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ELECTRICAL PIN-BOARD DATA SYSTEM

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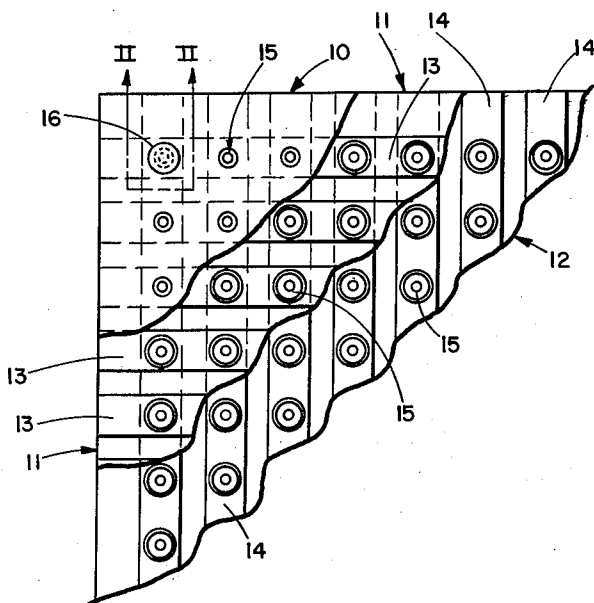


FIG. I

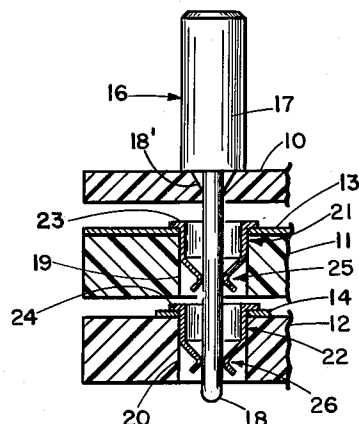


FIG. II

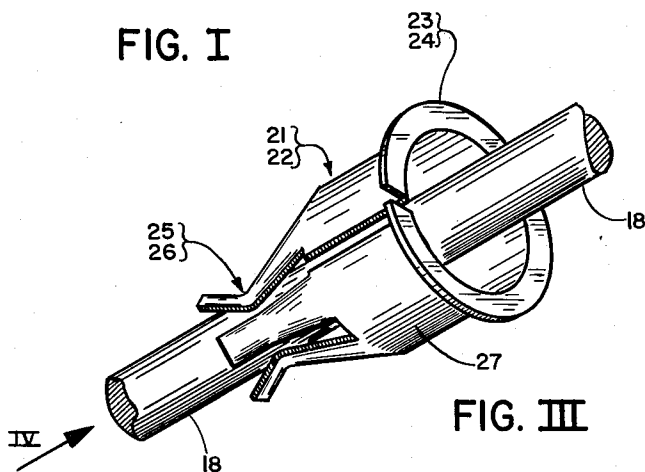


FIG. III

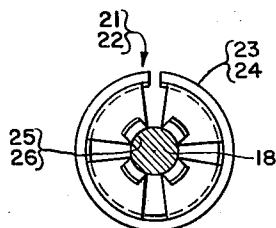


FIG. IV

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1

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ELECTRICAL PIN-BOARD DATA SYSTEM

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1 Claim. (Cl. 339-18)

This invention relates to systems for monitoring the units of a group of individual variable conditions, and has particular reference to a pin-board variable condition selection and alarm system.

In the course of handling complicated operations, monitoring of the units of a group of individual variable conditions may involve scanning with reference to pin-board systems for selecting and establishing comparison values. Such pin-board systems need to provide accurate and reproducible comparison values. For this reason the mechanical details of electrical connection in the pin-board system are important as taken in relation to its data system.

This invention is directed to a data system including a pin-board comparison value selector system with mechanical features of electrical connection therein.

It is an object of this invention to provide a new and improved electrical pin-board data system.

Another object of this invention is to provide new and improved electrical connections in a pin-board data system.

Other objects and advantages of this invention will be in part apparent and in part pointed out hereinafter.

In the drawings:

Figure I is a fragmentary cut-away plan view of a pin-board sandwich according to the system of this invention;

Figure II is a fragmentary section through the structure of Figure I as on line II--II therein, illustrating the mechanical features of electrical connection in the pin-board, with the sandwich plates separated;

Figure III is a perspective of a pin and socket electrical system connection according to this invention; and

Figure IV is an end view of the Figure III connection as indicated at IV in Figure III.

The pin-board showing of Figure I illustrates a top cover plate 10, a top sandwich plate 11 and a bottom sandwich plate 12. On the top of the top plate 11 horizontal circuit component strips 13 are mounted as part of a printed circuit. These are electrically conductive strips of thin material, for example, copper. Similar circuit strips 14 are similarly mounted on the bottom plate 12 as vertical components of the connection arrangements of this sandwich plate.

The top cover plate 10 and the plates 11 and 12 are all mounted together in sandwich fashion and pin connector openings as indicated at 15, Figure I, are provided in all three layers of this sandwich and in alignment so that a connector pin such as that indicated at 16 may be extended downwardly therethrough. These openings 15 are located at the overlying intersections of the horizontal and vertical strips of conductive material 14 and 13.

As in Figure II the top plate 10 and the sandwich plates 11 and 12 are shown in vertically separated relationship for illustration. In actual assembly they are vertically abutting each other flat face to flat face and are held together by any suitable sealing or securing means (not shown). The Figure II showing illustrates the form

2

of the connector pin 16 which has an electrical insulation handle 17 in the form of a relatively large cylinder. The connector pin itself is indicated at 18 and extends down through the various plates as an electrically conductive member in cylindrical pin form. The overlying combinations of openings through the various plates has been labeled 15 in Figure I and in Figure II the top plate opening 18' has a counterbore to allow easy entrance of the connector pin. The lower portion of the opening 18' is of a diameter only slightly greater than that of the diameter of the electrical portion 18 of the pin so as to provide lateral support therefor. The openings in the plates 11 and 12 as indicated at 19 and 20 are generally cylindrical in form and identical. In each of these openings 19 and 20 an electrically conductive sleeve connector unit is mounted as at 21 and 22.

Each of the sleeve connectors 21, 22, is generally cylindrical in shape and has an annular, upper end radially outward, flat flange as at 23 and 24 which overlies an annular portion of its respective plate and also overlies an annular portion of its respective conductive strip in electrically connecting secured relation thereto. The sleeve connector units 21 and 22 in their lower portions have inwardly extending resilient fingers as at 25 and 26 which in mutual opposition engage the electrically conductive connector pin portion 18 in a circular formation in a single transverse plane for each of the connector sleeves.

The connector sleeves 21 and 22 are identical and one is shown in detail in Figure III. The sleeve comprises a top cylindrical body 27 of resilient material and split lengthwise wherein the inner diameter is of the order of twice the diameter of the pin portion 18 and an outer diameter which in free state is greater than the diameter of the openings 19 and 20 of Figure II. Thus in assembly, the body 27 is compressed radially inward so as to be in tight fitting relation with its respective opening in the sandwich plate. The sleeve of Figure III further has a bottom portion comprising the resilient fingers 25 and 26 with reference to Figure II wherein these fingers are grouped around the sleeve in mutual opposition and uniform circumferential spacing. The fingers taper both lengthwise of the sleeve and inwardly toward the pin 18. The fingers together determine a downward tapering truncated cone with multiple and opposing electrical connection contacts with the pin 18 in the transverse plane defined by the truncation face of the cone. These contacts define a circle which, without the pin therein, is of lesser diameter than the pin. The fingers extend, further, downward from the plane of truncation and radially outward from the pin 18.

Accordingly each of the connector sleeves contacts the pin 18 in a circular fashion made up of several finger contacts which are resiliently opposed to each other, tightly grasping the connector pin 18 to provide tight electrical contact connections therewith.

The Figure IV showing is a view of the bottom of the Figure III structure in the direction of the arrow indicated by IV in Figure III, and illustrates the formation of the connector sleeves and their contacts with the connector pin 18.

This portion of the system of this invention therefore provides an electrical pin and sleeve connector assembly wherein each connector pin is a removable device between two electrical leads each represented by a sleeve connection with inwardly tapering and opposed resilient fingers to firmly grasp the pin therebetween in a single transverse plane and with relatively sharp connection contacts. Thus the pin 18 is self-cleaning as it is inserted and removed from the various openings of a pin-board sandwich as in Figure I. It cleans itself on insertion and removal due to the rubbing of all contacts in a circular spring-press connection arrangement.

This arrangement is simple, convenient, practical and may be provided in relatively very small space.

This invention, therefore, provides a new and improved electrical data pin board system.

As many embodiments may be made of the above invention and as changes may be made in the embodiments set forth above without departing from the scope of the invention, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative only and not in a limiting sense.

I claim:

An electrical circuit connection pin-board sandwich comprising a compact combination of a thin, insulation, cover plate and a pair of thin, insulation, connection plates, each of said plates having a series of openings therethrough, with each series of openings aligned with the series of openings in the other plates, thin, flat, electrical connector strips each bonded against one side only of one of said connection plates with each strip along one of said series of openings, each of said strips having openings therethrough equal in diameter and flush aligned with each of the respective openings in the respective connector plate, a connector sleeve in each of said connection plate openings, each of said sleeves having an essentially full circle outflaring flange at one end thereof, said sleeves each being wholly contained in its respective connector plate opening except for said flanged end, said flanged end extending outward only sufficiently to engage and hold the respective connector strip with the under side of said flange as a mechanical and electrical connection therewith, each of said sleeves comprising a top, cylindrical, lengthwise split body of resilient material having an inner diameter, as assembled, of the order of twice the diameter of said connector pin, and an outer diameter, in free state, greater than the diameter of said openings whereby in assembly said sleeves are resiliently mounted in said openings in mechanical assembly and said connector strips are resiliently held by said sleeves in a combination of mechanical assembly and electrical connection, each of said sleeves comprising, further, a bottom portion comprising a circumferentially spaced series of resilient electrical contact fingers, laterally unsupported except for the inherent resiliency of said fingers, wholly within the thickness of its respective sandwiched plate, with one of said spacings in continuance of the

split of said top body, said fingers together determining a downward tapering truncated cone with multiple and opposing resilient electrical connection contact with said pin in the transverse plane defined by the truncation face of said cone as the only side engagements of said pin with respect to any circuit part of said pin-board sandwich, as the only operationally separable and movable electrical contacts in the entire sleeve and hole assembly, and as a resilient self cleaning arrangement for said pin in said sandwich as said pin is inserted and removed therefrom said fingers extending from said plane of truncation, downward, and radially outward from said pin, said cover plate and said sandwiched plates being in stacked relation to each other with the bottom of one insulation plate resting on part of the electrical circuitry of said sandwich by resting on the flanges of the said split connector sleeves in the other insulation plate whereby said plates are separated only by the thickness combination of one of said connector strips and one flange of one of said split sleeves, and an electrically conductive cylindrical connector pin removably mounted through said sleeves and said cover plate, said pin having an insulation body head to rest on said cover plate and to limit the insertion of said pin into said sandwich, and said cover plate openings each formed as a top, conical wholly insulated countersink and a bottom, cylindrical, wholly insulated guide opening, with said guide opening of slightly greater diameter than that of the said connector pins, and said countersink and guide openings of less diameter than said head of said connector pin, whereby said pins are maintained in concentricity, and with substantial side clearance, with respect to said sandwiched plate openings solely by the combination of said guide openings and said resilient electrical contacts.

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