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(54) **CONNECTOR FOR RIBBON CABLE.**

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EP-A- 0 141 957
DE-C- 2 607 693
US-A- 4 153 325
US-A- 4 171 858
US-A- 4 279 074
US-A- 4 448 473

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Description

The present invention relates to a connector for ribbon cable, and particularly to improve means for aligning terminals in the housing.

Ribbon cable provides a convenient means for handling multiple conductors, and is typically manufactured with conductors on .050 inch (1.27 mm) centerline spacing in a common jacket of insulation. Accordingly, specialized connectors having insulation displacing terminals with slotted plates on .050 inch (1.27 mm) centerline spacing have been developed. Typically, such connectors have two rows of terminals spaced on .100 inch (2.54 mm) centers, the slotted plates in each row being offset from the slotted plates in the other row so that each row of terminals terminates alternate conductors in the cable. An early connector of this type, which is sold by AMP Incorporated under the trademark AMP-LATCH, is disclosed in US-A-3 820 555.

US-A-4 171 858 discloses a connector for terminating a multiconductor flat cable using insulation displacing contacts disposed in passages of the connector housing. Each contact includes a single barb which bites into the wall of a respective passage to prevent removal of the contact, and a double spring member contact having flared ends. Upon insertion of a contact into a passage, the flared ends of the contact engage a pair of preloading barriers that serve to space the double spring member contacts from each other by a predetermined distance and to center the contacts over an entry aperture. The preloading barriers terminate in the region of the flared ends of the contacts.

DE-C-26 07 693 and US-A-4 637 004 disclose an electrical connector of the type comprising an insulative housing having a mating end, a cable receiving end, and a plurality of terminal passages extending therebetween, the passage being of generally square cross-section. The connector further comprises a plurality of stamped and formed terminals received in respective passages, each terminal having a body portion comprising a substantially planar first plate extending to a coplanar slotted plate portion.

Terminals as described above generally depend on contact between the three plates of the C-shaped body portion and respective adjacent walls of the passage to angularly position the terminals in the housing. A detent may be stamped in one or more walls to provide an interference fit for retention. For such small terminals (about .070 inch (1.78 mm) square in the body portion), it is extremely difficult to control the formed dimensions relative to the terminal size. Since stamped dimensions are relative easy to control, an oversized formed dimension means that another dimension formed within the same stamped dimension will be undersized. Most notably, a place of oversized width means that one or two of the other plates will be undersized.

This in turn affects the angular orientation of the terminals in respective passages, and likewise the centerline spacing of the slotted plate portions. Considering also the tolerances in spacing of conductors in the ribbon cable, damage or even severing of one or more such conductors is possible.

According to the invention, an electrical connector of the type comprising an insulative housing having a mating end, a cable receiving end, and a plurality of terminal passages extending therebetween, said connector further comprising a plurality of elongate terminals received in respective passages, each terminal having a body portion of generally C-shaped cross-section, said body portion comprising a substantially planar first plate extending to a coplanar slotted plate portion, said first plate having a pair of opposed lugs which engage opposite walls of said passage to secure said terminal in a respective passage, characterised in that each said body portion further comprises a third plate substantially parallel to the first plate, said first and third plates having respective cantilever arms extending therefrom to form a mating portion of said terminal, said first and third plates being connected by a second plate extending substantially normally therebetween, each said passage having an elongate rib on one wall thereof, said rib extending from proximate said mating end toward said cable receiving end (14), with said cantilever arms being loaded against opposite sides of rib, and in that said rib forms a stop abutted by said second plate of said terminal to axially position said terminal in its passage, each passage having a pair of lead-ins at the cable receiving end to position the first plate of said body flushly against the wall of the passage adjacent to said first plate, whereby clearance is provided between the second and third plates and the walls of the passage, adjacent thereto to allow for dimensional variations in forming the second and third plates.

An additional advantage is achieved where the mating end of the terminal comprises cantilever arms extending from parallel plates of the body portion. Precise angular orientation of the terminal assures that parallel surfaces of the mating ends of the arms will contact opposite sides, rather than edges, of a mating pin.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is an exploded perspective of a sectioned connector;

Figure 2 is a perspective of the connector, ribbon cable, and cover;

Figure 3 is an end section of the connector;

Figure 4 is a partial side section taken along line 4-4 of Figure 3;

Figure 5 is a partial plan section taken along line

5-5 of Figure 3;

Figure 6 is a perspective of a prior art terminal;

Figure 7 is a partial plan section similar to Figure 5 with the prior art terminal.

Referring to Figure 1, the inventive connector comprises a dielectric housing 10 having a cable receiving end 14, a mating end 16, and a plurality of terminal receiving passages 12 extending therebetween. Each passage 12 is of generally square cross section and has a pair of ribs 20 on opposite walls extending from proximate the mating end 16 toward the cable receiving end 14. A pair of lead-ins 15 in opposed walls of each passage 12 at cable receiving end 14 serve to position terminals 18 received therein, as will be described.

Each terminal 18 is stamped and formed from conventional metal strip stock and comprises a body portion 22 of generally C-shaped cross-section having a first plate 24, a parallel third plate 28, and a second plate 26 (in two sections) extending substantially normally therebetween. The first and third plates 24, 28 have respective cantilever arms 34, 36 extending therefrom to contact surfaces 38, 40 for engaging a pin. The first plate 24 is stamped with a pair of opposed lugs 30, 32 which are received in passage lead-ins 15 to align the terminal 18 in passage 12. The first plate 24 further extends to a coplanar slotted plate 42; the slot 48 therein is offset .025 inch from the centerline of plate 24.

Figure 2 shows the assembled connector, with terminals 18 loaded in two rows of respective passages 12 of housing 10, the slotted plates 42 extending beyond cable receiving end 14. The slots 18 are spaced at .100 inch in each row and are offset .050 inch from slots 48 in the other row in order to terminate conductors 3 on .050 inch spacing in cable 2. The conductors 3 are aligned relative to housing 10 by flutes 6 in cover 4, the slotted plates 42 being received in apertures 5 to latch the cover 4 to the housing 10. In order for terminals 18 to engage conductors 3 without damage, it is thus important that centerline spacing of slots 48 be closely maintained. Note that the passages 12 in each row are directly opposite respective passages in the adjacent row, the offset being achieved by the offset slotted plates 42 and opposite orientation of terminals between rows. The terminals 18 may be installed in the center row of passages in either of two orientations to yield three possible combinations of two rows of terminals to connect with any two of three rows of pins (see also Figure 3).

Figure 3 shows how terminals 18 are axially positioned in passages 12. Each rib 20 serves to prestress the cantilever arms 34, 36, the contact surfaces 38, 40 bearing against opposite sides of the rib. The rib 20 also serves as a stop to limit insertion depth of the terminal 18 and further serves to withstand the forces imposed during termination of the ribbon cable. Lead-ins 15 receive lugs 30, 32 and serve to position plate 24 flushly against the adjacent wall of passage 12.

Figure 4 shows lugs 30, 32 engaged in opposite walls of passage 12. This is in interference fit in the plastic which not only maintains proper angular orientation of the terminal but retains it against withdrawal.

Figure 5 is a section view taken through plates 24, 28 between the top and bottom sections of plate 26, showing the engagement of lugs 30, 32 in the housing 10. Clearance between plates 26, 28 and adjacent walls of passage 12 allows for any dimensional variations in forming plates 26, 28.

Figure 6 depicts a terminal 54 according to the teaching of the prior art, which terminal comprises a body portion 54 having first, second and third plates 56, 58, 60, respectively, and a slotted plate 72 extending from first plate 58 coplanar therewith. Cantilever arms 64, 68 extend from respective plates 58, 62 and have contact portions 68, 70.

Figure 7 depicts the prior art terminals 54 loaded in a housing and illustrates the alignment problem. Since the terminals 54 are received in respective passages in an interference fit between first plate 58, dimple 88 on second plate 60, third plate 62, and adjacent walls of the passage, any dimensional variations in the width of the plates translates into terminal orientation. The terminals may thus end up skewed, adversely affecting the centerline spacing of slots 78. This skewing is exaggerated fof purposes of illustration.

The foregoing is exemplary and not intended to limit the scope of the claims which follow.

Claims

1. An electrical connector of the type comprising an insulative housing (10) having a mating end (16), a cable receiving end (14), and a plurality of terminal passages (12) extending therebetween, said connector further comprising a plurality of elongate terminals (18) received in respective passages (12), each terminal (18) having a body portion (22) of generally C-shaped cross-section, said body portion (22) comprising a substantially planar first plate (24) extending to a coplanar slotted plate portion (42), said first plate (24) having a pair of opposed lugs (30,32) which engage opposite walls of said passage (12) to secure said terminal (18) in a respective passage (12), characterised in that each said body portion (22) further comprises a third plate (28) substantially parallel to the first plate (24), said first and third plates (24,28) having respective cantilever arms (34,36) extending therefrom to form a mating portion of said terminal, said first (24) and third plates (28) being connected by a second plate

(26) extending substantially normally therebetween, each said passage (12) having an elongate rib (20) on one wall thereof, said rib (20) extending from proximate said mating end (16) toward said cable receiving end (14), with said cantilever arms (34,36) being loaded against opposite sides of rib (20), and in that said rib (20) forms a stop abutted by said second plate (26) of said terminal (18) to axially position said terminal (18) in its passage (12), each passage (12) having a pair of lead-ins (15) at the cable receiving end to position the first plate (24) of said body flushly against the wall of the passage (12) adjacent to said first plate (24), whereby clearance is provided between the second and third plates (26,28) and the walls of the passage (12), adjacent thereto to allow for dimensional variations in forming the second and third plates (26,28).

2. An electrical connector as in claim 1 characterized in that said first plate (24) of said body portion (22) is received substantially flushly against one wall of said passage (12).

Patentansprüche

1. Elektrischer Verbinder des Typs mit einem isolierenden Gehäuse (10), das ein Verbindungsende (16), ein Kabelaufnahmeende (14) sowie eine Mehrzahl sich dazwischen erstreckender Anschlußkanäle (12) aufweist, wobei der Verbinder außerdem eine Mehrzahl länglicher Anschlüsse (18) aufweist, die in den jeweilgen Kanälen (12) aufgenommen sind, wobei jeder Anschluß (18) einen Körperbereich (22) mit allgemein C-förmigem Querschnitt besitzt, der Körperbereich (22) eine im wesentlichen planare erste Platte (24) aufweist, die sich zu einem koplanaren Schlitzplattenbereich (42) erstreckt, und die erste Platte (24) ein Paar einander entgegengesetzter Fortsätze (30, 32) aufweist, die zur Befestigung des Anschlusses (18) in einem entsprechenden Kanal (12) an einander gegenüberliegenden Wänden des Kanals (12) angreifen, dadurch gekennzeichnet, daß jeder Körperbereich (22) weiterhin eine zu der ersten Platte (24) im wesentlichen parallele dritte Platte (28) aufweist, wobei die erste und die dritte Platte (24, 28) je einen freitragenden Arm (34, 36) auweisen, die sich zur Bildung eines Verbindungbereichs des Anschlusses von diesen wegerstrecken, wobei die erste (24) und die dritte Platte (28) durch eine sich im wesentlichen rechtwinkling zwischen diesen erstreckende zweite Platte (26) miteinander verbunden sind, jeder Kanal (12) an einer seiner Wände eine längliche Rippe (20) aufweist und sich die Rippe (20) von der Nähe des Verbindungsendes (16) in Richtung auf das Kabelaufnahmeende (14) erstreckt, wobei die freitragenden Arme (34, 36) gegen einander entgegengesetzte Seiten der Rippe (20) gespannt sind, und daß die Rippe (20) einen Anschlag bildet, an dem die zweite Platte (26) des Anschlusses (18) zur axialen Positionierung des Anschlusses (18) in dem Kanal (12) anliegt, daß jeder Kanal (12) an dem Kabelaufnahmeende (14) ein Paar Einführeinrichtungen (15) aufweist, um die erste Platte (24) des Körpers bündig an der der ersten Platte (24) benachbarten Wand des Kanals (12) zu positionieren, wodurch zwischen der zweiten Platte und der dritten Platte (26, 28) und den Wänden des Kanals (12), benachbart dazu, Freiraum geschaffen ist, um Dimensionsänderungen beim Formen der zweiten Platte und der dritten Platte (26, 28) zu ermöglichen.

2. Elektrischer Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß die erste Platte (24) des Körperbereichs (22) im wesentlichen bündig anliegend an einer Wand des Kanals (12) aufgenommen ist.

Revendications

1. Connecteur électrique du type comprenant un boîtier isolant (10) ayant une extrémité d'accouplement (16), une extrémité (14) de réception de câble et plusieurs passages (12) pour bornes s'étendant entre elles, ledit connecteur comprenant en outre plusieurs bornes allongées (18) reçues dans des passages respectifs (12), chaque borne (18) ayant une partie de corps (22) de section transversale de forme générale en C, ladite partie de corps (22) comprenant une première plaque (24) sensiblement plane s'étendant jusqu'à une partie de plaque fendue coplanaire (42), ladite première plaque (24) comportant deux pattes opposées (30, 32) qui s'engagent sur des parois opposées dudit passage (12), pour fixer ladite borne (18) dans un passage respectif (12), caractérisé en ce que chaque partie de corps (22) comprend en outre une troisième plaque (28) sensiblement parallèle à la première plaque (24), lesdites première et troisième plaques (24, 28) ayant des bras respectifs (34, 36) en porte-à-faux qui en partent pour former une partie d'accouplement de ladite borne, lesdites première (24) et troisième (28) plaques étant reliées par une deuxième plaque (26) s'étendant sensiblement normalement entre elles, chaque passage (12) ayant une nervure allongée (20) sur une de ses parois, ladite nervure (20) s'étendant à partir d'un point proche de ladite extrémité d'accouplement (16) vers ladite extrémité (14) de réception de câ-

ble, lesdits bras en porte-à-faux (34, 36) étant chargés contre les côtés opposés de la nervure (20), et en ce que ladite nervure (20) forme une butée contre laquelle ladite deuxième plaque (26) de ladite borne (18) bute pour positionner axialement ladite borne (18) dans son passage (12), chaque passage (12) présentant deux entrées (15) à l'extrémité de réception de câble pour positionner la première plaque (24) dudit corps à fleur contre la paroi du passage (12) adjacente à ladite première plaque, de manière qu'un jeu soit établi entre les deuxième et troisième plaques (26, 28) et les parois du passage (12), qui leur sont adjacentes, pour permettre des variations dimensionnelles dans le formage des deuxième et troisième plaques (26, 28).

2. Connecteur électrique selon la revendication 1, caractérisé en ce que ladite première plaque (24) de ladite partie de corps (22) est reçue sensiblement à fleur contre une paroi dudit passage (12).

Fig.1

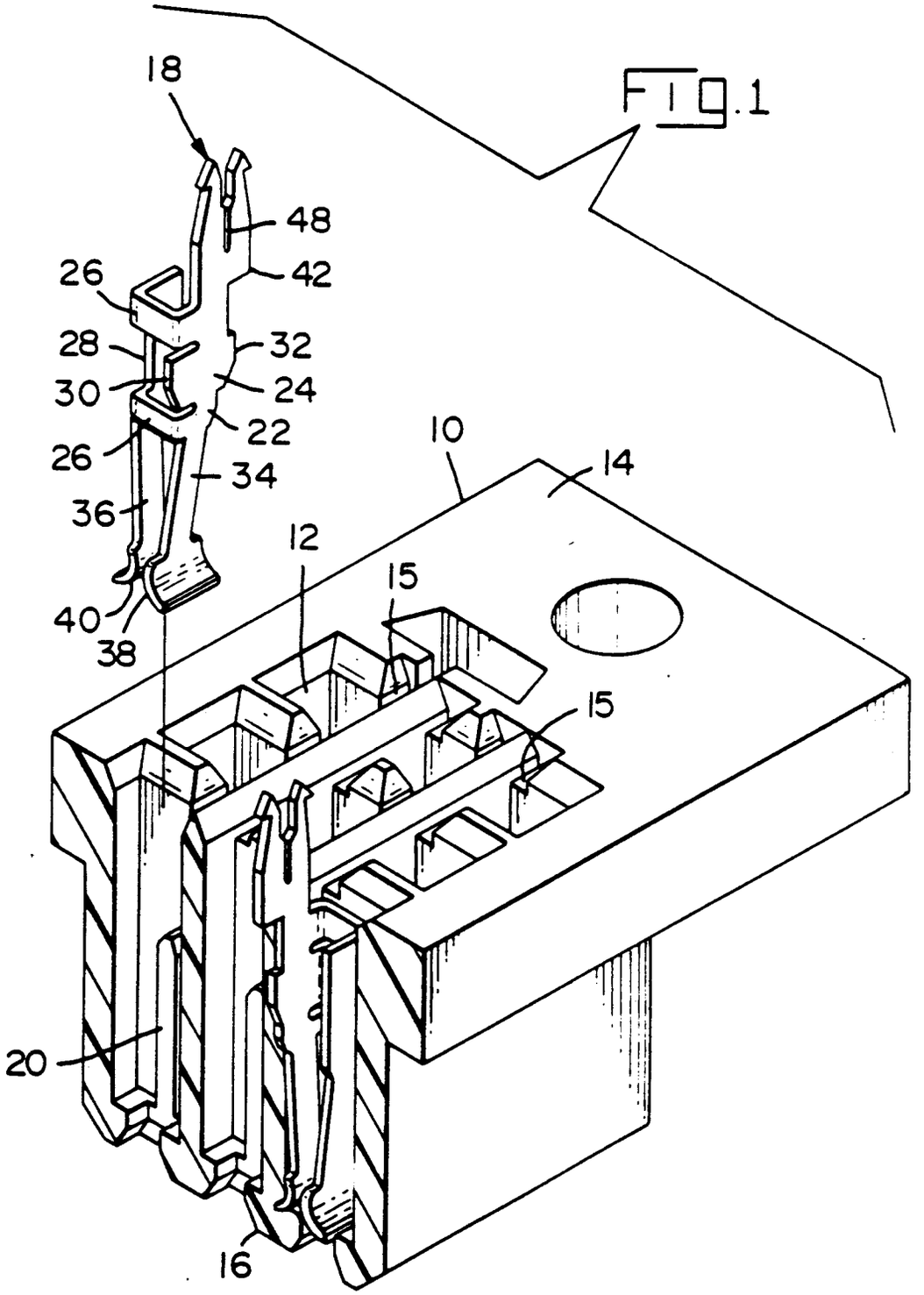
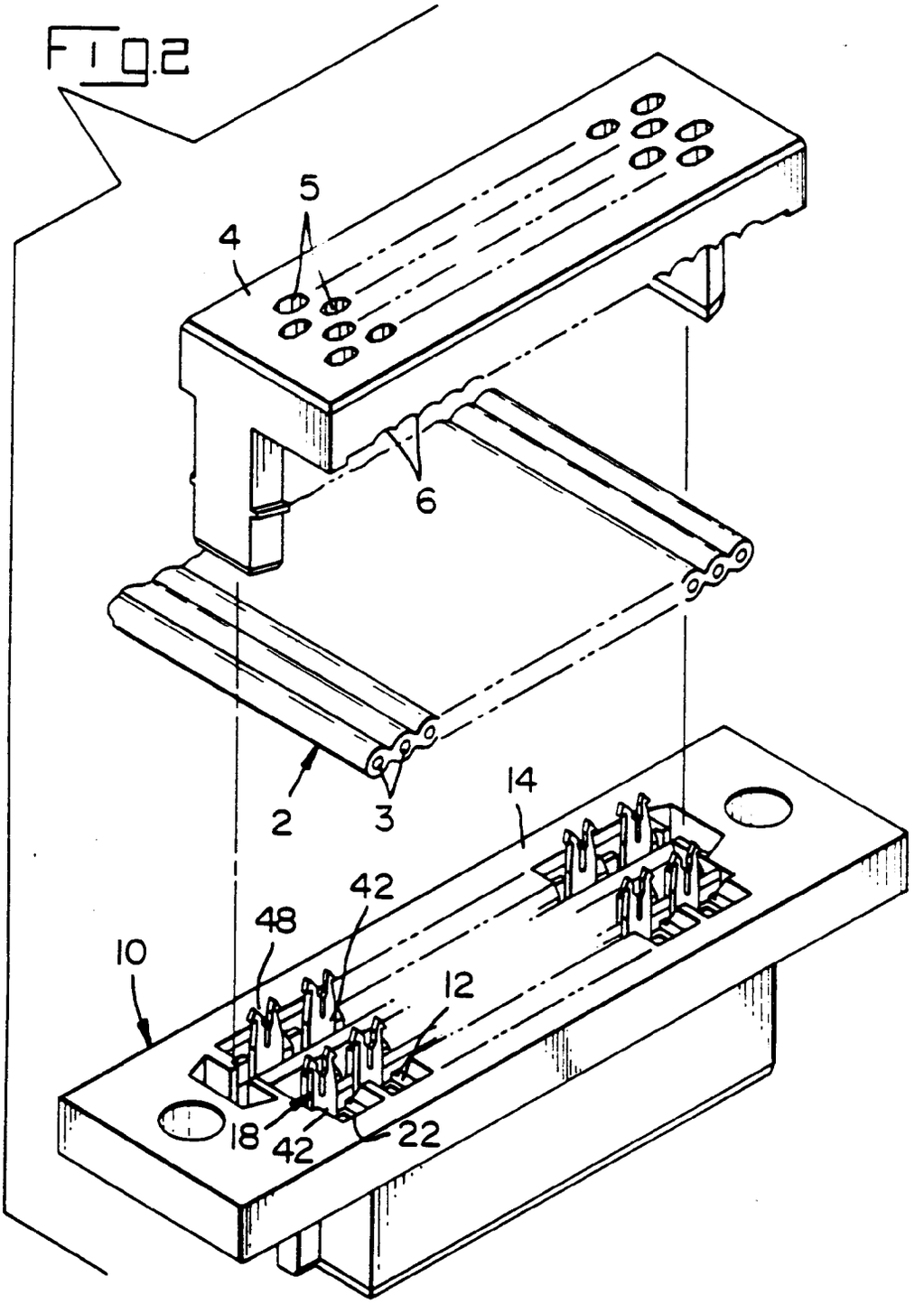


Fig.2



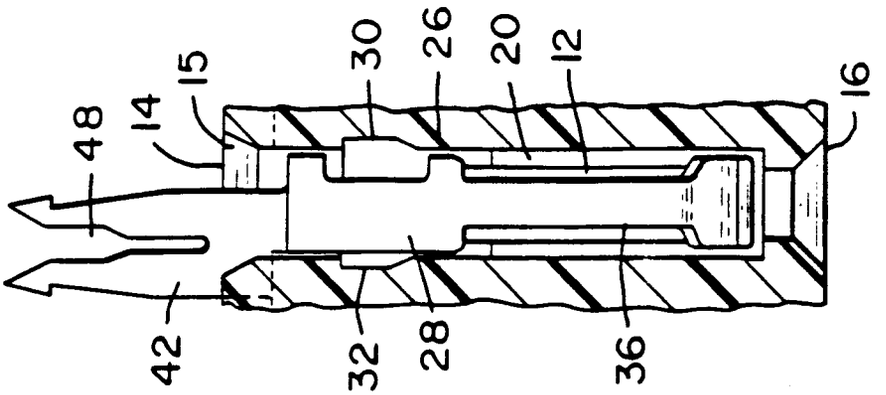

48
14
15
30
26
20
12
16
42
32
28
36

FIG. 4

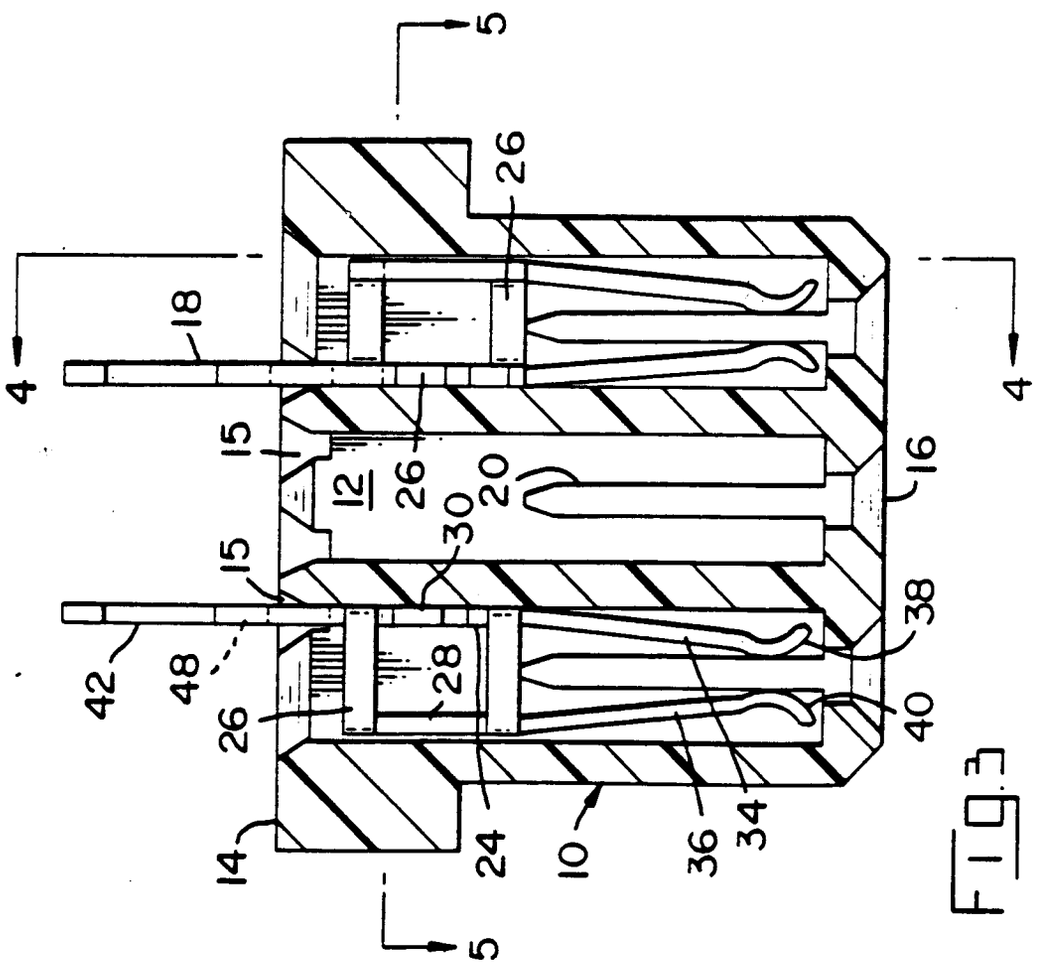

5
26
18
4
15
12
26
20
30
16
15
38
42
48
28
26
40
14
24
10
36
34
5
4

FIG. 3

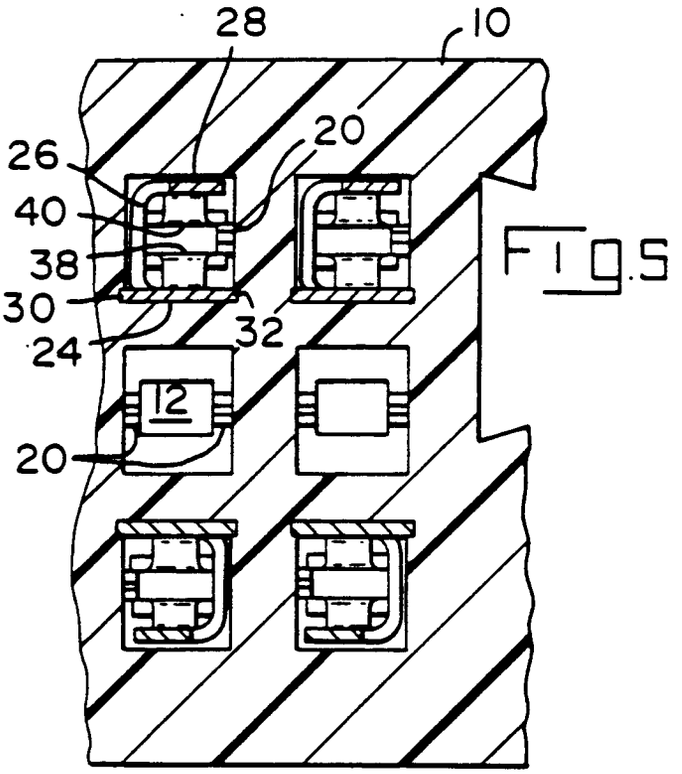


FIG.5

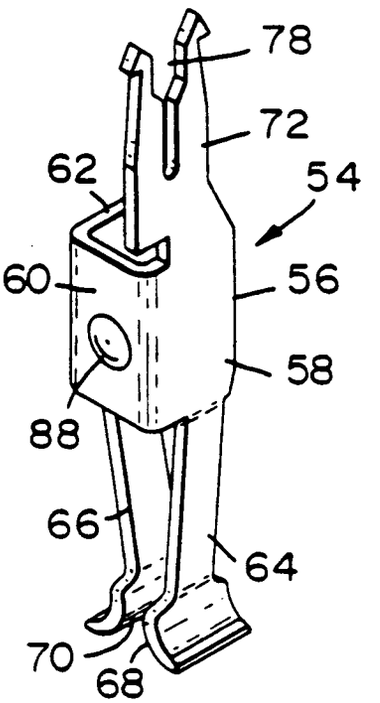


FIG.6
PRIOR ART

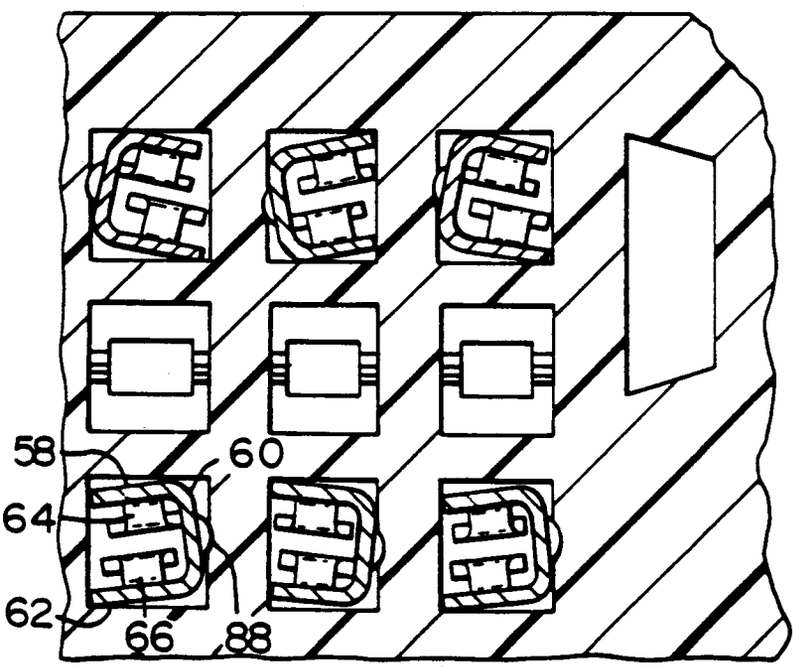


FIG.7
PRIOR ART