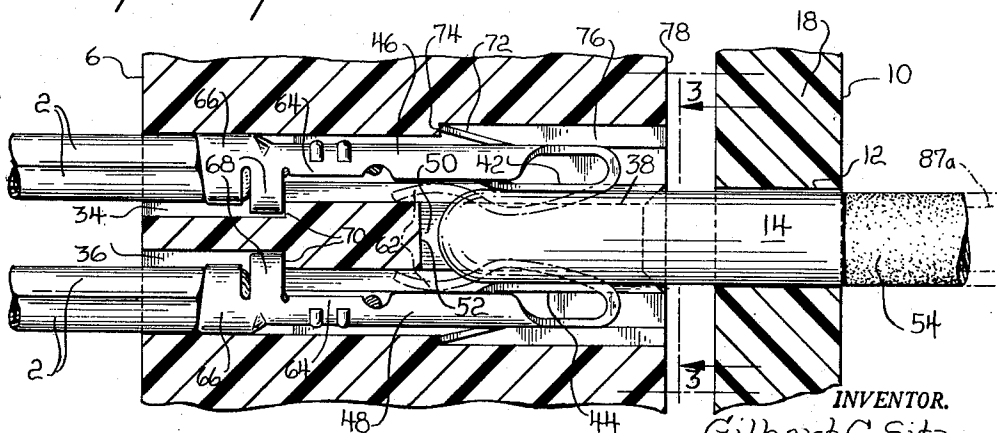
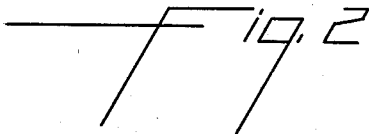


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ELECTRICAL PIN BOARD

3 Sheets-Sheet 1



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April 9, 1963

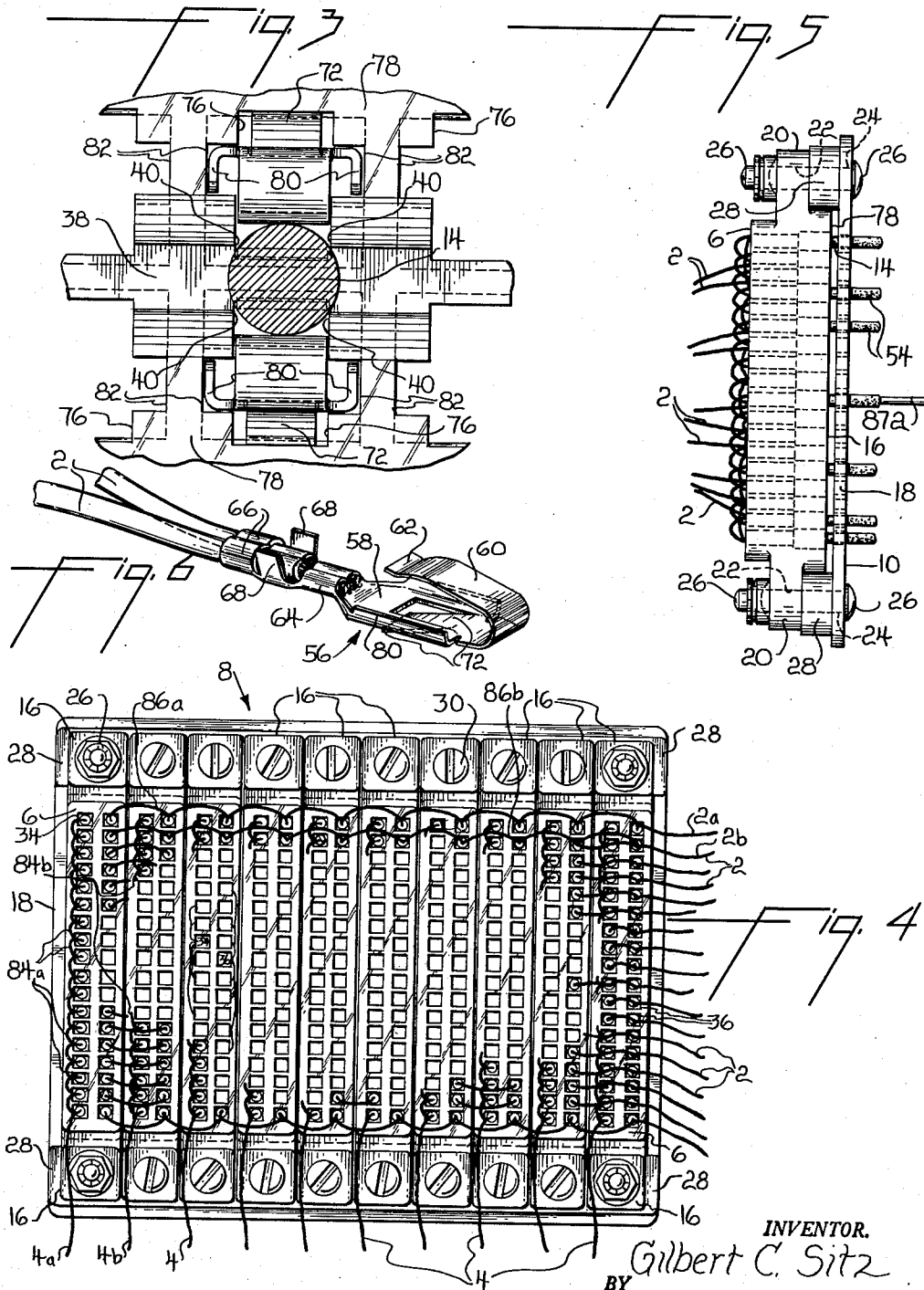
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3,085,220

ELECTRICAL PIN BOARD

Filed June 29, 1959

3 Sheets-Sheet 2



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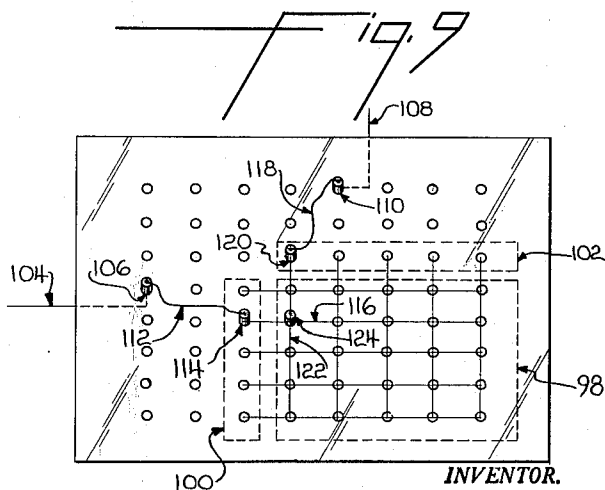
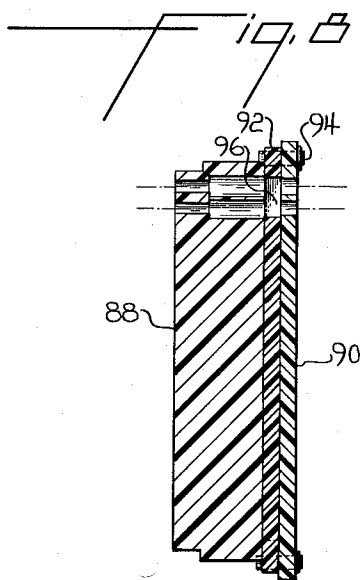
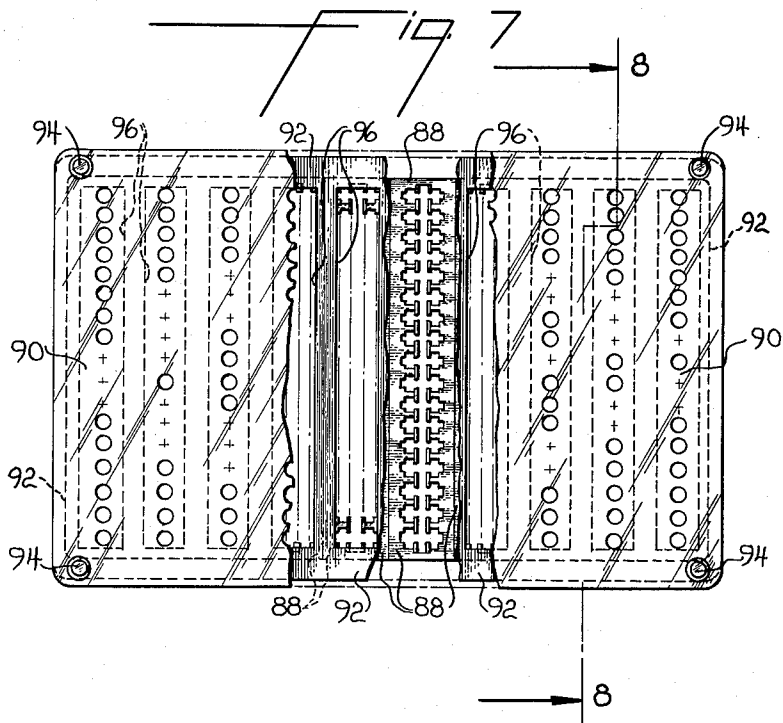
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3,085,220

ELECTRICAL PIN BOARD

Filed June 29, 1959

3 Sheets-Sheet 3



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3,085,220

ELECTRICAL PIN BOARD

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2 Claims. (Cl. 339-18)

This invention relates to electrical pin boards to be used as the control panel in signal and switching systems and the like.

In common practice, the control circuits of electrical systems, such as in accounting, computing or simply switching devices, are brought to a control panel which includes a plug contact arrangement for cross-connecting or closing the circuits as desired. Typically, the contact elements of the control panel to which the control circuit leads are to be attached are pre-set in a permanent arrangement in a unit of fixed proportions. The electrical systems field, however, is multiplying in variety and complexity, and even in established systems, the need for redesign and rearrangement is frequently encountered.

An object of the present invention, therefore, is to provide a universal electrical control or pin board easily constructable or rearrangeable to meet any conditions of use.

Another object is to provide a pin board arrangement wherein the contact elements may be releasably insertable in any desired circuit arrangement independent of and subsequent to the construction of the supporting or housing device therefor. Further, an objective is to design the housing of modular construction for increased flexibility.

A further object is to provide a pin board arrangement of simple and durable construction with the component parts being easily replaceable when damaged.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIGURE 1 is a perspective view of an embodiment of a pin board according to the present invention, certain parts being broken away for purposes of illustration;

FIGURE 2 is a fragmentary sectional view taken along line 2-2 of FIGURE 1 on an enlarged scale;

FIGURE 3 is a view taken along line 3-3 of FIGURE 2;

FIGURE 4 is a plan view of the rear of the pin board;

FIGURE 5 is a side elevation of the pin board as shown in FIGURE 4;

FIGURE 6 is an enlarged perspective view of a contact element insertable in the pin board;

FIGURE 7 is a plan view of an alternative embodiment of a pin board structure in accordance with the invention with certain parts being broken away for clarity of illustration;

FIGURE 8 is a sectional view taken along lines 8-8 of FIGURE 7; and

FIGURE 9 is a diagrammatic illustration of one form the wiring pattern of the pin board may take.

With reference to FIGURES 1 to 6, the various control circuit leads 2 and 4 of an electrical system are brought to the rear face 6 of pin board 8, the front face 10 of

2

which provides an array of apertures 12 for selectively receiving any number of pins or plugs 14 to interconnect leads 2 and 4 in the desired circuit pattern.

In the illustrative embodiment of the invention, pin board 8 comprises a plurality of elongated blocks or modules 16, preferably molded from any suitable insulating material, disposed side-by-side and detachably fastened to front plate 18, also of suitable electrical quality plastic material, in any convenient manner. For example, blocks 16 may be provided at their ends with projecting lugs 20 having bolt holes 22 therethrough in registry with bolt holes 24 of front plate 18, nut and bolt arrangement 26 securing the parts together. To enhance the mechanical rigidity where a large number of blocks are used, all but the endmost blocks preferably are fastened to a pair of metal supporting bars or rails 28, as by screws 30 extending through lug holes 24 and into threaded holes 32 of the bars, the end holes of which also passing bolt 26 thereby attaching bars 28 to plate 18.

Through each block 16 there extends a double row of generally rectangular passageways 34, 36 disposed so that each passageway 34 in one row is paired with an opposed passageway 36 in the other row, the passageways being mutually parallel and disposed to extend transversely of front plate 18. A rectangular groove or slot 38 extending approximately half-way through the block from its front surface, as best shown in FIGURES 2 and 3, and running between the rows and intersecting the passageways to define four approximately equally spaced edges 40, provides a communicating opening between each passageway pair. Edges 40, together with a registered one of apertures 12 of plate 18 and a pair of opposed metallic contact fingers 42 and 44 projecting into slot 38 and depending from contact inserts 46 and 48 received in passageways 34 and 36 respectively, define in effect a socket 50 adapted to receive a contact pin 14 in short-circuiting engagement with fingers 42 and 44. The bottom 52 of slot 38 advantageously provides a stop for the socket in limitation of pin insertion.

Apertures 12 thus are arrayed in rows in registry with slot 38 and centered relative to the associated set of spaced edges 40 which advantageously closely correspond in position to points on the periphery of aperture 12. Edges 40, where pins 14 and apertures 12 are circular in cross-section but differing in diameter to the extent required for tolerance purposes and ease of pin insertion, may thus serve as elongated bearing surfaces severely limiting pin wobble while assuring that opposed segments of the pin enter the passageways, FIGURE 3, forcefully to depress contact fingers 42 and 44 as will be explained. In this connection, edges 40 may closely approach the spacing necessary for snugly receiving pin 14 by virtue of the prealigning action of aperture 12.

Pins 14 preferably comprise a metallic cylinder having a sleeve or coating 54 of suitable insulating material covering at least that portion to be gripped during manipulation and left projecting from the pin board after insertion.

Turning now to FIGURE 6, there is shown one form the contact inserts may take although it will be understood that any contact arrangement, preferably releasably set in the housing blocks 16, which achieves reliable electrical continuity upon insertion of a pin will suffice. Advantageously, the contact inserts of each opposed pair are of similar construction and capable of being mass-produced by conventional stamping techniques. Thus the contact generally designated at 56, is formed from a suitable sheet metal stock, such as a tin or gold-plated brass of spring quality, and comprises an elongated, generally rectangular base or shank portion 58 from the forward end of which extends a longitudinally bowed leaf spring 60 providing contact fingers 42 and 44, spring 60 being

3

reversely bent back upon but angled away from base 58 and terminating in a shoe 62. Portion 64 extending from the other end of base 58 provides the means by which the lead wires 2 and 4 are connected to insert 56, and advantageously comprises a pair of opposed ears arranged to be crimped onto the bared end of a lead wire in a manner described in detail in U.S. Patent No. 2,600,012 issued June 10, 1952, to James C. Macy. An additional pair of ears 66 may similarly embrace an insulated portion of a lead wire for further support as desired. It will be noted that one or more lead wires, two such being shown in FIGURE 6, may be connected in the connecting portion 64 of any given contact insert according to its function and position in the wiring arrangement at the rear face 6 of the pin board.

Insert 56 is slidably receivable in either one of the passageway pair 34 or 36 from rear face 6 until side stop wings 68 projecting outwardly from between ears 64 and 66 about a rearwardly facing stop shoulder 70 in the passageway as best shown in FIGURE 2. Coincidentally, a resilient tang 72 struck down from base 58 snaps behind a forwardly facing passageway stop shoulder 74, a channel 76 leading from the front surface 78 of the block affording access by a thin blade, not shown, for prying tang 72 out of engagement from stop 74 when it is desired to withdraw the insert from the block. A pair of side flanges 80 on base 58 closely fitted in height and width to side channels 82 on the passageways assure an accurate and stable location of leaf spring 60 while providing strengthening ribs for the insert.

As alluded to above, leaf spring 60 is biased away from base 58 and arranged so that when the pair of inserts 46 and 48 are set in passageways 34 and 36, contact fingers 42 and 44 normally project, as indicated by the dotted lines in FIGURE 2, from opposite sides into slot 38 with a spring bias sufficient to achieve good contact pressure with a pin 14 slid therebetween, the fingers being resiliently depressed against the spring bias by the pin in operation as shown. Shoes 62, however, are positioned, FIGURE 2, to engage the opposed sidewalls of the passageways positively to prevent the opposed fingers from contacting each other when the pin is withdrawn.

The effect of short-circuiting any one of the multiplicity of contact pairs by insertion of a pin will depend, of course, on the wiring pattern of leads 2 and 4 in accordance with the conditions of a particular use which may range from simply a need for a system of separate switches for selectively shorting a like number of pairs of leads to the well-known cross-connecting or grid network system, or any combination or adaptation of either, or both. By way of example, in FIGURE 4 a grid system is indicated. As such, all of the contact inserts 46 in the column of passageways 34, the left-hand column in FIGURE 4, in each block are wired in common by jumper wires 84a, 84b, etc. to constitute the various vertical lines of the grid which connect with leads 4a, 4b, etc. respectively. The horizontal or cross lines of the grid are formed by jumper wires 86a, 86b, etc., each of which connect in common a given insert 48 in the right-hand column of passageways 36 of one block with all the corresponding inserts of the other blocks, ultimately to connect with leads 2a, 2b, etc. respectively. Approximately placed pins 14 thus serve to connect any of leads 2 selectively with any one or more of leads 4.

Two or more pins may be connected, as shown in FIGURE 1, by jumper wire 87, or may be the terminal of external leads 87a for increased flexibility in the system.

It will be appreciated that the pin board may easily be constructed to accommodate any desired number of switch points or cross-connecting leads as desired. For example, additional leads for a grid system are obtained by providing extra block fastening positions, vertically and horizontally, on plate 18, or by arranging two or more unitary pin boards side-by-side.

In an alternative embodiment, FIGURES 7 and 8, the

4

built-up modular construction is achieved by cementing, with a suitable adhesive for the plastic material involved, a series of blocks 88 in side-by-side, and if desired, in end-to-end relation, blocks 88 being similar to blocks 16 except that lugs 20 are absent for size reduction. Blocks 88 may then be cemented directly to apertured front plate 90. Preferably, however, the blocks are first cemented to an intermediate insulating plate 92 which is then detachably secured to front plate 90, as by bolts 94, to the end that upon removal of front plate 90, access may be had into the front of the contact insert passageways, through elongated slots 96 in plate 92, for releasing tangs 72 when desired.

FIGURE 9 is a diagrammatic view for illustrating the versatility of the pin board. In the figure, only the block segment 98, indicated by dotted lines, is wired in the grid network pattern as described in connection with FIGURE 4, there being five horizontal lines crossed with five vertical lines. The next adjacent five vertical apertures, indicated by the dotted line block 100, have a wiring connection as shown with only the five horizontal lines respectively of the grid and constitute horizontal pilot apertures for the grid. Similarly, the five apertures included within block 102 are wired only to the vertical lines of the grid and are the vertical pilot apertures. The remaining apertures have no inter-aperture wiring connection at the back face of the pin board, but one of the associated contact inserts in each such aperture is utilized to terminate an input or output lead to be connected with the grid system similar to leads 2 and 4, FIGURE 4.

As thus wired, any five input leads may be connected to any five output leads by jumpers from the input and output apertures to the appropriate pilot apertures with proper pins in the grid segment 98. For example, input lead 104, terminated by a contact insert in aperture 106, and output lead 108, terminated by a contact insert in aperture 110, are shown connected by jumper 112 pinned to aperture 106 and horizontal pilot aperture 114 and thus to horizontal line 116, jumper 118 pinned to aperture 110 and vertical pilot aperture 120 and thus to vertical line 122, the connection being completed by insertion of pin 124 at the appropriate grid cross-over aperture.

I claim:

1. An electrical pin board comprising a plurality of pairs of electrical contacts, the contacts of each pair providing a pair of spaced opposed spring elements for slidably receiving therebetween a pin to short-circuit the contact pair, insulating housing means having a front and a rear face and a plurality of pairs of parallel passageways arranged in rows and columns extending inwardly thereof from said rear face, said contacts having detent means accessible from said front face releasably cooperating with shoulder means on said housing means for securing said contacts in said passageways, each passageway pair having an opening therebetween extending to said front face and into which said opposed spring elements project, said opening being defined by housing wall portions providing four elongated approximately equally spaced bearing edges disposed to guide a pin between the associated spring element pair, each contact having lead wire engaging means accessible from said rear face.

2. An electrical pin board comprising a plurality of elongated insulating blocks, means including an insulating plate securing said blocks side-by-side in a unit, each block carrying a column of opposed pairs of electrically spaced contact elements, the contact elements being individually engaged in the blocks in a snap-fit, said plate having a plurality of pin guiding apertures each in registry with a contact element pair for guiding a pin into short-circuiting relation therewith, said contact element pairs being arranged in rows and columns with at least a section thereof having one of the contact elements of each pair connected in common by rows and the other contact element of the pairs connected in common by columns to provide a grid network, the remaining contact element pairs hav-

5

ing means for selectively connecting the contact elements thereof to any other contact element of the pin board.

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