



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

**0 073 104
A1**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 82303997.9

(51) Int. Cl.³: H 01 R 23/66

(22) Date of filing: 29.07.82

(30) Priority: 17.08.81 US 293692

(43) Date of publication of application:
02.03.83 Bulletin 83 9

(84) Designated Contracting States:
DE FR GB

(71) Applicant: GENERAL MOTORS CORPORATION
General Motors Building 3044 West Grand Boulevard
Detroit Michigan 48202(US)

(72) Inventor: Nestor, Charles Richard
1988 St. Francis
Niles Ohio 44446(US)

(74) Representative: Haines, Arthur Donald et al,
General Motors Limited Patent Section P.O. Box 242
Delaware Drive
Tongwell Milton Keynes MK15 8HA(GB)

(54) Electrical connector for flexible printed circuits.

(57) An electrical connector 10 for a flexible printed circuit 70 comprises a connector body 12 having two rows of open channels 22 and a terminal 14 disposed in each channel. Each channel 22 has a longitudinal rib 38 which projects from a partition wall 20 on one side of the channel and is spaced from the partition wall 20 on the other side of the channel and which cooperates with a base wall 18 of the connector body 12 to define a slot 40. The terminals 14 have a side wall 44 disposed between the longitudinal rib 38 and the partition wall 20 on the other side of the channel and a lateral flange 46 which is attached to a longitudinal edge of the side wall 44 and which is disposed in the slot 40 to retain the terminal 14 in the transverse direction. Each terminal 14 further comprises a contact bow 48 which is attached to a forward edge of the lateral flange 46 and has a nose portion 52 seated against the longitudinal rib 38 to retain the terminal 14 in one longitudinal direction. The median portion of the contact bow 48 projects outwardly of the channel for making an electrical connection with a flexible printed circuit 70.

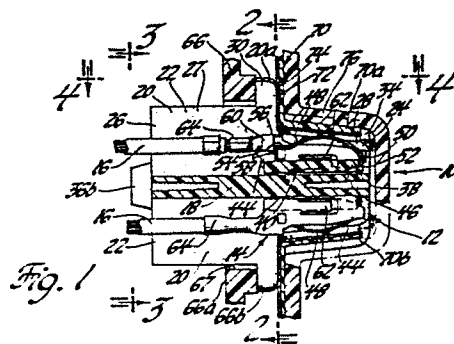


Fig. 1

ELECTRICAL CONNECTOR FOR
FLEXIBLE PRINTED CIRCUITS

This invention relates generally to terminals and electrical connectors for flexible printed circuits and, more particularly,

5 to a terminal and an electrical connector of the wipe-in type, such as is disclosed in U.S. Patent 3,365,694 granted to George W. Parker on January 23, 1968.

The connector disclosed in the Parker
10 patent comprises a plug body 26 having two rows of parallel pockets 25 and a plurality of terminals 21 attached to the ends of insulated conductor wires 22A. The terminals 21 are disposed in the pockets 25 and have bowed contact portions 20 which project
15 laterally outwardly of the plug body 26. The bowed contact portions 20 have a wipe-in engagement with conductive portions of a flexible printed circuit when the plug body 26 is plugged into a panel 10 or 30 supporting the flexible printed
20 circuit.

The object of this invention is to generally improve upon the terminal and electrical connector disclosed in the Parker patent.

One feature of the invention is that the
25 terminals are seated against solid portions of the plug body to prevent pushout when the terminals engage the flexible printed circuit.

Another feature of the invention is that the terminals are very narrow which reduces the
30 overall width of the electrical connector and permits a closer spacing of the printed circuit conductors.

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of a preferred embodiment of the invention as illustrated in the accompanying sheets of drawings in which:

Figure 1 is a longitudinal section of terminals and an electrical connector in accordance with this invention mated with a flexible printed circuit.

Figure 2 is a section taken substantially along the line 2-2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a section taken substantially along the line 3-3 of Figure 1 looking in the direction of the arrows.

Figure 4 is a view of the connector taken substantially along the line 4-4 of Figure 1 looking in the direction of the arrows.

Figure 5 is a perspective view showing the electrical connector in the process of being assembled to a panel.

Figure 6 is a perspective view showing the electrical connector assembled to a support panel and in position for connection with a flexible printed circuit mounted on its own support panel.

Figure 7 is a perspective view of one of the terminals used in the electrical connector shown in Figures 1-6.

Referring now to the drawings and particularly to Figure 1, the electrical connector 10 comprises a plug connector body 12 of dielectric material and a plurality of terminals 14 which are attached to the stripped ends of insulated cables 16.

The connector body 12 comprises a horizontal or base wall 18 and a plurality of upstanding partition walls 20 which extend from both sides of the base wall 18 to define two rows of open channels 22. The channels 22 have front openings 24 and rear openings 26 at the opposite longitudinal ends of the connector body 10 and longitudinal openings 27 opposite the base wall 18. The longitudinal openings 27 extend the entire length of the connector body 12 and communicate with the respective front and rear openings 24 and 26.

The partition walls 20 have tapered plug-in portions 28 at the front end of the connector body 12 and intermediate wings 30 which serve as stops.

Two inner partition walls 20a are joined together to provide a pair of sockets 32. The sockets 32 are closer to one side of the connector body 12 and serve as indexing means to assure proper panel mounting and connection with the flexible printed circuit as will hereinafter more fully appear.

The four outer partition walls 20b have a gusset 34 attached to their respective plug-in portions 28 and one of the wings 30. The outer partition walls 20b also have latch arms 36a and 36b attached to their rearward portions. The latch arms 36a and 36b are different sizes and also serve as indexing means to assure proper panel mounting.

Each channel 22 has a longitudinal rib 38 projecting into it from a partition wall 20, 20a or 20b at one side of the channel. Each rib 38 is parallel to, and shaped a short distance from, the base wall 18 to define a narrow slot 40 in each

channel 22 as shown in Figure 1. Each longitudinal rib 38 is also spaced from the partition wall 20, 20a or 20b on the opposite side of the channel 22 and has a shoulder 42 which faces the rear opening 26 of the channel as shown in Figure 4.

Each terminal 14 is a unitary sheet metal stamping which is bent to shape and has a flat side wall 44 which has a lateral flange 46 integrally attached at a longitudinal edge of its flat side wall. Each terminal 14 further includes a contact bow 48 which is attached to the front edge of the lateral flange 46 and is bent back over the lateral flange 46 so that the bow 48 has a median portion which projects outwardly of its side wall 44. The side wall 44 has a bent front tab 50 which extends in front of the contact bow 48 to protect and reinforce the nose 52 of the contact bow.

The contact bow 48 also has a tail 54 which lies between a small lateral flange 56 integrally attached to a longitudinal edge of the side wall 44 (opposite the lateral flange 46) and a side tab 58 struck and bent from the side wall 44. The tail 54 is trapped laterally between the side wall 44 and a depending finger 60 which extends from the small lateral flange 56 past the side tab 58. The side wall 44 also has a longitudinal latch tang 62 struck and bent therefrom.

The terminal 14 is attached to the cable 16 by a standard double crimp barrel attachment 64 which is integrally connected to a rear edge of the side wall 44 and offset towards the small lateral flange 56 so that it does not interfere with assembly on the terminal 14 into the channel 22.

The terminal 14 is inserted into the channel 22 attachment or tail end first through the front opening 24 and seated against the front end of the longitudinal rib 38 with its side wall 44 disposed between the longitudinal rib 38 and one of the partition walls 20, 20a or 20b as shown in Figures 1 and 2. The terminal 14 is retained in the open channel 22 by its lateral flange 46 which is disposed in the slot 40 and its latch tang 62 which engages the shoulder 42 of the longitudinal rib 38 as shown in Figures 1 and 4.

The electrical connector 10 is mounted on a support panel 66 from the backside 66a by threading the connector 10 sideways through an appropriately shaped hole 67 in the support panel 66 as shown in Figure 5. After the connector 10 is threaded completely through the hole 67, the connector 10 is aligned with the hole 67 and pushed back into the hole 67 from the front side into the panel mounted position shown in Figure 6. The connector body 12 is secured on the support panel 66 by the wings 30 which engage the front side 66b of the support panel 66 and the latch arms 36 which engage the backside 66a. In some instances, the connector 10 can be mounted from the front side 66b of the support panel 66, by threading the wiring harness 68 through the hole first. However, it is usually easier to mount the connector 10 from the backside 66a because the wiring harness 68 is often very long and complex.

The hole 67 has different sized side

slots 67a and 67b and offset slots 67c in the other two sides. These slots cooperate with the different sized latch arms 36a and 36b and offset sockets 32, which as noted above serve as indexing means to
5 ensure that the connector 10 is properly mounted on the support panel 66.

Figure 6 also shows a representative flexible printed circuit 70 comprising a flexible Mylar sheet 72 having a plurality of thin conductive
10 strips 74 attached to one surface. The flexible printed circuit 70 is cut to provide two flap portions 70a and 70b and two index holes 70c. The flexible printed circuit 70 is mounted on a socket member 76 which is shaped to plug onto the
15 connector 10 supported on the panel 66. The socket member 76 has two projecting pins 78 which project through the index holes 70c in the Mylar sheet 72 to index the flexible printed circuit 70 on the socket member 76. These pins 78 plug into the
20 sockets 32 of the connector body 12 when the socket member 76 is plugged onto the connector 10 to ensure that the connector 10 and the flexible printed circuit are properly mated.

Claims:

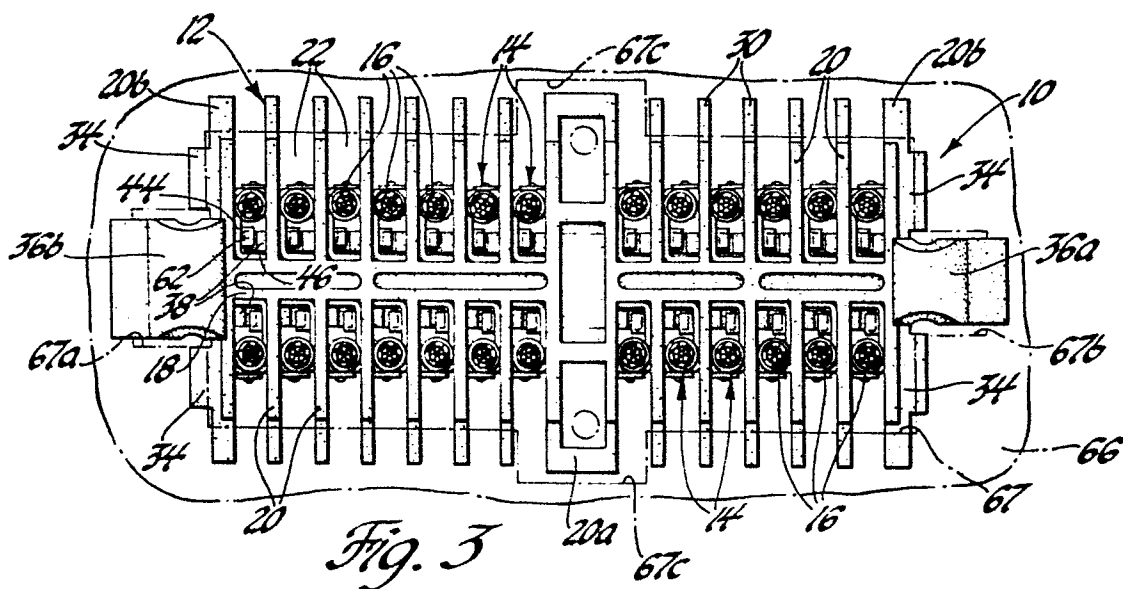
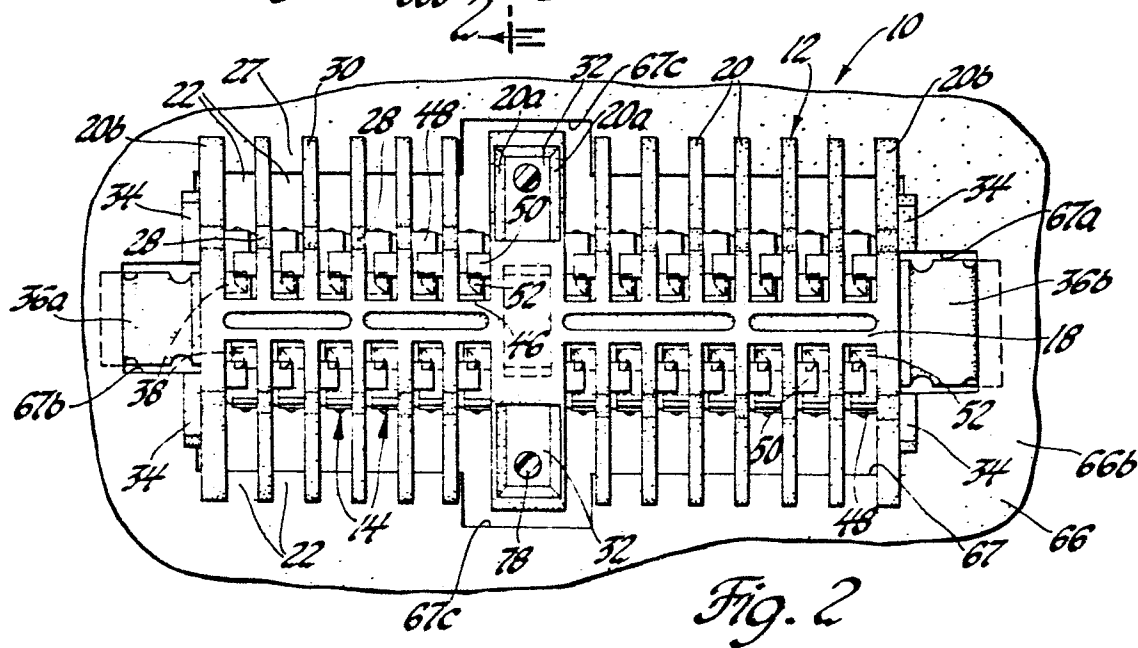
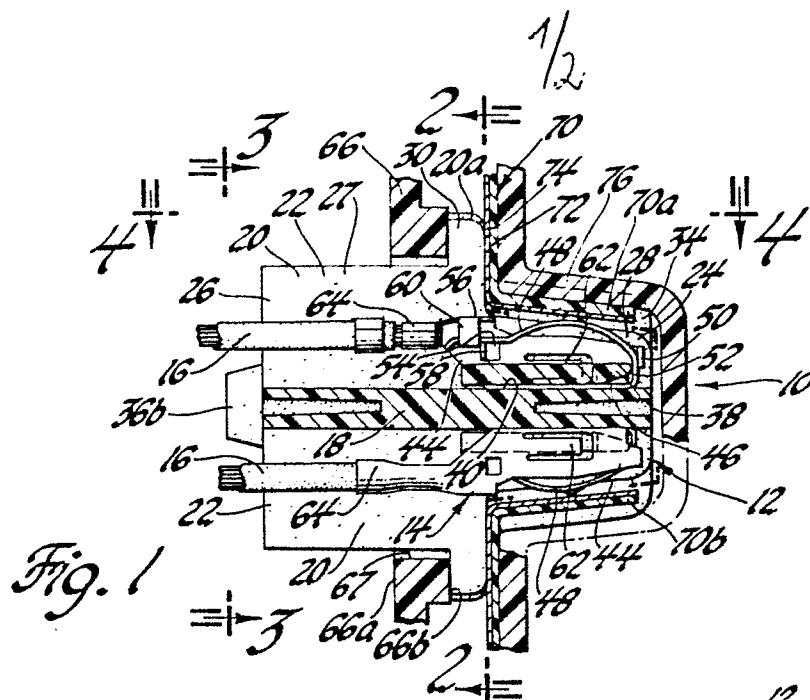
1. An electrical connector (10) for a flexible printed circuit (70) in which a plurality of terminals (14) are housed in separate portions (22) of a connector body (12), each terminal (14) being shaped to make wiping engagement with a respective contact portion (74) of said flexible printed circuit (70),
5 characterised in that the connector (10) comprises a connector body (12) having a base wall (18) and a plurality of upstanding partition walls (20) projecting from said base wall (18) to define a plurality of open channels (22), a longitudinal rib (38) in each channel which projects into the channel (22) from a partition wall (20) or one side of the channel and is spaced from
10 the partition wall (20) on the other side of the channel, said longitudinal rib (38) being spaced close to the base wall (18) to define a slot (40), and a terminal (14) disposed in each open channel (22), said terminal having a side wall (44) disposed between
15 the longitudinal rib (38) and the partition wall (20) on the other side of said channel, a lateral flange (46) which is attached to a longitudinal edge of the side wall (44) and which is disposed in the slot (40) to retain the terminal transversely in the channel (22),
20 a contact bow (48) which is attached to a forward edge of the lateral flange (46) and extends back thereover, said contact bow (48) having a nose portion (52) seated against the longitudinal rib (38) to retain the terminal (14) in the channel (22) in one longitudinal direction,
25 and a median portion projecting outwardly of the side wall (44) for making an electrical connection, and a latch tang (62) which engages a shoulder (42) of the longitudinal rib (38) to retain the terminal (14) in the channel (22) in the opposite longitudinal direction.
30



2. An electrical connector (10) for a flexible printed circuit (70) according to claim 1, characterised in that the upstanding partition walls (20) project from opposite sides of said base wall (18) to define two rows of parallel open channels (22) each having a front opening (24), a rear opening (26) and a longitudinal opening (27) opposite the base wall (18), and each longitudinal rib (38) has a front adjacent the front opening (24) of the respective channel (22), a shoulder (42) facing the rear opening (26) of the respective channel (22), and cooperates with the base wall (18) to define said slot (40).

3. An electrical connector (10) for a flexible printed circuit (70), characterised in that each terminal (14) comprises said side wall (44) having said lateral flange (46) attached at a longitudinal edge; said contact bow (48), which is attached to said forward edge of the lateral flange, extends back thereover, and has said nose portion (52) and said median portion projecting outwardly of the side wall (44) for making an electrical connection, and a tail (54); a tab (50), which is connected to a front edge of the side wall (44) and which extends in front of the nose portion (52) to protect and reinforce the nose portion (52); a small lateral flange (56) which is attached to the opposite longitudinal edge of the side wall (44) and which is disposed outwardly of the tail (54) for limiting outward movement of the contact bow (48); a side tab (58) which is attached to the side wall (44) and which is disposed inwardly of the tail (54) for supporting the tail (54) when the contact bow (48) is depressed; and a cable attachment portion (64) which is attached to a rear edge of the side wall (44)

and which is offset towards the small lateral flange (56) to permit access to the inside surface of the nose portion (52).





European Patent
Office

EUROPEAN SEARCH REPORT

0073104
Application number

EP 82 30 3997

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
D, A	<p>---</p> <p>US-A-3 365 694 (GENERAL MOTORS) * Figures 1,2; column 2, lines 5-49 *</p>	1-3	H 01 R 23/66
X, Y	<p>---</p> <p>US-A-3 417 362 (AMP) * Figures 1,2,9; column 2, line 45 - column 3, line 25; column 4, lines 17-20*</p>	1-3	
Y	<p>---</p> <p>US-A-2 956 260 (R.C.A.) * Figures 2,3; column 2, lines 4-16 *</p>	1	
A	<p>---</p> <p>DE-A-2 014 830 (BUNKER-RAMO) * Figure 2 *</p> <p>-----</p>	3	
			<p>TECHNICAL FIELDS SEARCHED (Int. Cl. 3)</p> <p>H 01 R 9/00 H 01 R 13/00 H 01 R 23/00</p>
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24-11-1982	Examiner WAERN G.M.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			