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(54) **SHIELD CONTINUITY CONTACTS FOR ELECTRICAL CONNECTORS.**

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(56) References cited :
DE-A- 3 320 147
US-A- 4 537 459
US-A- 4 571 012

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EP 0 599 951 B1

Description

This invention relates to shield continuity contacts for use in electrical connectors.

Unshielded cables may pick up interference from external electrical machinery due to capacitative coupling.

Conventionally, to guard against this, a metal or metallic shield which is connected to ground is placed round the cable.

A problem arises at the connectors as, to be effective, the shield must be continuous. Various methods of ensuring this continuity at the connector are employed, depending on the type of connector used.

In connector systems, such as that described in US-A-4571012, it is normal to connect the cable shield to a metallic or metallised plastic outer cover on the plug, and arrange this cover to engage with fingers formed on the inside of the receptacle aperture by folding the metallic outer cover of this receptacle around the front face of the receptacle and into the cavity to be occupied by the plug. The fingers thus formed are known as grounding fingers.

The formation of shield continuity connections in this manner is well known and has been particularly used in the aerospace industry.

The technique has been applied to the communication industry and in particular, connectors for data use. In this application, the arrangement described has a number of disadvantages. Most notably the necessity for the shield and finger design to be folded around the connector after the latter has been completed. This is a relatively complex and costly manufacturing operation. Furthermore, these fingers are all connected to earth and serve only to ground the shield of a plug inserted into the connector receptacle. Hence, connectors shielded in this manner cannot be used for example, for identifying the plug inserted therein.

A further disadvantage is that it is difficult, except when used on a PCB, to connect to the grounding fingers at the front face of the connector.

The present invention in its various embodiments aims to overcome the above-mentioned disadvantages.

US-A-4537459 describes a system in which a multi-way cable is screened by an outside layer which is compressed at the connector. A pin on the inserting connector is inserted through the side of the moulding and makes contact with the screening layer on the cable. On insertion of a plug, the pin makes contact with the earthing contact on the fixed connector thus continuing the screening contact.

Broadly, the invention resides in the provision of a connector which includes at least two grounding contacts which are electrically isolated from each other.

More specifically the invention is defined in the independent claims to which reference should be made.

As the earthing contacts are electrically isolated from each other until insertion of a shielded plug into the cavity, it is possible to utilize the electrical linking of the contacts by the shield as a means for detecting the presence of the shielded plug in the connector.

Thus, the need for a mechanical patch frame is eliminated.

Preferably, the contacts are inserted into the connector body via an aperture in one of the walls.

An advantage of this is that the contact feature may be formed by a simple stamping operation and need not be of the same material as is used for the outer screen thus allowing best choice of materials to improve contact resistance and reliability and reducing costs.

Furthermore, the invention is easier to assemble than the prior art as it involves a simple insertion operation without the folding required by the prior art.

In one preferred embodiment of the invention the aperture is in the rear wall of the connector body and the contact may be inserted from the rear of the body. A terminal portion will remain outside the body facilitating connection. Unlike the prior art construction described previously the grounding fingers are close to the connecting wires as they exit the connector.

Embodiments of the invention will now be described, by way of example and with reference to the accompanying drawings in which:

Figure 1 is a perspective view from the front and one side of the connector body partially showing a contact;

Figure 2 is an exploded perspective view from the rear and one side of the connector of Figure 1, showing separately a contact prior to insertion;

Figure 3 is a perspective view from the front and one side of a second embodiment of the invention;

Figure 4 is a view on the line A-A in Figure 3;

Figure 5 is an exploded perspective view from the rear and one side of a third embodiment of the invention;

Figure 6 is a partial view of the contact of Figure 5;

Figure 7 is an exploded perspective view from the rear and one side of a fourth embodiment of the invention; and

Figure 8 is a schematic view of an intelligent patching system including the connector system embodying the invention.

The electrical connector shown in Figure 1 comprises a connector body 10, a plug receiving cavity 12 for receiving a plug, a pair of contacts 14 and a respective pair of contact channels (not shown). The contacts are intended to establish electrical contact between the plug and grounding contact, thus providing a continuous path to earth.

The side walls 15 of the cavity each have one of the contact channels. The channels extend along the respective side walls and receive the contact.

As can be seen from Figure 2, the grounding contact 14 is inserted through an aperture 15 comprising a first aperture part 16 and a second aperture part 18, in the rear wall of the connector body 10. The contact has a resilient tongue 22 which is depressed against its natural bias on insertion through the aperture 15. The second aperture part 18 provides a means for easing the insertion of the contact. The contact also carries a retaining means 24 which comprises a further resilient tongue which is depressed on insertion into the plug cavity and then restored such that it abuts the rear wall of the connector having the aperture.

A second embodiment shown in Figures 3 and 4 is essentially the same as that shown in Figure 1, however the contact 26 has a bowed portion extending into the plug cavity. A protruding portion 30 of the contact may be used as a terminal such as a screw terminal, a solder terminal, a push-on connector, an insulation displacement connector or a crimp terminal. The contact retaining means comprises a retaining clip 28 at an end of the contact for abutting a side wall of the body at the aperture mouth 29. The side walls have a recess for receiving the clip 28 such that the clip is flush with the remainder of the wall surface. In the embodiment of Figures 5 and 6 the grounding contact is inserted into the connector through the front face 29 of the connector body and is retained in place after assembly by the retaining clips 28 similar to those of the embodiment of Figures 3 and 4.

In addition the terminal portions of the contact have retaining tabs 32 which, with the contact in position are folded over as shown in Figure 6 to prevent the contact from moving out of position.

Figure 7 shows an alternative retaining means 38 for the grounding contact 42, which comprises two resilient tongues 40 which are depressed on insertion into the plug cavity and then restored such that they abut a shoulder in the side of the plug cavity.

The intelligent patching system shown in Figure 8 comprises a number of electrical connector receptacles 200 of the type shown in Figure 1, into which shielded or unshielded plugs 400 may be inserted. In the connector receptacles 200, at least one grounding contact 210 from each position is connected to earth and a further contact 230, which is electrically isolated from the earthed contact 210, is connected to a socket identification system 600. The output of the socket identification system 600 is connected to a terminal port allocation device 800 which determines the interconnection of the signal contacts 230 in the connector 200 with the ports of a computer 100.

A next free port selection network 120, which is connected between the terminal port allocation device 800 and the computer 100, keeps a record of those ports of the computer which have been allocated so that the next connector to be activated will be allocated the next free port.

On insertion of a shielded plug 400 into a connector receptacle 200, the two contacts 210 and 230 are bridged, taking the initially non-grounded contact 230 to earth potential. This may be used to indicate the presence of the shielded plug 400 in the connector receptacle 200 to the socket indication system 600. The socket indication system 600 then advises the terminal port allocation device 800 to activate the particular position of the connector receptacle 200, and allocate it to a port selected by the next free port selection network 120, on the computer 100.

Generally, the number of connector receptacles 200 is less than the number of ports available at the computer 100.

On insertion of an unshielded plug into a connector receptacle 200, the two contacts 210 and 230 remain electrically isolated. In this instance, plug insertion may be determined by detection of a signal flowing through working contacts of the connector. For example, two of the working contacts in the plug may be linked so that when inserted into a connector receptacle, the corresponding contacts in the receptacle will be bridged. This may be used to indicate the presence of an unshielded plug in the connector receptacle to the socket indication system 600. The socket indication system 600 then advises the terminal port allocation device 800 to activate the particular position of the connector receptacle 200, and allocate it to a port selected by the next free port selection network 120, on the computer 100.

In a further embodiment in which a number of connector receptacles are located in an array, adjacent to each other, the contact connected to ground could be arranged to serve two or more adjacent receptacles.

Various alternatives to the embodiments described are possible and will occur to those skilled in the art. For example, the various retaining means described are interchangeable so that the contact of Figure 2 could be provided with the retaining tabs of Figure 6. The choice of retaining means and contact will depend on the application of the connector.

Claims

1. An electrical connection apparatus for a voice or data communications system comprising first and second electrical connectors, the first electrical connector comprising a shielded plug; the second connector comprising at least two earth contacts (14;26;42) for grounding the connector, and a connector body (10) having a cavity (12) for receiving the shielded plug, the cavity (12) having side walls and a rear wall, at least one of which

has an aperture (15,16,18), the earth contacts (14;26;42) extending from outside the connector body (10), through the aperture into the cavity (12) for establishing electrical contact with the plug, characterized by the earth contacts (14;26;42) being electrically isolated from each other until insertion of the shielded plug.

2. Apparatus according to Claim 1, wherein a channel extends along a side wall of the plug receiving cavity (12) of the second electrical connector, and the contact (14;26;42) is received in the channel.

3. Apparatus according to claim 1 or 2, wherein each earth contact (14;26;42) of the second electrical connector includes means (24;28;32) for retaining the contact in the aperture.

4. Apparatus according to Claim 1, 2 or 3, wherein at least a portion of each contact (14;26;42) of the second electrical connector is biased towards the plug receiving cavity (12).

5. Apparatus according to Claim 3 or 4, wherein the retaining means (24;28) of each contact of the second electrical connector comprises a tab arranged to abut the wall of the connector having the aperture.

6. Apparatus according to Claim 3 or 4, wherein the retaining means of each contact of the second electrical connector comprises a resilient tab (24;28) arranged to locate behind a shoulder in a side wall of the plug receiving cavity.

7. Apparatus according to Claim 3 or 4, wherein the retaining means of each contact of the second electrical connector comprises a retaining clip (28) at an end of the contact abutting a side wall of the body at the aperture mouth (29).

8. Apparatus according to Claim 4, 5, 6 or 7, wherein each contact of the second electrical connector comprises a resilient tongue (40).

9. Apparatus according to Claim 4, 5 or 6, wherein each contact of the second electrical connector has a bowed portion extending into the plug cavity (12).

10. Apparatus according to Claim 3 or 4, wherein the retaining means of the earth contacts of the second electrical connector comprises a tab (32) on a terminal portion of the contact outside the connector body.

11. Apparatus according to Claim 10, wherein the tab (32) is bent outside the body wall having the said aperture to retain the contact in position.

12. An intelligent patching system for patching terminals of a data or voice communications system to a central station comprising a plurality of second electrical connectors (200) as defined in any preceding claim, and means (230,600) for detecting when a terminal plug (400) is inserted into the plug receiving cavity of the electrical connector.

13. An intelligent patching system according to Claim 12, comprising means for activating (800,600) the terminal connections on detection of the inserted terminal plug (400).

Patentansprüche

1. Eine Vorrichtung für eine elektrische Verbindung für ein Sprach- oder Datenübermittlungssystem, das erste und zweite elektrische Verbinder enthält, wobei der erste elektrische Verbinder einen abgeschirmten Stecker enthält, wobei der zweite Verbinder mindestens zwei Massekontakte (14,26,42) zur Erdung des Verbinders und einen Verbinderkörper (10) mit einer Aushöhlung (12) zur Aufnahme des abgeschirmten Steckers enthält, wobei die Aushöhlung (12) Seitenwände und eine Rückwand besitzt, von denen wenigstens eine eine Öffnung (15,16,18) besitzt, und wobei sich die Massekontakte (14,26,42) von außerhalb des Verbinderkörpers (10) durch die Öffnung in die Aushöhlung (12) hinein erstrecken, um einen elektrischen Kontakt mit dem Stecker herzustellen, dadurch gekennzeichnet, daß die Massekontakte (14,26,42) bis zur Einführung des abgeschirmten Steckers voneinander elektrisch isoliert sind.

2. Vorrichtung gemäß Anspruch 1, wobei sich ein Kanal entlang einer Seitenwand der den Stecker aufnehmenden Aushöhlung (12) des zweiten elektrischen Verbinders erstreckt und der Kontakt (14,26,42) in dem Kanal aufgenommen ist.

3. Vorrichtung gemäß Anspruch 1 oder 2, wobei jeder Massekontakt (14,26,42) des zweiten elektrischen Verbinders Mittel (24,28,32) zum Zurückhalten des Kontaktes in der Öffnung beinhaltet.

4. Vorrichtung gemäß Anspruch 1, 2 oder 3, wobei wenigstens ein Abschnitt jedes Kontaktes (14,26,42) des zweiten elektrischen Verbinders in Richtung der den Stecker aufnehmenden Aushöhlung (12) vorgespannt ist.

5. Vorrichtung gemäß Anspruch 3 oder 4, wobei die

Rückhaltemittel (24,28) jedes Kontakts des zweiten elektrischen Verbinders einen Vorsprung enthalten, der so angeordnet ist, daß er an die Wand des die Öffnung aufweisenden Verbinders stößt.

6. Vorrichtung gemäß Anspruch 3 oder 4, wobei die Rückhaltemittel jedes Kontakts des zweiten elektrischen Verbinders einen flexiblen Vorsprung (24,28) enthalten, der so angeordnet ist, daß er sich hinter einer Schulter in einer Seitenwand der den Stecker aufnehmenden Aushöhlung befindet.

7. Vorrichtung gemäß Anspruch 3 oder 4, wobei die Rückhaltemittel jedes Kontakts des zweiten elektrischen Verbinders an einem Ende des Kontakts einen Rückhaltebügel (28) enthalten, der an der Mündung (29) der Öffnung an eine Seitenwand des Körpers stößt.

8. Vorrichtung gemäß Anspruch 4, 5, 6 oder 7, wobei jeder Kontakt des zweiten elektrischen Verbinders eine flexible Zunge (40) enthält.

9. Vorrichtung gemäß Anspruch 4, 5 oder 6, wobei jeder Kontakt des zweiten elektrischen Verbinders einen gewölbten Abschnitt besitzt, der sich in die Steckeraushöhlung (12) hinein erstreckt.

10. Vorrichtung gemäß Anspruch 3 oder 4, wobei die Rückhaltemittel der Massekontakte des zweiten elektrischen Verbinders einen Vorsprung (32) auf einem Endabschnitt des Kontakts außerhalb des Körpers des Verbinders enthalten.

11. Vorrichtung gemäß Anspruch 10, wobei der Vorsprung (32) von der die Öffnung aufweisenden Körperwand auswärts gekrümmt ist, um den Kontakt auf Position zu halten.

12. Ein intelligentes Steckersystem zum Stecken von Anschlüssen eines Daten- oder Sprachübermittlungssystems zu einem zentralen Standort, das eine Vielzahl der zweiten elektrischen Verbinder (200), wie sie in irgendeinem vorhergehenden Anspruch definiert sind, und Mittel (230,600) enthält zur Erkennung, wann ein Anschlußstecker (400) in die den Stecker aufnehmende Aushöhlung des elektrischen Verbinders eingesteckt ist.

13. Ein intelligentes Steckersystem gemäß Anspruch 12, das Mittel zur Aktivierung (800,600) der Anschlußverbindungen enthält, wenn erkannt wird, daß ein Anschlußstecker (400) eingesteckt ist.

Revendications

1. Dispositif de raccordement électrique pour un système de communications de voix ou de données comprenant des premier et second dispositifs de raccordement électrique, le premier dispositif de raccordement électrique comprenant une prise protégée ; le second dispositif de raccordement comprenant au moins deux contacts à la terre (14 ; 26 ; 42) pour mettre à la terre le dispositif de raccordement, et un corps de dispositif de raccordement (10) possédant une cavité (12) pour recevoir la prise protégée, la cavité (12) possédant des parois latérales et une paroi arrière, dont au moins une possède une ouverture (15, 16, 18), les contacts à la terre (14 ; 26 ; 42) s'étendant de l'extérieur du corps de dispositif de raccordement (10), à travers l'ouverture dans la cavité (12) pour établir un contact électrique avec la prise, caractérisé par les contacts à la terre (14 ; 26 ; 42) isolés électriquement l'un de l'autre jusqu'à l'insertion de la prise protégée.

2. Dispositif selon la revendication 1, dans lequel un canal s'étend le long d'une paroi latérale de la cavité (12) recevant la prise du second dispositif de raccordement électrique, et le contact (14 ; 26 ; 42) est reçu dans le canal.

3. Dispositif selon la revendication 1 ou 2, dans lequel chaque contact à la terre (14 ; 26 ; 42) du second dispositif de raccordement électrique comprend des moyens (24 ; 28 ; 32) pour retenir le contact dans l'ouverture.

4. Dispositif selon l'une quelconque des revendications 1, 2 ou 3, dans lequel au moins une partie de chaque contact (14 ; 26 ; 42) du second dispositif de raccordement électrique est appliquée vers la cavité (12) recevant la prise.

5. Dispositif selon la revendication 3 ou 4, dans lequel les moyens de retenue (24 ; 28) de chaque contact du second dispositif de raccordement électrique comprend une patte disposée pour être jointive à la paroi du dispositif de raccordement ayant l'ouverture.

6. Dispositif selon la revendication 3 ou 4, dans lequel les moyens de retenue de chaque contact du second dispositif de raccordement électrique comprennent une patte élastique (24 ; 28) disposée pour se situer derrière un épaulement dans une paroi latérale de la cavité recevant la prise.

7. Dispositif selon la revendication 3 ou 4, dans lequel les moyens de retenue de chaque contact du second dispositif de raccordement électrique

comprennent un étrier de retenue (28) à une extrémité du contact jointive à une paroi latérale du corps à la bouche d'ouverture (29).

8. Dispositif selon l'une quelconque des revendications 4, 5, 6 ou 7, dans lequel chaque contact du second dispositif de raccordement électrique comprend une languette élastique (40).

9. Dispositif selon l'une quelconque des revendications 4, 5 ou 6, dans lequel chaque contact du second dispositif de raccordement électrique a une partie courbée s'étendant dans la cavité de prise (12).

10. Dispositif selon la revendication 3 ou 4, dans lequel les moyens de retenue des contacts à la terre du second dispositif de raccordement électrique comprennent une patte (32) sur une partie terminale du contact à l'extérieur du corps du dispositif de raccordement.

11. Dispositif selon la revendication 10, dans lequel la patte (32) est courbée à l'exterieur de la paroi du corps ayant ladite ouverture pour retenir le contact en position.

12. Système intelligent d'estampage pour estamper des bornes d'un système de communications de données ou de voix vers une station centrale comprenant une pluralité de seconds dispositifs de raccordement électrique (200) comme défini dans l'une quelconque des revendications précédentes, et des moyens (230, 600) pour détecter quand une prise terminale (400) est insérée dans la cavité recevant la prise du dispositif de raccordement électrique.

13. Système intelligent d'estampage selon la revendication 12, comprenant des moyens pour activer (800, 600) les raccords terminaux lors de la détection de la prise terminale insérée (400).

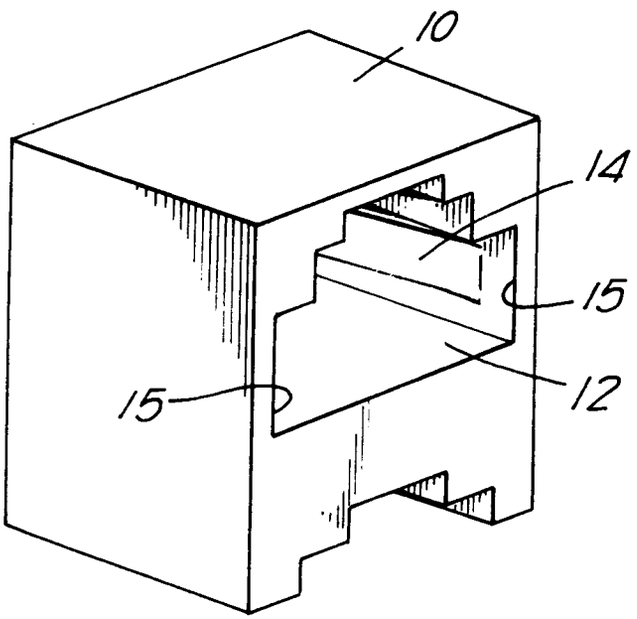

FIG. 1

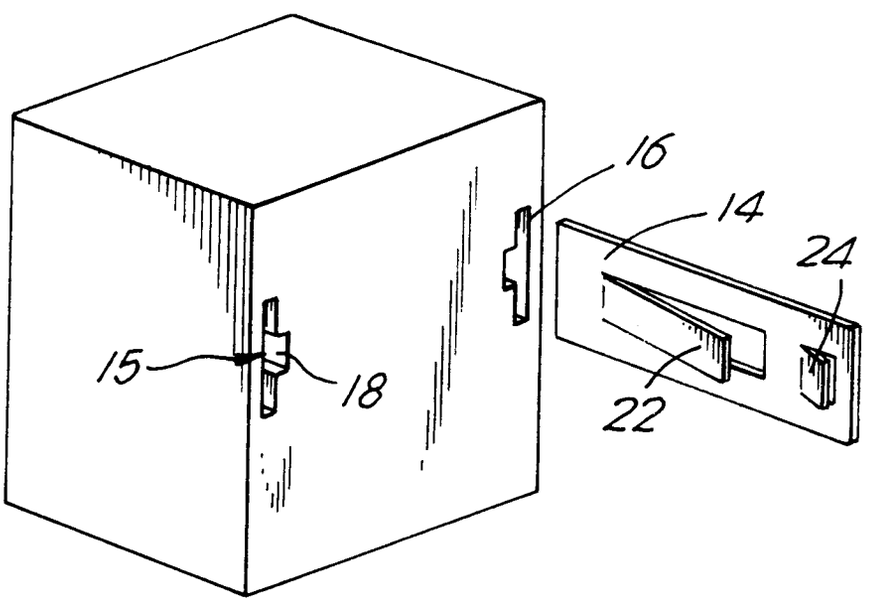

FIG. 2

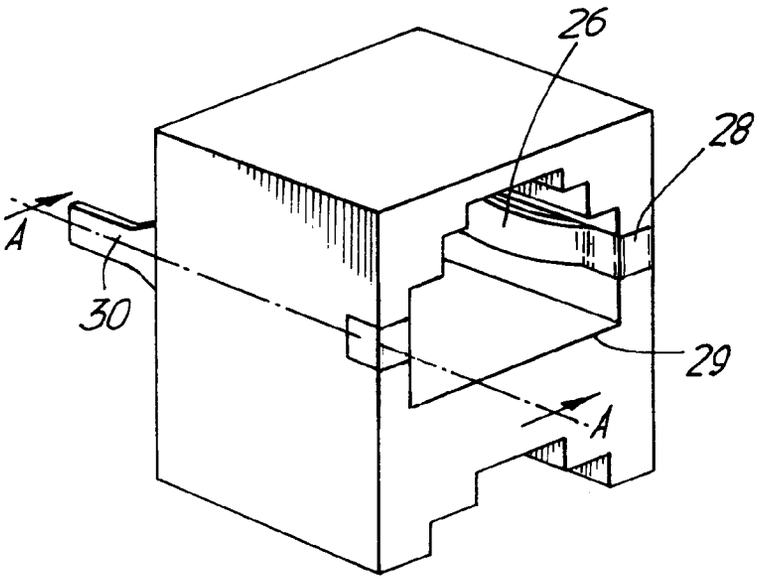

FIG.3

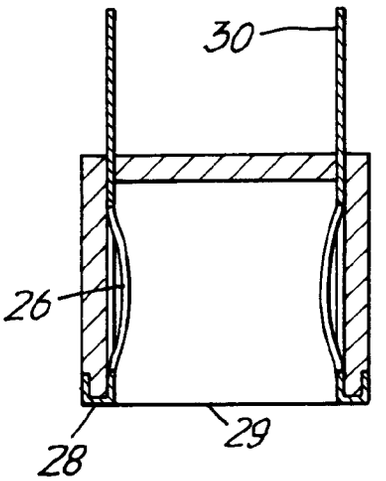

FIG.4

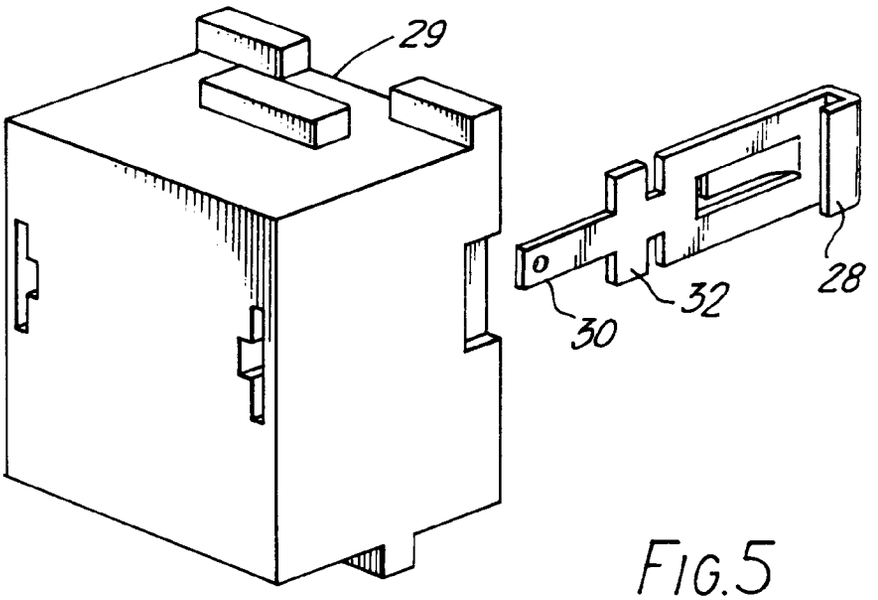

FIG.5

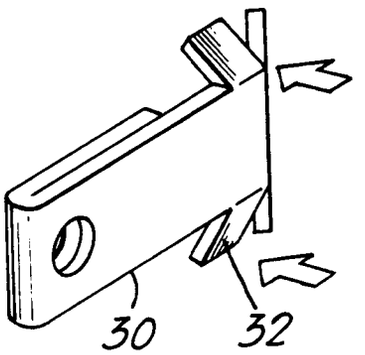

FIG. 6

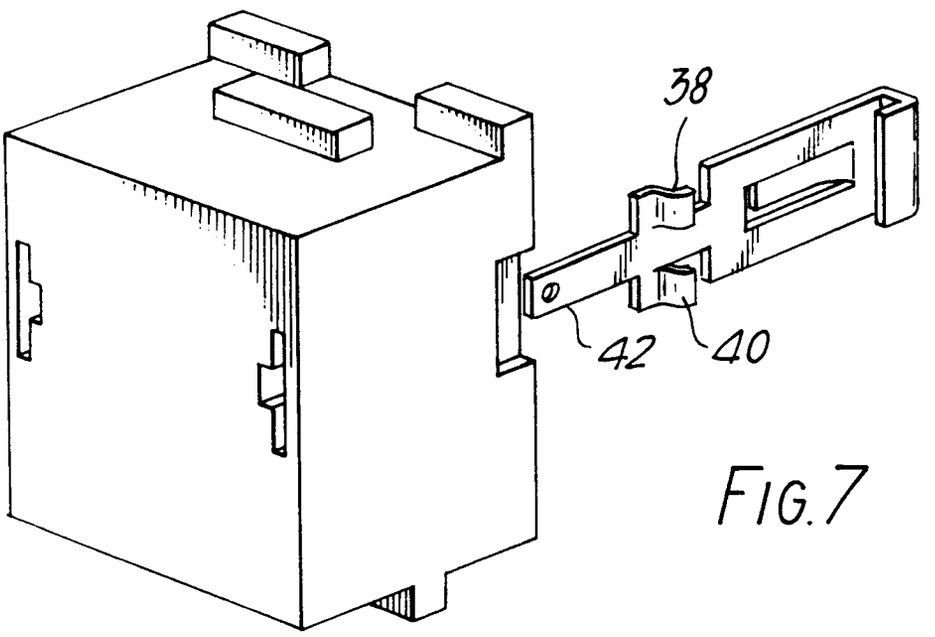

FIG. 7

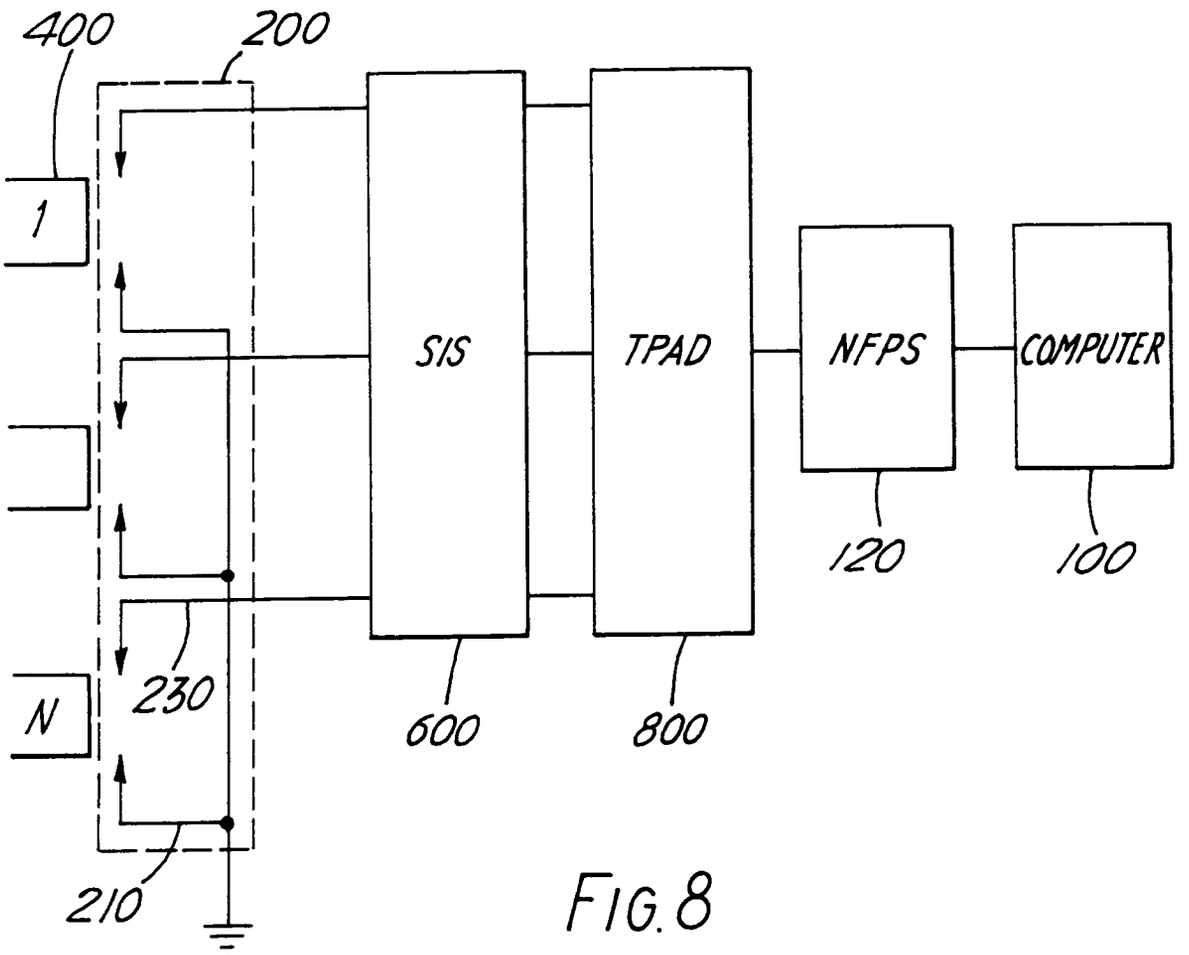

FIG. 8