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ELECTRICAL CONNECTOR

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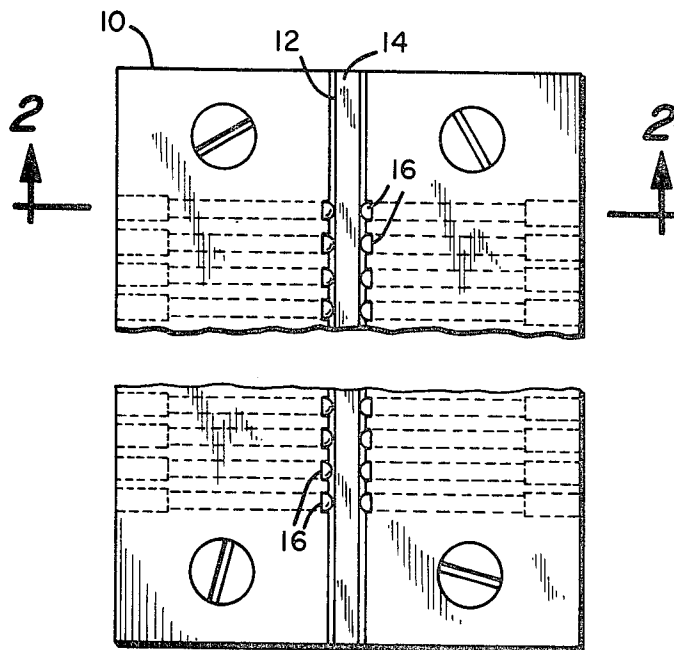


Fig. 1

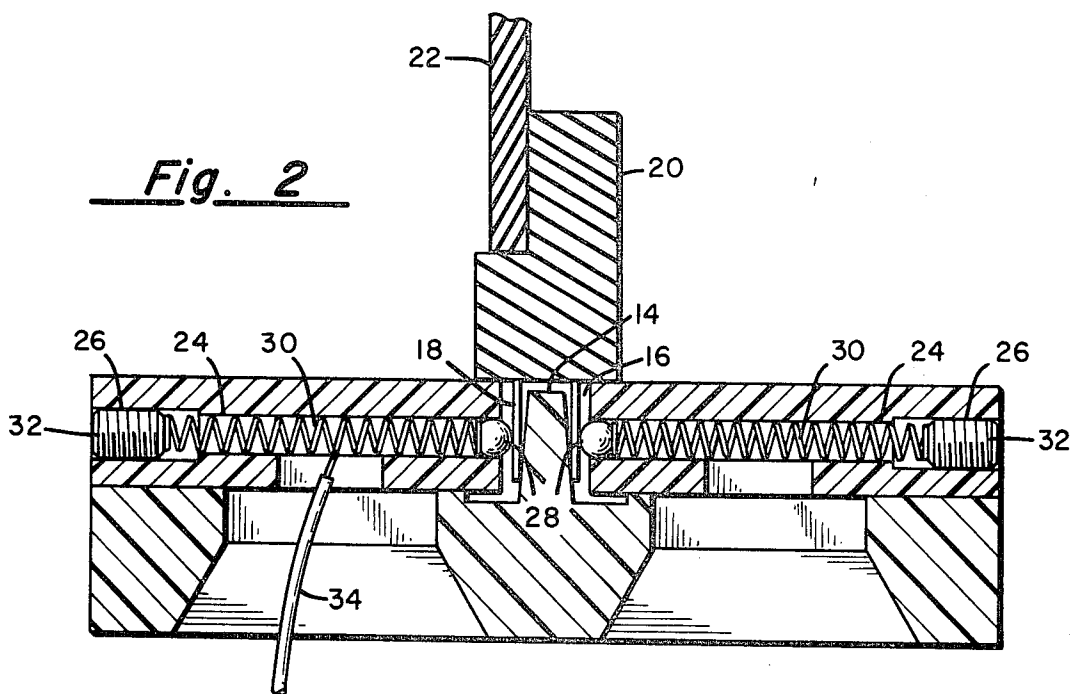


Fig. 2

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ELECTRICAL CONNECTOR

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3 Claims

ABSTRACT OF THE DISCLOSURE

A female receptacle for use in electrical apparatus for connecting printed circuit cards or the like into an assembly is described. The receptacle of this invention utilizes spring biased contact members located within the receptacle to establish electrical continuity with a male connector member on the printed circuit card.

BACKGROUND OF THE INVENTION

This invention relates to the female portion of an electrical connector assembly used to establish an electrical connection between an external device and one or more components mounted on a printed circuit board. The printed circuit board is provided with a male header and it is the purpose of this invention to provide a device which will accept the male pin contact members on the header and provide a reliable electrical contact between these pins and the external circuit.

Many forms of connectors are commercially available for accommodating printed circuit cards. For example, reference is made to the Bock et al. Patent 3,193,791 which shows one form of such a connector. This patent shows a receptacle formed from a suitable insulating material with a plurality of spaced apart leaf spring contact members located in slots on either side of the rectangular housing. A printed circuit card having conductive land areas on one edge thereof is adapted to be inserted into the slot in the housing and between the leaf spring contact members.

The present invention is like this prior art arrangement in that it too is used to interconnect external circuitry with that on a printed circuit card. However, the design features of the connector of the present invention are markedly different from those in the Bock patent.

In the present invention, there is provided an insulating block having a top and bottom surface. A longitudinal slot is provided in the block which is adapted to receive the male pins on the printed circuit card header. In order to obtain a positive and reliable contact with these male pins, the block is provided with a number of apertures or tunnels which lie in a plane intermediate the top and bottom surfaces of the receptacle. The number of and spacing between apertures corresponds to the spacing of the pins on the printed card header.

Located within each tunnel is a coil spring and spherical contact member. The tunnels mentioned above communicate with the longitudinal slot so that the coil spring urges the spherical contact member into engagement with the pins on the header. Further, means are provided for adjusting the spring bias force exerted on the spherical contact member.

Accordingly, it is an object of the present invention to provide an improved electrical receptacle for interconnecting printed circuit cards with external apparatus, said receptacle being economical to fabricate and highly reliable.

The invention will be better understood with reference to the accompanying drawings in which:

FIG. 1 represents a top view of a preferred embodiment of the invention, and

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FIG. 2 is a cross-sectional view taken along the line 2—2 of FIG. 1.

Referring to FIG. 1, there is shown a block 10 formed from a suitable insulating material such as plastic. Formed within the block 10 is a longitudinal slot 12 extending downwardly into the block from its top surface to a predetermined depth. Formed within the slot is a tapered projection 14 which, in effect, divides the longitudinal slot.

While not absolutely required, it has been found convenient to also provide in the walls of the slot in the block 10 a plurality of notches 16 which are spaced so as to accommodate the pins 18 shown on the printed circuit header 20 in FIG. 2. Numeral 22 in FIG. 2 is used to identify the printed circuit card itself which is connected in some suitable and well known fashion to the header member 20. The printed circuit card header illustrated has two rows of pins and when inserted into the receptacle, the rows straddle the projection 14.

Fabricated within the block 10 are a plurality of apertures or tunnels 24 which are located in a plane intermediate the top and bottom surfaces of the block 10. In the figures, two sets of tunnels are shown, there being one set on each side of the projection 14. These apertures are parallel to one another and spaced apart in accordance with the spacing between pins on the printed circuit header 20. One end of the tunnel 24 communicates with the slot 12 and the opposite end is provided with an internal threaded portion 26.

Located within each tunnel or aperture 24 is a spherical contact member 28 of a diameter slightly smaller than the diameter of the tunnel or aperture 24. The spacing between the solid wall of the slot 12 and the side of the projection 14 is such that the spherical contact member 28 is prevented from falling completely out of the tunnel and out of the slot 12.

Also located within each tunnel or aperture 24 is a coil spring 30. An externally threaded cap 32 when screwed into the internally threaded portion 26 of the aperture 24 forces the spring 30 against the spherical contact members 28 urging them into the slot 12. By adjusting the position of the threaded cap member 32, the tension of the spring can be controlled. Electrical connection to external circuitry (not shown) may be established by soldering or otherwise connecting an electrical lead 34 to the spring member as illustrated in FIG. 2.

In operation, when the female receptacle is constructed in the manner indicated in the foregoing portion of this specification, with the spherical contact members and coil spring inserted into the tunnels in the receptacle block 10, when a printed circuit header 20 having contact pins 18 is inserted into the slot 12 so that the contact pins are contained within notches 16, the insertion force will be sufficient to depress the spherical contact members 28 back into the tunnel against the bias afforded by the coil springs 30. However, the springs maintain a predetermined contact force between the spherical contact members 28 and the male pins 18 to provide a reliable electrical connection.

The spring members maintain a continuous force on the male pins without producing distortion or undue abrasion of the pin members. Hence repetitive insertions and disconnections without lead damage is afforded. Further, because of the wiping action that takes place upon the insertion and removal of the printed circuit header 20, the contact is self-cleaning. Accordingly, the reliability of the contact remains high.

Many variations of the above described connector will occur to those skilled in the art. For example, the spherical contact member 28 could be replaced by a cylindrical slug having a diameter slightly less than the diameter of the tunnel into which it is to be inserted, the end of

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the slug facing towards the slot 12 being rounded so as to prevent abrasion of the male contact pins as they are inserted or removed from the slot. While inductive reactance of the springs 30 has been found to have little effect on the high frequency performance of the circuits interconnected by the present invention, if the inductive reactance should prove to be a problem in certain special applications, the use of a cylindrical slug in place of the spring and ball configuration may be advantageous. Also, the header 20 could be of a type having only a single row of contact pins and in that configuration only one of the two sets of tunnels would be fabricated into the receptacle block 10. Therefore, the scope of the invention is to be determined from the appended claims.

What is claimed is:

1. A female receptacle for mounting a printed circuit card of the type having a male connector on one edge thereof, said male connector comprising a plurality of contact pins maintained in a spaced apart relationship with one another in a block of insulating material and extending downwardly from one edge thereof and means connecting said pins to predetermined areas on said card, said female receptacle comprising:

a block of insulating material having a slot extending downwardly from a top surface thereof, said slot being slightly larger in width than the width of said pins and having a first plurality of apertures lying in a plane substantially parallel to the top surface of said block and terminating in said slot, the spac-

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ing between said apertures corresponding to the spacing of pins on said male connector; spherical contact means located in said apertures; and compression spring means positioned in said apertures for urging said spherical contact means into said slot.

2. Apparatus as in claim 1 and further including means for adjusting the tension of said spring means.

3. Apparatus as in claim 1 and further including means for connecting electrical leads from an external circuit to said spring means, the arrangement being such that circuit continuity is established from said external circuit through said spring means and spherical contact to the contact pin on said male connector.

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