

[54] **ELECTRICAL JACK**  
[75] Inventor: **James C. Deitch**, Minneapolis, Minn.

[73] Assignee: **Magnetic Controls Company**, Minneapolis, Minn.

[22] Filed: **June 4, 1973**

[21] Appl. No.: **366,363**

[52] U.S. Cl. .... **339/17 R, 339/182, 179/97**

[51] Int. Cl. .... **H05k 1/18, H01r 17/18**

[58] Field of Search ..... 179/95-97;  
200/51.09, 51.1; 317/112; 339/119, 17 R, 18  
B, 121, 157, 198 G, 198 GA, 198 H, 198 K,  
182, 183

[56]

**References Cited**

**UNITED STATES PATENTS**

540,012	5/1895	D'Adhemar .....	339/183 X
752,722	2/1904	Stromberg .....	339/182 X
1,676,016	7/1928	Frost .....	179/96
1,718,280	6/1929	Edwards .....	317/112
1,839,795	1/1932	Mansfield .....	179/96 X

1,880,824	10/1932	Copenhaver et al. ....	179/96 X
2,032,191	2/1936	Tromp et al. ....	317/112 X
2,157,428	5/1939	Obszarny .....	317/112 X

**FOREIGN PATENTS OR APPLICATIONS**

218,819	9/1957	Australia .....	179/97
---------	--------	-----------------	--------

*Primary Examiner*—Bobby R. Gay

*Assistant Examiner*—Lawrence J. Staab

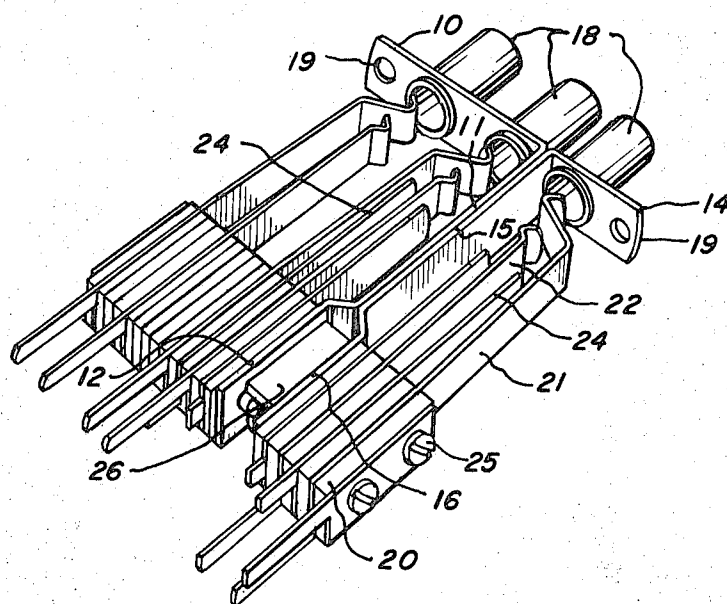
*Attorney, Agent, or Firm*—Dorsey, Marquart, Windhorst, West & Halladay

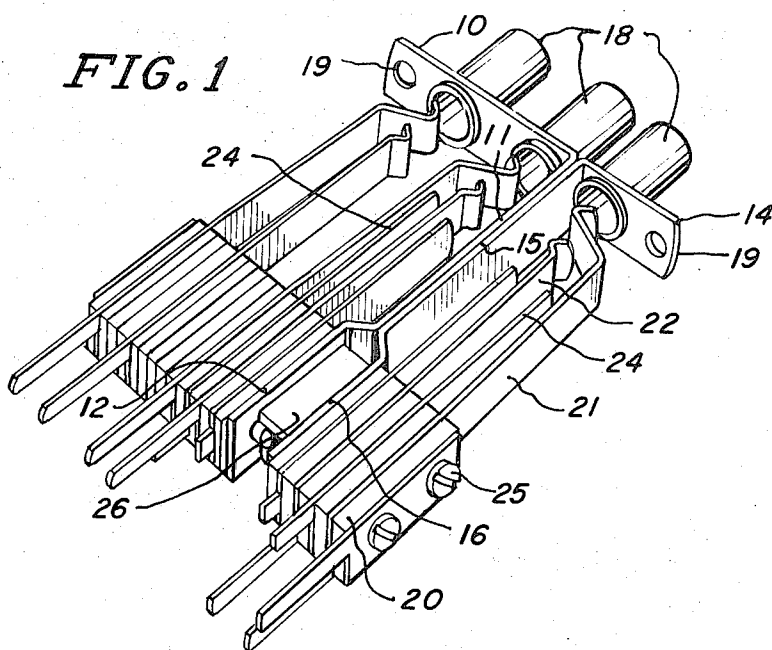
[57]

**ABSTRACT**

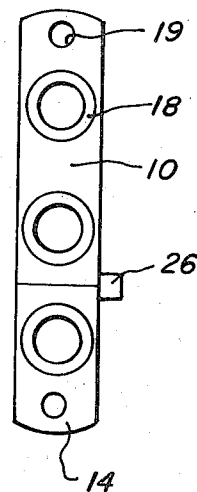
An electrical jack of the type adapted for side-by-side mounting in an electrical jack panel which includes a pair of frame members each having a portion to which are connected a plurality of jack springs separated by insulating blocks and each being spaced from that same portion of the other frame member by a spacing block disposed between said portions to prevent relative movement thereof and which is offset to enable adjacent jacks to be interlocked with each other.

**10 Claims, 9 Drawing Figures**

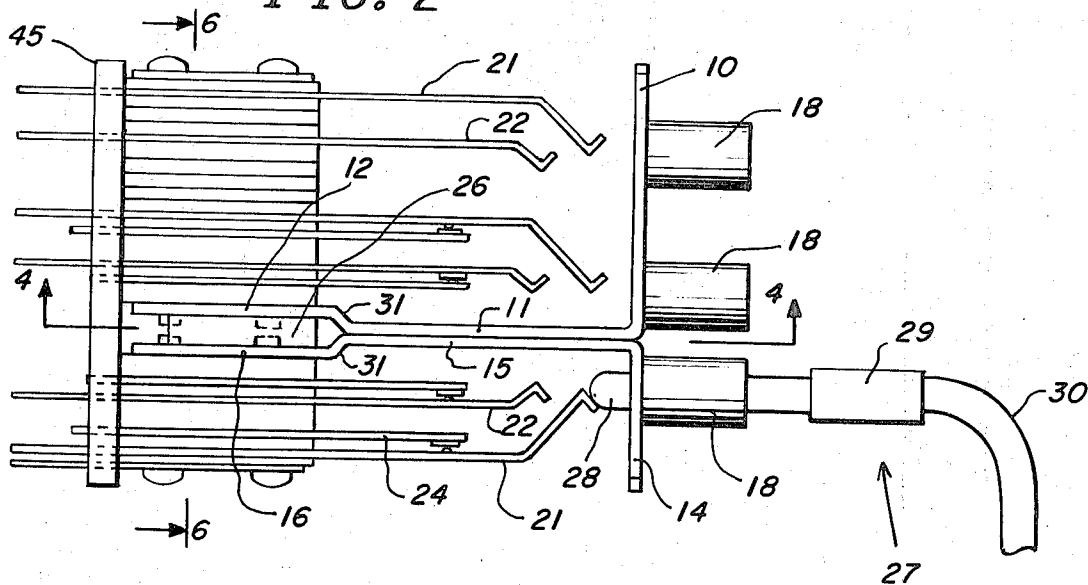




**FIG. 3**



**FIG. 2**



**FIG. 4**

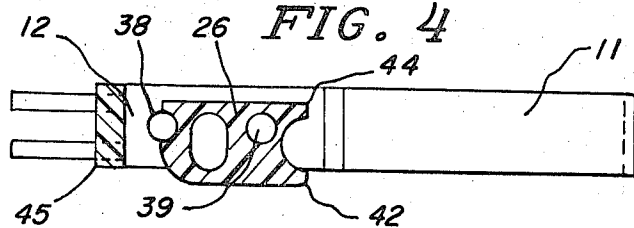


FIG. 5

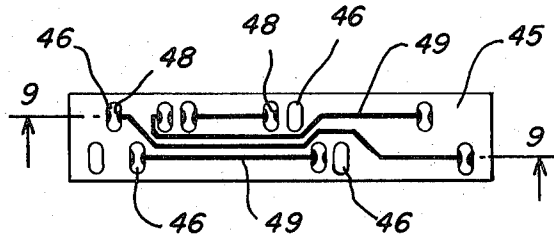
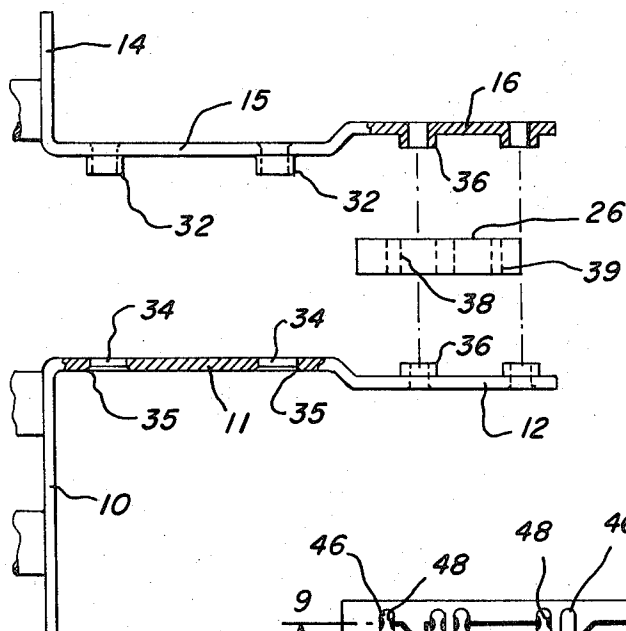


FIG. 8

FIG. 6

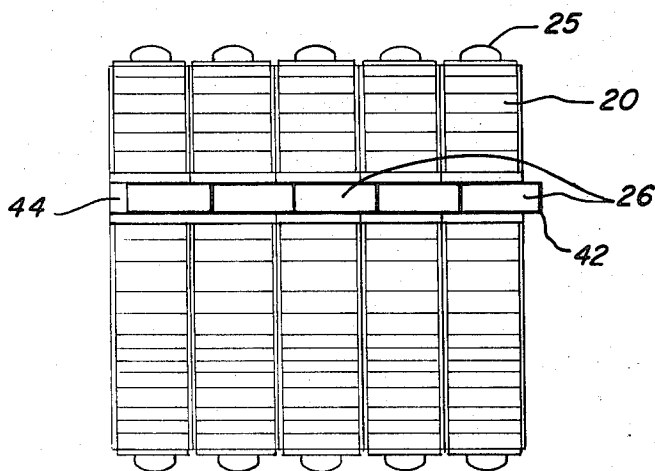


FIG. 7

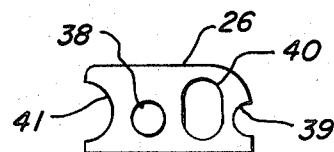
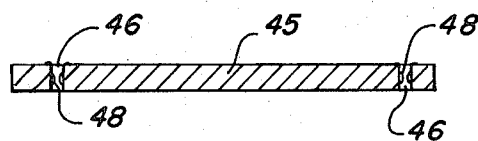


FIG. 9



## ELECTRICAL JACK

## BACKGROUND OF THE INVENTION

The present invention relates generally to the field of electrical jacks, and more specifically, to an improved electrical jack of the type adapted for side-by-side mounting in an electrical jack panel.

In the prior art, there are several forms of electrical jacks which are adapted for side-by-side mounting in an electrical jack panel. One basic construction of such a jack includes a first relatively rectangular frame section having formed therein a plurality of jack sleeves providing for electrical connection between the jack and a remote terminal and a second frame section integrally formed with the first frame section along one longitudinal edge thereof and disposed at right angles with respect thereto. Mounted to this second frame section are a plurality jack spring and insulating blocks associated with each of the jack sleeves. Although this particular electrical jack structure provides reasonably good vertical stability between the first and second frame sections about an axis perpendicular to the longitudinal edge connecting the first and second frame sections, it provides very little horizontal stability between such sections along the axis formed by such longitudinal edge. As a result, the second frame section is easily misaligned relative to the first frame section by inadvertent lateral movement of the section while the jack is secured to the jack panel.

A second form of electrical jack includes a pair of frame members each having a first portion containing a plurality of jack sleeves for electrically connecting the jack with a remote terminal and a second portion adapted for connection with the second portion of the other frame member by press welding. The second portion also includes a section to which is secured a plurality of jack springs and insulating blocks which in the aggregate are conventionally referred to as the "stack." Although this type of construction provides for reasonably good horizontal stability, it provides for very little vertical stability. Also, because the second section of the frame members are joined together by press welding, these sections are often misaligned relative to each other, resulting in a non-uniform jack. Additionally, because of the manner in which the jack springs and insulating blocks are connected to the second sections of the frame members, relative movement between the stacks of springs and insulators is permitted in the area on the frame where the jack springs and insulating blocks are secured to the frame members. This results in continued stresses being placed on the second sections and precludes the use of a circuit board for electrically connecting selected jack springs to each other. It also allows deflection of the jack springs from their intended positions thereby precluding such springs from making proper connection with the mating plug and distorting the contact pressure between the springs and contact members.

## SUMMARY OF THE INVENTION

In contrast to the prior art, the present invention relates to an electrical jack of the type adapted for side-by-side mounting in an electrical jack panel. Further the present invention relates to an electrical jack which provides for satisfactory stability in both the horizontal and vertical direction when such jacks are interlocked with others, thereby eliminating the possibility of rela-

tive movement between sections of the frame members.

More specifically, the structure of the electrical jack of the present invention includes a pair of frame members each having a first section with a plurality of jack sleeves for electrically connecting the jack with a terminal remote from the jack, a second section adapted for connection with the second section of the corresponding frame member, and a third section to which is mounted a plurality of insulating blocks and jack springs. The second sections are connected together by preformed mating portions to insure proper alignment between the second sections and thus proper alignment between the frame members. The third sections are integral with the second sections and extend therefrom for supporting the insulating blocks and springs. Finally, the electrical jack of the present invention includes a spacing block member connected to and disposed between the third sections of the frame members to eliminate relative movement between the third sections of the frame members and to enable adjacent electrical jacks to be interlocked with each other to provide sufficient vertical stability for a plurality of adjacent jacks when so interlocked.

Accordingly, it is an object of the present invention to provide an electrical jack of the type adapted for side-by-side mounting in an electrical jack panel which provides sufficient horizontal and vertical stability.

Another object of the present invention is to provide an electrical jack in which the frame members are connected to each other in a manner which insures proper alignment between such members.

A further object of the present invention is to provide an electrical jack having a spacing block disposed between spaced-apart portions of the two frame members to eliminate relative movement between such frame members.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the electrical jack of the present invention.

FIG. 2 is a plan view of the electrical jack of the present invention.

FIG. 3 is a plan view of the electrical jack of the present invention as viewed from one end of the jack.

FIG. 4 is a sectional view of the electrical jack of the present invention as viewed along the line 4—4 of FIG. 2.

FIG. 5 is an exploded plan view, partially in section, showing the relationship between the frame members and the spacing block and the manner in which the same are connected to each other.

FIG. 6 is a diagrammatical view of a plurality of electrical jacks positioned side-by-side in an electrical jack panel. The view of FIG. 6 is viewed along the line 6—6 of FIG. 2 to show the interlocking between adjacent jacks.

FIG. 7 is a plan view of the spacing block member adapted to be used in the electrical jack of the present invention.

FIG. 8 is a plan view of a circuit board used in the electrical jack of the present invention.

FIG. 9 is a sectional view of the circuit board of FIG. 8 as viewed along the line 9—9 of FIG. 8.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference first to FIGS. 1 and 2, the electrical jack of the present invention which is of the type which is commonly used for "telephones" or "communications," includes a pair of relatively L shaped frame members each including a first, second and third sections (reference numerals 10, 11, 12 and 14, 15, 16 respectively). As illustrated, each of the first sections 10 and 14 of the frame members is an elongated relatively rectangular shaped section which forms one leg of the L shaped frame member and which contains means in the form of the jack sleeves 18 and the jack plug 27 shown in FIG. 2 for electrically connecting a portion of the jack with a terminal (not shown) remote from the jack. Each of the first sections 10 and 14 further includes an aperture 19 for connecting the jack of the present invention to an electrical jack panel by appropriate connecting means (not shown).

Integrally connected with each of the first sections 10 and 14 and disposed at right angles thereto is a second section 11 and 15 respectively. As illustrated, the second sections 11 and 15 are relatively rectangular sections which are adapted for connection with each other in the manner illustrated in FIG. 5 and described in more detail below. Integrally connected with each of the second sections 11 and 15 is a third section 12 and 16 respectively. The third sections 12 and 16 are connected with the second sections 11 and 15 at the connecting point 31 such that the third sections 12 and 16 are spaced apart as shown. Mounted to each of the third sections 12 and 16 are a plurality of jack springs 21 and 22, connecting springs 24 and insulating blocks 20. Each of these members 20, 21, 22 and 24 is connected with its respective third section 12 and 16 by appropriate connecting members such as a pair of screws 25. An insulating block 20 is disposed between each of the jack springs 21 and 22 and the connecting springs 24 to electrically insulate such springs from each other.

As illustrated in FIGS. 1 and 2, each of the jack springs 21 and 22 and each of the connecting springs 24 have a portion extending past the end of the frame members and past the insulating blocks 20. To enable the electrical jack to function as desired, certain of these spring member portions are electrically connected with each other. Conventionally, such connections are accomplished by soldering connecting wires between selected spring members. It should be noted that with this type of connecting means, a limited amount of relative movement between the third sections 12 and 16 may occur without adversely affecting the functioning of the connecting means. In one embodiment, electrical connection is achieved between selected spring members 21, 22 and 24 by means of a circuit board which is illustrated best in FIGS. 8 and 9 and identified by the reference numeral 45. Such a circuit board, however, can only be used when relative movement between the third sections 12 and 16 is eliminated.

With reference to FIGS. 8 and 9, the circuit board 45 is a relatively rectangular member having a plurality of holes 46 positioned to correspond to the portions of the spring members 21, 22 and 24 extending past the insulating blocks 20, thereby enabling the circuit board 45 to be connected with the jack in the manner illustrated in FIG. 2. Referring again to FIGS. 8 and 9, certain of

the holes 46 are provided with connector members 48 which are adapted for electrical engagement with certain corresponding spring members 21, 22 and 24. Then, in the manner shown in FIG. 8, these connector members 48, and the spring members with which each is associated, are electrically connected with certain of the other connector members 48 and spring members by a connecting means 49. Although the connecting means 49 may be either printed circuits or metal strapping, the circuit board 45 in the preferred embodiment contemplates the use of printed circuits as the connecting means.

Referring again to FIGS. 1 and 2, a spacing block member 26 is disposed between the third sections 12 and 16 of the frame members. As illustrated best in FIGS. 3, 4, and 6 of the block member 26 is offset with respect to the third sections 12 and 16 to enable adjacent electrical jacks to be interlocked with respect to each other. The block 26 also serves to prevent relative movement between the third sections 12 and 16 during use of the electrical jack, thereby enabling a circuit board to be used for electrically connecting the spring members 21, 22 and 24. Without the block 26, relative movement would occur between the third sections 12 and 16 when inserting a plug into the jack sleeve 18. For example, as illustrated in FIG. 2, a conventional jack plug 27 having a contact portion 28, a portion 29 by which the plug may be gripped and a cord 30 leading to a terminal (not shown) remote from the jack is adapted for insertion into one of the jack sleeves 18 such that the contact portion 28 engages the jack springs 21 and 22. However, in order to make such engagement, the plug must be pushed into the sleeve 18 a sufficient distance to enable the contact portion 28 to make appropriate engagement with the spring 22. When this is done, both the jack springs 21 and 22 are biased outwardly as a result of engagement with the contact portion 28. This in turn exerts pressure on the connecting section 31 between the third sections 12 and 16 and the second sections 11 and 15 respectively, tending to rotate the third sections 12 and 16 inwardly about the connecting portion 31. However, with the presence of the spacing block 26 between the third sections 12 and 16, no relative movement between the third sections is permitted. Because of the elimination of the relative movement between the third sections 12 and 16, a printed circuit board may be used to make electrical connections between certain of the spring members 21, 22 and 24. Although the block may be constructed from a variety of materials, the block 26 of the present invention is constructed from an electrically non-conductive plastic material.

Referring next to FIG. 5, the means by which the second sections 11 and 15 are connected with each other and the means by which the spacing member 26 is connected between the third sections 12 and 16 may be seen. As illustrated, the second section 15 includes a pair of male sleeve portions 32 which are adapted for insertion into a corresponding pair of female openings 34 to make the connection between the second sections 11 and 15. The sleeve portions 32 and the openings 34 are preformed in the frame members and are positioned to insure proper alignment between the frame members when connected. It should be noted that the exterior dimension of the sleeves 32 corresponds substantially to the internal dimension of the opening 34 to permit the sleeves 32 to be inserted into

5

the openings 34 in a relatively tight relationship. One end of each of the openings 34 includes a beveled portion 35 enabling the ends of sleeves 32 to be peened by suitable means to securely connect the second sections 11 and 15 to each other.

To connect the block 26 properly between the third sections 12 and 16, each of the third sections includes a pair of sleeves 36 extending toward the opposing third section and functioning to retain the spacing member 26 between the third sections 12 and 16 in its proper position. As shown in FIGS. 5 and 7, the spacing member 26 includes openings 38 and 39 extending therethrough with internal dimensions approximating the exterior dimensions of the sleeve portions 36 so that the sleeves 36 may extend into the opening 38 and 39 when the member 26 is properly positioned between the third sections 12 and 16. It should be noted that the internal surface of each of the sleeves 36 contains threads adapted for threaded connection with the screw members 25 (FIGS. 1 and 2) for connecting the spring members 21, 22 and 24 and the insulating blocks 20 (FIGS. 1 and 2) to the third sections 12 and 16.

With reference next to FIG. 7, the holes 38 and 39 which extend through the spacing block 26 are positioned to insure proper positioning of the block 26 between the third sections 12 and 16. The block 26 also includes a second pair of openings 40 and 41 which serve as relief openings to eliminate certain stresses on the block 26.

With reference to FIG. 4, the spacing block 26 is disposed between the third sections 12 and 16 of the frame members such that a portion of the spacing block 26 extends outwardly from a first imaginary plane bridging a first edge of the third sections 12 and 16. Further, a portion 44 of the spacing block 26 is recessed from a second imaginary plane bridging a second edge of the third sections 12 and 16 to enable the outwardly extending portion 42 of the block 26 of an adjacent jack to be interlocked with the recessed portion 44.

Thus, with the offset arrangement of the blocks 26, a plurality of electrical jacks may be mounted in side-by-side relationship in the manner illustrated in FIG. 6. As shown, adjacent jacks are interlocked as a result of the portion 42 of the block 26 extending into and interlocking with or engaging the recessed portion 44 of the block 26 of an adjacent jack. With this interlocking relationship between adjacent jacks, the entire jack assembly is provided with additional vertical stability, a quality which none of the jacks have individually.

Although the description of the preferred embodiment has been quite specific, it is contemplated that various modifications could be made to the jack of the present invention without deviating from the spirit of the present invention. Consequently, it is intended that the scope of the present invention be dictated by the appended claims rather than by the description of the preferred embodiment.

I claim:

6

1. An electrical jack of the type adapted for side-by-side mounting in an electrical jack panel comprising:

a pair of frame members each including first, second and third sections, said first section having means for electrically connecting a portion of said jack with a terminal remote from said jack, said second section in abutting engagement with the second section of the other frame member of said pair of frame members, and said third section being spaced from the third section of the other frame member of said pair of frame members and

a block member connected with and disposed between the third sections of said pair of frame members, said block member being offset relative to said third sections to enable interlocking relationship between adjacent jacks.

2. The electrical jack of claim 1 wherein said block member is adapted for interlocking relationship with a recess formed between the third sections of an adjacent jack.

3. The electrical jack of claim 2 wherein said block member is disposed between said third sections such that a portion of said block extends outwardly from a first imaginary plane bridging a first edge of said third sections for interlocking engagement with an adjacent jack and such that a portion of said block is sufficiently recessed from a second imaginary plane bridging a second edge of said third sections to enable interlocking relationship between adjacent jacks.

4. The electrical jack of claim 3 wherein a portion of said block member extends outwardly from said first imaginary plane the same distance that a portion of said block is recessed from said second imaginary plane.

5. The electrical jack of claim 4 wherein the second sections of corresponding frame members include preformed mating male and female portions for connecting said second sections together.

6. The electrical jack of claim 1 having electrical connecting members mounted to the third sections of each of said frame members.

7. The electrical jack of claim 1 wherein each of said frame members is an L shaped member with said first section forming one leg thereof and with said second and third sections forming the other leg thereof.

8. The electrical jack of claim 1 wherein the second sections of corresponding frame members include preformed mating male and female portions for connecting said second sections together.

9. The electrical jack of claim 1 wherein said block member serves to eliminate relative movement between said third sections.

10. The electrical jack of claim 1 having a plurality of jack springs mounted to each of said third sections and having a printed circuit board associated with said plurality of jack springs for electrically connecting selected jack springs.

\* \* \* \* \*