 7 is provided with a lug 23 engageable by an articulated latch 22 on plate 1.

The carrier plate 12 is formed with perforations 15 accommodating two sets of connector pins 17 and 17*a* respectively engageable with the conductor strips 3 and the conductor strips 5. Pins 17 and 17*a* are urged downwardly by associated contact springs 19 which bear upon heads 18 of these pins and are lodged in enlarged extensions 16 of the bores 15 open toward the strips on insulating layer 8. The pins 17, only some of which are shown in FIG. 1, are each disposed at the intersection of one of the strips 3 with one of the strips 6; with $m$ strips 6 on support 7 and $2^n$ strips 3 divided into two groups on support 1, as shown, the number of pins 17 will thus be $mn$. The number of strips 5 equals the number $m$ of strips 6; this is also the number of pins 17*a* which are each positioned in line with a respective strip 6 and an associated strip 5.

Punch card 24 has perforations at the locations of some of the pins 17 and also is shown to be formed with other perforations 21*a*, one for each pin 17*a*. The presence of the same number of perforations 21*a* on all the punch cards simplifies their manufacture, yet only some of these perforations (i.e. those aligned with respective perforations 21) may be needed for individual cards. Thus, the perforations 21*a* could also be replaced by a larger cutout exposing the strips 5*a* to the pins 17*a*.

The circuits selectively establishable from an input terminal 4 to an output terminal 5*a* can be easily traced and will be seen to extend over the associated strip 3, a pin 17 passing through a perforation 21 into contact with that strip, a spring 19 bearing upon the head 18 of that pin and upon an intersecting strip 6, another connector 19, 18, 17*a* contacting the same strip 6, and the conductor strip 5 engaged by the pin 17*a* of the latter connector by way of a perforation 21*a*. The cards 24 may, of course, be punched manually or automatically according to the program desired.

Modifications of the specific programmer described and illustrated are, of course, possible without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. A punch-card programmer comprising a first insulating support, a second insulating support removably overlying said first support, a set of input terminals on said first support, a set of output terminals on said first support, a first array of parallel conductor strips disposed on said first support, a second array of parallel conductor strips disposed on said second support in orthogonally intersecting relationship with said first array, a third array of conductor strips disposed on said first support and insulated from said first array, the conductor strips of said first array being connected to respective terminals of one of said sets, the conductor strips of said third array being connected to respective terminals of the other of said sets, a carrier plate interposed between said supports, a first set of resilient connectors traversing said carrier plate at respective junction points of the conductor strips of said first and second arrays for establishing conductive contact therewith, and a second set of resilient connectors traversing said carrier plate at locations registering with individual conductor strips of said second array and respective conductor strips of said third array for establishing conductive contact therewith, said carrier plate and said first support being separable to receive a punch card therebetween with perforations penetrable by certain of said connectors whereby circuits are completed between selected input and output terminals via the associated conductor strips and connectors.

2. A punch-card programmer comprising a first insulating support, a second insulating support removably overlying said first support, a set of input terminals on said first support, a set of output terminals on said first support, a first array of parallel conductor strips disposed on one part of said first support, a second array of parallel conductor strips disposed on said second support in orthogonally intersecting relationship with said first array, a third array of conductor strips transverse to those of said first array and aligned with those of said second array disposed on another part of said first support and insulated from said first array, the conductor strips of said first array being connected to respective terminals of one of said sets, the conductor strips of said third array being connected to respective terminals of the other of said sets, a carrier plate interposed between said supports, a first set of resilient connectors traversing said carrier plate at respective junction joints of the conductor strips of said first and second arrays for establishing conductive contact therewith, and a second set of resilient connectors traversing said carrier plate at locations registering with individual conductor strips of said second array and aligned conductor strips of said third array for establishing conductive contact therewith, said carrier plate and said first support being separable to receive a punch card therebetween with perforations penetrable by certain of said connectors whereby circuits are completed between selected input and output terminals via the associated conductor strips and connectors.

3. A punch-card programmer comprising a first insulating support, a second insulating support hinged to said first support and swingable between an operative position adjacent said first support and a withdrawn position inclined with reference thereto, a set of input terminals on said first support, a set of output terminals on said first support, a first array of parallel conductor strips disposed on said first support, a second array of parallel conductor strips disposed on said second support in orthogonally intersecting relationship with said first array, a third array of conductor strips disposed on said first support and insulated from said first array, the conductor strips of said first array being connected to respective terminals of one of said sets, the conductor strips of said third array being connected to respective terminals of the other of said sets, a carrier plate on said second support facing said first support, a first set of resilient connectors traversing said carrier plate at respective junction points of the conductor strips of said first and second arrays for establishing conductive contact therewith in the operative position of said second support, and a second set of resilient connectors traversing said carrier plate at locations registering with individual conductor strips of said second array and respective conductor strips of said third array for establishing conductive contact therewith in the operative position of said second support, said carrier plate and said first support being separable by a punch card inserted therebetween with perforations penetrable by certain of said connectors whereby circuits are completed between selected input and output terminals via the associated conductor strips and connectors.

4. A punch-card programmer comprising a substantially horizontal first insulating support, a second insulating support hinged to said first support and swingable between an operative position adjacent said first support and a withdrawn position inclined with reference thereto, a set of input terminals on said first support, a set of output terminals on said first support, a first array of parallel conductor strips disposed on said first support, a second array of parallel conductor strips disposed on said second support in orthogonally intersecting relationship with said first array, a third array of conductor strips disposed on said first support and insulated from said first array, the conductor strips of said first array being connected to respective terminals of one of said sets, the conductor strips of said third array being connected to respective terminals of the other of said sets, a carrier plate on said second support facing said first support, a first set of resilient connectors traversing said carrier plate at respective junction points of the conductor strips of said first and second arrays for establishing conductive contact therewith in the operative position of said second support, a second set of resilient connectors traversing said carrier plate at locations registering with individual conductor strips of said second array and conductor strips of said third array for establishing conductive contact therewith in the operative position of said second support, said carrier plate and said first support being separable by a punch card on said first support with perforations penetrable by certain of said connectors whereby circuits are completed between selected input and output terminals via the associated conductor strips and connectors, spring means anchored to said supports for urging said second support into said withdrawn position, and latch means for holding said second support in said operative position against the force of said spring means.

5. A punch-card programmer comprising a first insulating support, a second insulating support hinged to said first support and swingable between an operative position adjacent said first support and a withdrawn position inclined with reference thereto, a set of input terminals on said first support, a set of output terminals on said first support, a first array of parallel conductor strips disposed on one part of said first support, a second array of parallel conductor strips disposed on said second support in orthogonally intersecting relationship with said first array, a third array of conductor strips transverse to those of said first array and aligned with those of said second array disposed on another part of said first support and insulated from said first array, the conductor strips of said first array being connected to respective terminals of one of said sets, the conductor strips of said third array being connected to respective terminals of the other of said sets, a carrier plate on said second support facing said first support, a first set of resilient connectors traversing said carrier plate at respective junction points of the conductor strips of said first and second arrays for establishing conductive contact therewith in the operative position of said second support, and a second set of resilient connectors traversing said carrier plate at locations registering with individual conductor strips of said second array and aligned conductor strips of said third array for establishing conductive contact therewith

in the operative position of said second support, said carrier plate and said first support being separable by a punch card therebetween with perforations penetrable by certain of said connectors whereby circuits are completed between selected input and output terminals via the associated conductor strips and connectors.

6. A punch-card programmer comprising a substantially horizontal first insulating support, a second insulating support hinged to said first support and swingable between an operative position adjacent said first support and a withdrawn position inclined with reference thereto, a set of input terminals on said first support, a set of output terminals on said first support, a first array of parallel conductor strips disposed on one part of said first support, a second array of parallel conductor strips disposed on said second support in orthogonally intersecting relationship with said first array, a third array of conductor strips transverse to those of said first array and aligned with those of said second array disposed on another part of said first support and insulated from said first array, the conductor strips of said first array being connected to respective terminals of one of said sets, the conductor strips of said third array being connected to respective terminals of the other of said sets, a carrier plate on said second support facing said first support, a first set of resilient connectors traversing said carrier plate at respective junction points of the conductor strips of said first



and second arrays for establishing conductive contact therewith in the operative position of said second support, a second set of resilient connectors traversing said carrier plate at locations registering with individual conductor strips of said second array and aligned conductor strips of said third array for establishing conductive contact therewith in the operative position of said second support, said carrier plate and said first support being separable by a punch card on said first support with perforations penetrable by certain of said connectors whereby circuits are completed between selected input and output terminals via the associated conductor strips and connectors, spring means anchored to said supports for urging said second support into said withdrawn position, and latch means for holding said second support in said operative position against the force of said spring means.


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