OPIC
Office de la propriété intellectuelle du Canada

CIPO
Canadian Intellectual Property Office

(12) (19) (CA) **Demande-Application**

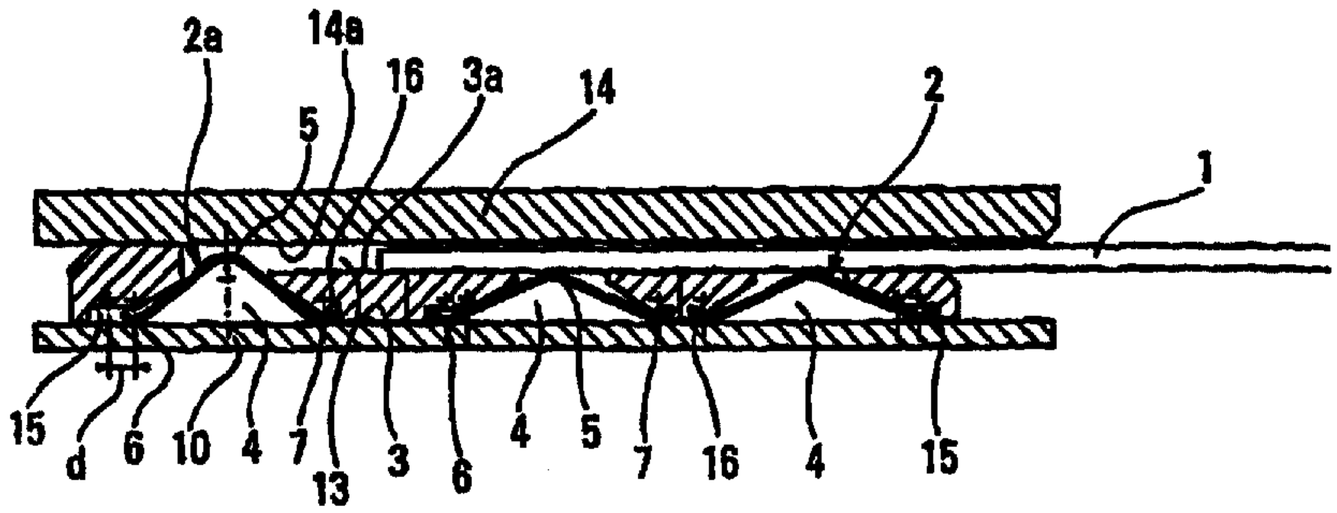
(21) (A1) **2,283,959**
(86) 1998/03/13
(87) 1998/09/24

(72) ODIC, EMMANUEL, FR
(71) FRAMATOME CONNECTORS INTERNATIONAL, FR

(51) Int.Cl.[6] G06K 7/00
(30) 1997/03/17 (97 03197) FR
(30) 1997/03/17 (97 03196) FR

(54) **CONNECTEUR POUR LECTEUR DE CARTE, A CONTACTS BALAIS ELASTIQUES, ET LECTEUR COMPORTANT UN TEL CONNECTEUR**

(54) **CARD READER CONNECTOR, WITH ELASTIC BRUSH CONTACTS, AND READER COMPRISING SAME**



(57) Le connecteur pour lecteur de carte à microcircuit (1) comprend des contacts (2) reliés à un circuit électronique et destinés, lors de la mise en place de la carte (1) dans le lecteur, à être reliés à des plages de contact du microcircuit de cette carte (1). Ce connecteur comprend une plaquette (3) en matière électriquement isolante comportant des alvéoles (4) recevant chacune librement un contact balai (2) dont une première extrémité (5) fait saillie hors de l'alvéole (4) et est destinée à être mise en contact avec une plage de contact du microcircuit de la carte (1) et dont l'autre extrémité (6, 7) prend appui sur une plage conductrice du circuit électronique formé sur une carte (10) du circuit imprimé appliquée contre la plaquette (3) en matière électriquement isolante.

(57) The invention concerns a card reader connector with microcircuit (1) comprising contacts (2) connected to an electronic circuit and designed, when the card (1) is integrated in the reader, to be connected to the card (1) microcircuit contact pads Said connector comprises a wafer (3) made of electrically insulating material comprising cells (4) each freely receiving a brush contact (2) the first end (5) of which projects from the cell (4) and is designed to be contacted with one contact pad of the card (1) microcircuit and the other end (6, 7) rests on one conducting pad of the electronic circuit formed on a card (10) of the printed circuit pressed against the wafer (3) made of electrically insulating material.

PCT ORGANISATION MONDIALE DE LA PROPRIETE INTELLECTUELLE
Bureau international

DEMANDE INTERNATIONALE PUBLIEE EN VERTU DU TRAITE DE COOPERATION EN MATIERE DE BREVETS (PCT)

(51) **Classification internationale des brevets** 6 : **G06K 7/00**

A1

(11) **Numéro de publication internationale:** **WO 98/41946**

(43) **Date de publication internationale:** 24 septembre 1998 (24.09.98)

(21) **Numéro de la demande internationale:** PCT/FR98/00517

(22) **Date de dépôt international:** 13 mars 1998 (13.03.98)

(30) **Données relatives à la priorité:**

97/03196	17 mars 1997 (17.03.97)	FR
97/03197	17 mars 1997 (17.03.97)	FR

(81) **Etats désignés:** CA, CN, JP, US, brevet européen (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Publiée
Avec rapport de recherche internationale.

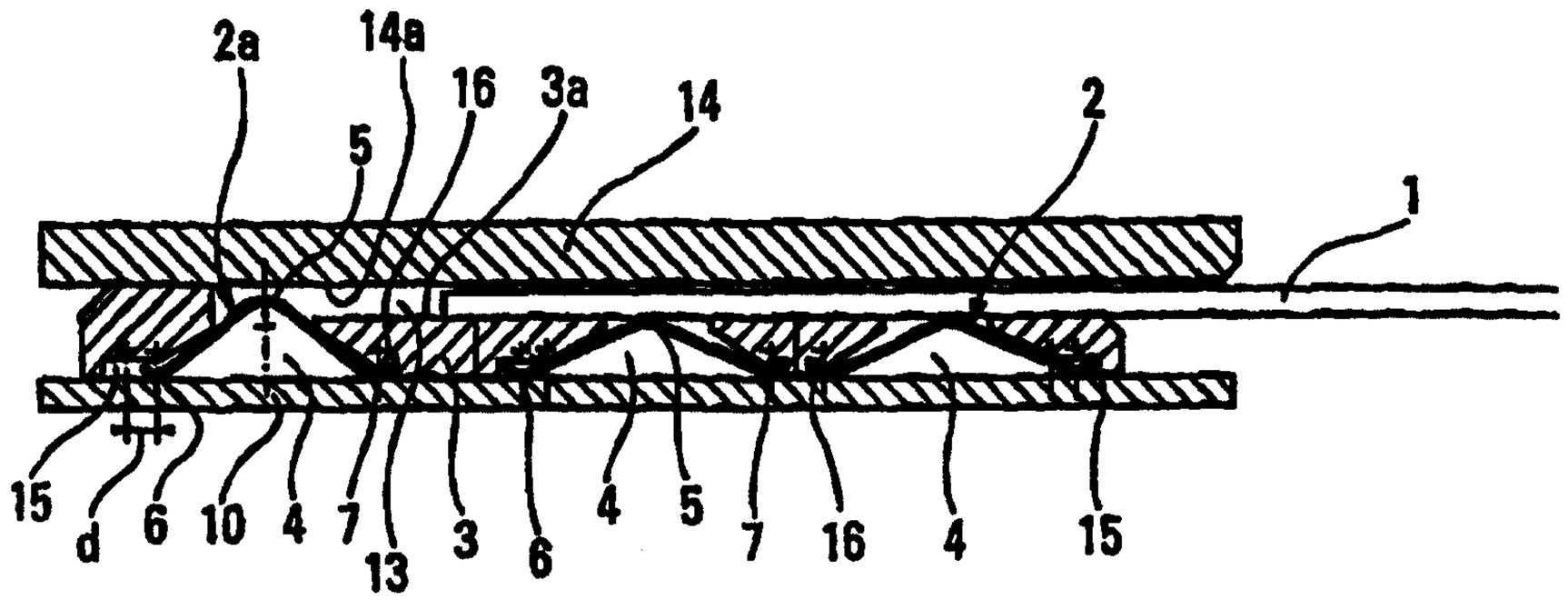
(71) **Déposant** *(pour tous les Etats désignés sauf US)*: FRAMATOME CONNECTORS INTERNATIONAL [FR/FR]; Tour Framatome, 1, place de la Coupole, F–92400 Courbevoie (FR).

(72) **Inventeur; et**
(75) **Inventeur/Déposant** *(US seulement)*: ODIC, Emmanuel [FR/FR]; 17, rue Arago, F–25300 Pontarlier (FR).

(74) **Mandataires:** KEIB, Gérard etc.; Novamark Technologies, 122, rue Edouard Vaillant, F–92593 Levallois Perret Cedex (FR).

(54) **Title:** CARD READER CONNECTOR, WITH ELASTIC BRUSH CONTACTS, AND READER COMPRISING SAME

(54) **Titre:** CONNECTEUR POUR LECTEUR DE CARTE, A CONTACTS BALAIS ELASTIQUES, ET LECTEUR COMPORTANT UN TEL CONNECTEUR



(57) **Abstract**

The invention concerns a card reader connector with microcircuit (1) comprising contacts (2) connected to an electronic circuit and designed, when the card (1) is integrated in the reader, to be connected to the card (1) microcircuit contact pads Said connector comprises a wafer (3) made of electrically insulating material comprising cells (4) each freely receiving a brush contact (2) the first end (5) of which projects from the cell (4) and is designed to be contacted with one contact pad of the card (1) microcircuit and the other end (6, 7) rests on one conducting pad of the electronic circuit formed on a card (10) of the printed circuit pressed against the wafer (3) made of electrically insulating material.

(57) Abrégé

Le connecteur pour lecteur de carte à microcircuit (1) comprend des contacts (2) reliés à un circuit électronique et destinés, lors de la mise en place de la carte (1) dans le lecteur, à être reliés à des plages de contact du microcircuit de cette carte (1). Ce connecteur comprend une plaquette (3) en matière électriquement isolante comportant des alvéoles (4) recevant chacune librement un contact balai (2) dont une première extrémité (5) fait saillie hors de l'alvéole (4) et est destinée à être mise en contact avec une plage de contact du microcircuit de la carte (1) et dont l'autre extrémité (6, 7) prend appui sur une plage conductrice du circuit électronique formé sur une carte (10) du circuit imprimé appliquée contre la plaquette (3) en matière électriquement isolante.

UNIQUEMENT A TITRE D'INFORMATION

Codes utilisés pour identifier les Etats parties au PCT, sur les pages de couverture des brochures publiant des demandes internationales en vertu du PCT.

AL	Albanie	**ES**	Espagne	**LS**	Lesotho	**SI**	Slovénie
AM	Arménie	**FI**	Finlande	**LT**	Lituanie	**SK**	Slovaquie
AT	Autriche	**FR**	France	**LU**	Luxembourg	**SN**	Sénégal
AU	Australie	**GA**	Gabon	**LV**	Lettonie	**SZ**	Swaziland
AZ	Azerbaïdjan	**GB**	Royaume-Uni	**MC**	Monaco	**TD**	Tchad
BA	Bosnie-Herzégovine	**GE**	Géorgie	**MD**	République de Moldova	**TG**	Togo
BB	Barbade	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tadjikistan
BE	Belgique	**GN**	Guinée	**MK**	Ex-République yougoslave de Macédoine	**TM**	Turkménistan
BF	Burkina Faso	**GR**	Grèce			**TR**	Turquie
BG	Bulgarie	**HU**	Hongrie	**ML**	Mali	**TT**	Trinité-et-Tobago
BJ	Bénin	**IE**	Irlande	**MN**	Mongolie	**UA**	Ukraine
BR	Brésil	**IL**	Israël	**MR**	Mauritanie	**UG**	Ouganda
BY	Bélarus	**IS**	Islande	**MW**	Malawi	**US**	Etats-Unis d'Amérique
CA	Canada	**IT**	Italie	**MX**	Mexique	**UZ**	Ouzbékistan
CF	République centrafricaine	**JP**	Japon	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Pays-Bas	**YU**	Yougoslavie
CH	Suisse	**KG**	Kirghizistan	**NO**	Norvège	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	République populaire démocratique de Corée	**NZ**	Nouvelle-Zélande		
CM	Cameroun			**PL**	Pologne		
CN	Chine	**KR**	République de Corée	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Roumanie		
CZ	République tchèque	**LC**	Sainte-Lucie	**RU**	Fédération de Russie		
DE	Allemagne	**LI**	Liechtenstein	**SD**	Soudan		
DK	Danemark	**LK**	Sri Lanka	**SE**	Suède		
EE	Estonie	**LR**	Libéria	**SG**	Singapour		

CARD READER CONNECTOR WITH SPRING BRUSH CONTACTS AND READER INCLUDING A CONNECTOR OF THIS KIND

The present invention concerns a microcircuit (or microchip) card connector for a card reader, in particular for reading an electronic purse type pocket card.

A pocket card reader of this kind must be of low cost so that it can be marketed on a large scale and must enable the user to verify easily the amount available on their "purse" card.

The problem arises in such readers of connecting the contact areas of the microcircuit carried by the card to the electronic circuit of the reader.

Patents FR 87 15 739 and FR 95 06 854 describe the use for this purpose of connectors comprising brush contacts fastened to an electrically insulative material frame.

DE-A-43 30 017 discloses a microcircuit card reader connector comprising:

- a) contacts connected to an electronic circuit and adapted to be connected to contact areas of the microcircuit of the card when the card is inserted in the reader and,
- b) an electrically insulative material plate comprising cells each freely receiving a brush contact one end of which projects out of the cell and is adapted to come into contact with a contact area of the microcircuit of the card and whose other end bears and slides on a conductive area of the electronic circuit formed on a printed circuit card pressed against the electrically insulative material plate.

MODIFIED PAGE

WO-A-96 02 892 concerns a microcircuit card reader connector comprising:

- a) contacts connected to an electronic circuit and adapted to be connected to contact areas of the microcircuit of the card when the card is inserted in the reader, and

- b) an electrically insulative material plate incorporating cells each receiving a brush contact one end of which projects out of the cell and is adapted to come into contact with a contact area of the microcircuit of the card and whose other end is in contact with a conductive area of the electronic circuit on a printed circuit card pressed against the electrically insulative material plate.

The end of the brush contact is adapted to be brazed onto a printed circuit card.

WO-A-95 33 243 shows a microcircuit card reader connector comprising:

a) contacts connected to an electronic circuit and adapted to be connected to contact areas of the microcircuit of the card when the card is inserted in the reader, and

b) an electrically insulative material plate incorporating cells each freely receiving a brush contact one end of which projects out of the cell and is adapted to come into contact with a contact area of the microcircuit of the card and whose other end is in contact with a conductive area of the electronic circuit on a printed circuit card pressed against the electrically insulative material plate.

The other end of the brush contact is adapted to be pressed elastically against conductive areas of the printed circuit.

The aim of the present invention is to reduce the cost of a connector of the above kind by eliminating all soldering operations for connecting the contact areas of the microcircuit of the card to the contact areas of the electronic circuit of the reader.

The invention is therefore directed to a connector for a reader for a microcircuit card, comprising contacts connected to an electronic circuit and adapted, when the card is inserted in the reader, to be connected to contact areas of the microcircuit of the card, the connector comprising an electrically insulative material plate incorporating cells each freely receiving a brush contact one end of which projects out of the cell and is adapted to come into contact with a contact area of the microcircuit of the card and whose other end bears and slides on a conductive area of the electronic circuit on a printed circuit card pressed against the electrically insulative material plate.

In accordance with the invention, the connector is characterized in that the brush contacts are in the form of a metal leaf spring bent to a V-shape whose top constitutes said first end and at least one foot of which constitutes said second end.

In this way the brush contacts are simply housed in the cells of an insulative plate, in which they are retained by the printed circuit card that carries the electronic circuit. The brush contacts are freely engaged in these cells and no soldering is necessary.

When the card is inserted in the reader, the contact areas of the microcircuit on the card come into contact with the projecting ends of the brush contacts whose other ends come into contact with the contact areas of the printed circuit card.

The brush contacts are preferably engaged in cells whose section in the plane of the V-shape of the brush contacts has a flared shape substantially complementary to that of the V-shape of the brush contacts.

The brush contacts are preferably made of a metal having spring properties.

Accordingly, when the card is inserted into the reader, it bears on the projecting tops of the V-shaped contacts and presses them down into the cells, which causes elastic deformation of the V-shape of the contacts and sliding of their feet on the contact areas of the printed circuit.

This arrangement makes it possible to establish an excellent electrical connection between the contact areas

MODIFIED PAGE

card 10 pressed against the electrically insulative material plate 3.

In the example shown, the plate 3 carries tenons 11 cooperating with fixing holes 12 of the printed circuit card 10.

As shown in figures 5 to 9, the brush contacts 2 are in the form of a metal leaf spring bent to a V-shape whose top 5 constitutes the first end, projecting out of the cells 4, and at least one foot 6, 7 of which bears on a conductive area 8, 9 of the electronic circuit 10a.

The brush contacts 2 are engaged in the cells 4, whose section in the plane of the V-shape of the brush contacts 2 has a flared shape substantially complementary to that of the V-shape of the brush contacts 2.

The brush contacts 2 are made from a conductive metal having good spring properties.

Also, the plane of the V-shape of the brush contacts 2 is parallel to the direction in which the card 1 is inserted into the reader.

As shown in figures 8 and 9, the first end 5 of the brush contacts 2 projects into a slot 13 delimited by the face 3a of the plate 3 and the face 14a of a card guide 14.

In the figure 8 example the card guide 14 is fixed to the plate 3.

In the figure 9 example the card guide 14 is made in one piece with the plate 3.

Figure 8 also shows that the feet of the V-shape of the brush contacts 2 have a shape that is curved toward the plate 3. The feet 6, 7 are engaged in housings 15, 16 of the plate 3 formed between the latter and the printed circuit card 10.

One housing 15 of the housings 15, 16 has a dimension such that the corresponding foot 6 can move a distance d on the contact area 8 or 9 of the printed circuit 10a because of the deformation of the brush contact 2 caused by inserting the card 1.

The other foot 7 of the brush contact 2 is immobilized in the corresponding housing 16 so that it does not move when the card 1 is inserted.

How the connector just described works will now be explained.

Before inserting the card 1 into the reader, the tops 5 of the brush contacts 2 project out of the cells 4 onto the surface 3a of the insulative plate 3.

When the card 1 is inserted, the tops 5 of the contacts 2 are successively pressed down into the cells 4.

This depression causes elastic deformation of the brush contacts 2 as a result of which one of the feet 6 moves a distance d in its housing 15.

This movement of the feet 6 of the contacts 2 brings them into elastic bearing contact with the contact areas 8, 9 and the like of the electronic circuit carried by the printed circuit card 10.

When the microcircuit card 1 is fully engaged over the plate 3, as shown in figure 7, the contact areas of the microcircuit of the card are in contact with the tops 5 of the brush contacts 2. The brush contacts 2 therefore electrically connect the microcircuit of the card 1 to the electronic circuit carried by the printed circuit card 10.

In the example shown in the figures, the connector of the invention also comprises a contact 2a for detecting the end of the insertion travel of the card into the reader.

The contact 2a is identical to the other contacts and is engaged in a cell 4 in the insulative plate 3 identical to the other cells.

The contact 2a is on a branch 17 of the plate 3 which is offset from its longitudinal axis.

The top 5 of the contact 2a projects from the surface 3a of the plate 3 near a shoulder 18 forming a shoulder at the end of the travel of the card 1.

Figure 7 shows that when the microcircuit card is

at its end of travel position on the plate 3, the card 1 bears on the top 5 of the brush contact 2a whose feet 6, 7 bear on two conductive areas 19, 20 of the electronic circuit on the printed circuit card 10 (see figure 3) and close a circuit for detecting the end of the travel of the card 1.

One of the conductive areas is duplicated (see figure 4) to form a first part 20a which is not connected to the end of travel detector circuit and a second part 20 which is connected to that circuit.

One foot 7 of the brush contact 2a is immobilized in a housing 16 of the insulative plate 3 (see figure 8) and its other foot 6 is engaged in a housing 15 in which it can move a distance d from the first part 20a of the duplicated area toward the second part 20 thereof as a result of the deformation of the brush contact 2a caused by the microcircuit card 1.

Figure 4 also shows that the two parts 20, 20a of the duplicated conductive area are separated by a gap 21 that is oblique to the direction in which the second foot 6 of the brush contact 2a moves, which prevents the foot 6 snagging on an increased thickness portion of the second conductive area 20.

Of course, the invention is not limited to the embodiment just described and many modifications can be made to the latter without departing from the scope of the invention.

Accordingly, the invention applies equally to a system in which the card is put down flat rather than slid into place.

Also, the card 1 could be pressed onto the face of the plate 3 from which the contacts 2 project by a spring.

CLAIMS

1. A connector for a reader for a microcircuit card (1), comprising contacts (2) connected to an electronic circuit (10a) and adapted, when the card (1) is inserted in the reader, to be connected to contact areas of the microcircuit of the card, the connector comprising an electrically insulative material plate (3) incorporating cells (4) each freely receiving a brush contact (2) one end (5) of which projects out of the cell (4) and is adapted to come into contact with a contact area of the microcircuit of the card (1) and whose other end (6, 7) bears and slides on a conductive area (8, 9) of the electronic circuit on a printed circuit card (10) pressed against the electrically insulative material plate (3), characterized in that the brush contacts (2) are in the form of a metal leaf spring bent to a V-shape whose top (5) constitutes said first end and at least one foot (6, 7) of which constitutes said second end.

2. A connector according to claim 1, characterized in that the brush contacts (2) are engaged in cells (4) whose section in the plane of the V-shape of the brush contacts (2) has a flared shape substantially complementary to that of the V-shape of the brush contacts (2).

3. A connector according to claim 1 or claim 2, characterized in that the brush contacts (2) are made of a metal having elastic properties.

4. A connector according to any one of claims 1 to 3, characterized in that the plane of the V-shape of the brush contacts (2) is parallel to the direction in which the card (1) is inserted into the reader.

5. A connector according to any one of claims 1 to 4, characterized in that the first end (5) of the brush contacts projects into a slot (13) delimited by one face (3a) of the plate (3) and the face (14a) of a card guide (14).

6. A connector according to claim 5, characterized in that the card guide (14) is fixed to the plate (3).

7. A connector according to claim 5, characterized in that the card guide (14) is made in one piece with the plate (3).

8. A connector according to any one of claims 1 to 7, characterized in that the feet (6, 7) of the V-shape of the brush contacts (2) have a shape curved toward the plate (3).

9. A connector according to any one of claims 1 to 8, characterized in that the feet (6, 7) of the V-shape are engaged in housings (15, 16) in the plate (3) formed between the latter and the printed circuit card (10).

10. A connector according to claim 9, characterized in that at least one of the housings (15, 16) has a dimension such that the corresponding foot (6) can move on the contact area (8, 9) of the printed circuit on deformation of the brush contact (2) caused by inserting the card (1).

11. A connector according to claim 10, characterized in that one foot (7) of the brush contact (2) is immobilized in the corresponding housing (16).

12. A connector according to any one of claims 1 to 11, comprising at least one contact (2a) for detecting the end of the insertion travel of the card (1) into the reader, the contact (2a) being connected to conductive areas of the electronic circuit, a cell (4) freely receiving the brush contact (2a) whose first end (5) projects out of the cell (4) and is adapted to detect the end of the travel of the card (1) and whose other end (6, 7) bears on a conductive area (19; 20, 20a) of the electronic circuit on the printed circuit card (10).

13. A connector according to claim 12, characterized in that when the microcircuit card (1) is at the end of travel position on the plate (3), the card (1) bears on the top (5) of the brush contact and the feet (6, 7) thereof bear on two conductive areas (19, 20) of the electronic circuit on the printed circuit card (10) to close an end of card travel detector circuit.

14. A connector according to claim 13, characterized in that one of said conductive areas is duplicated to form a first part (20a) which is not connected to the end of travel detector circuit and a second part (20) which is connected to that circuit, and in that one foot (7) of the brush contact (2a) is immobilized relative to the insulative plate (3) and the second foot (6) can move from the first part (20a) of the duplicated area toward the second part (20) thereof due to the effect of the deformation of the brush contact (2a) caused by the microcircuit card (1).

15. A connector according to claim 14, characterized in that the two parts (20, 20a) of the duplicated conductive area are separated by a gap (21) that is oblique to the direction of movement of said second foot (6) of the brush contact.

16. A connector according to any one of claims 12 to 15, characterized in that the brush contact (2a) for detecting the end of travel of the card (1) is on a branch (17) of a plate (3) which is offset relative to the axis of the plate.

17. A card reader comprising a connector according to any one of claims 1 to 16.

MODIFIED PAGE

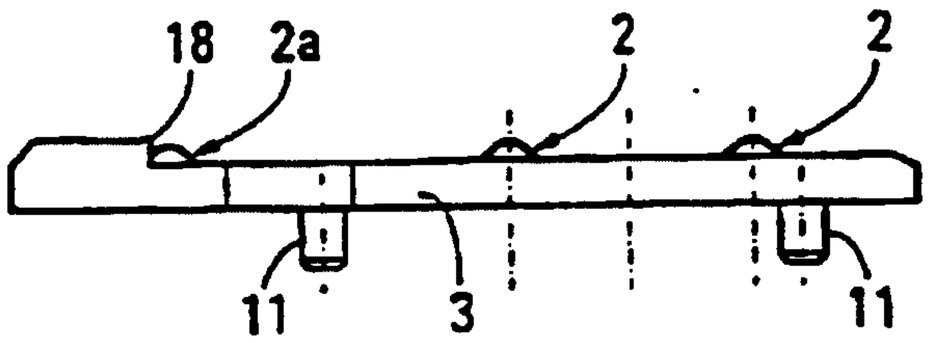


Fig.1

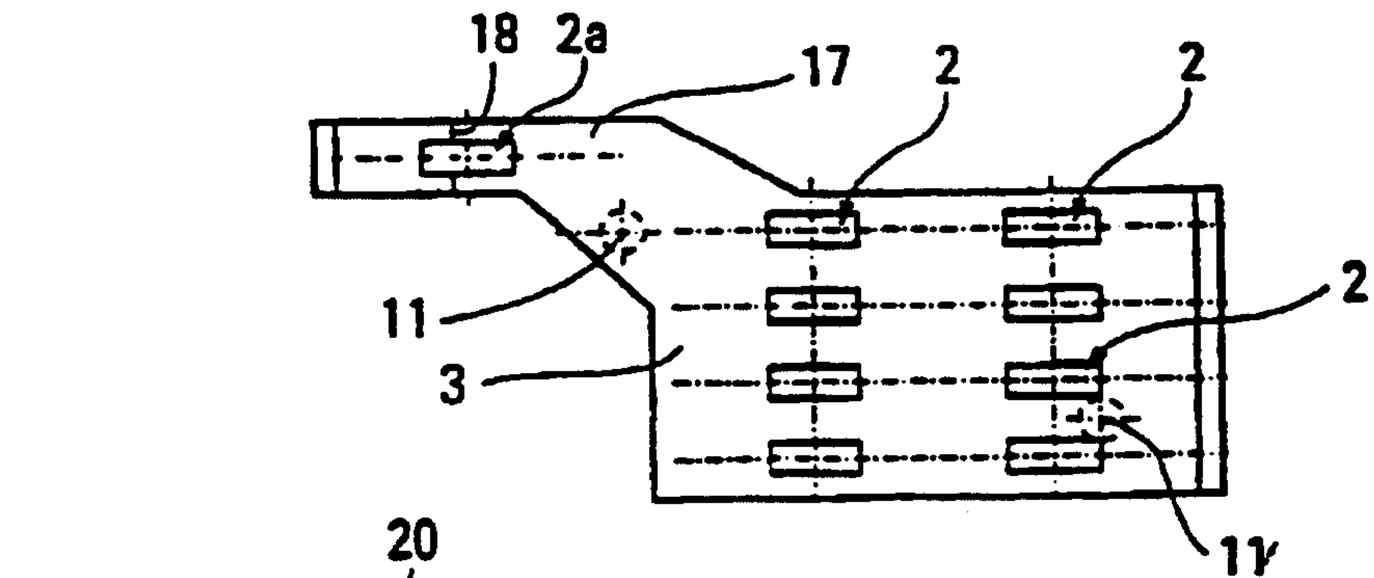


Fig.2

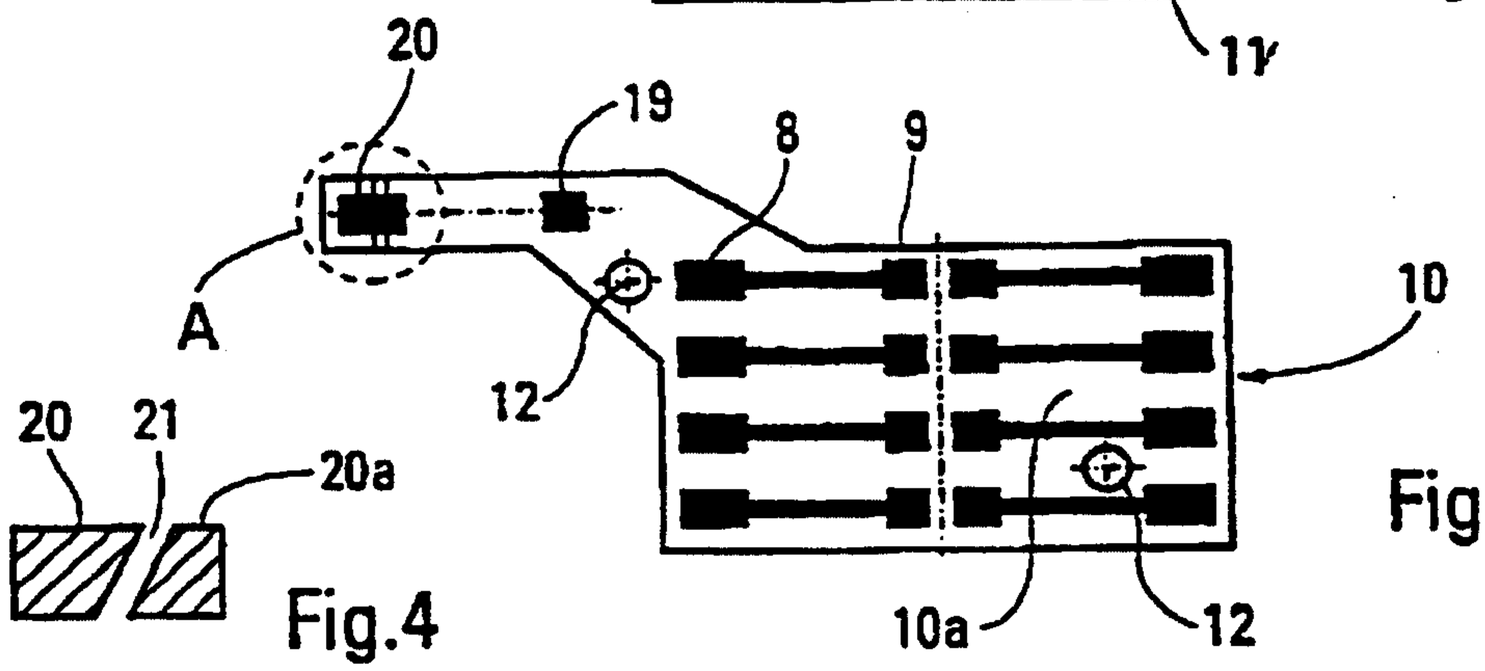
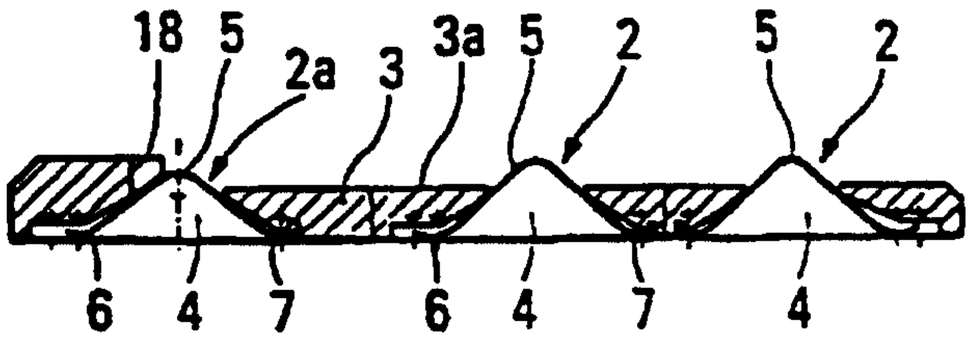


Fig.3

Fig.4



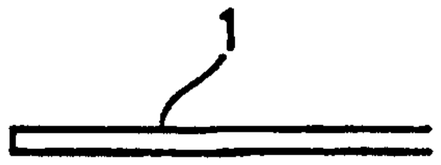


Fig.5

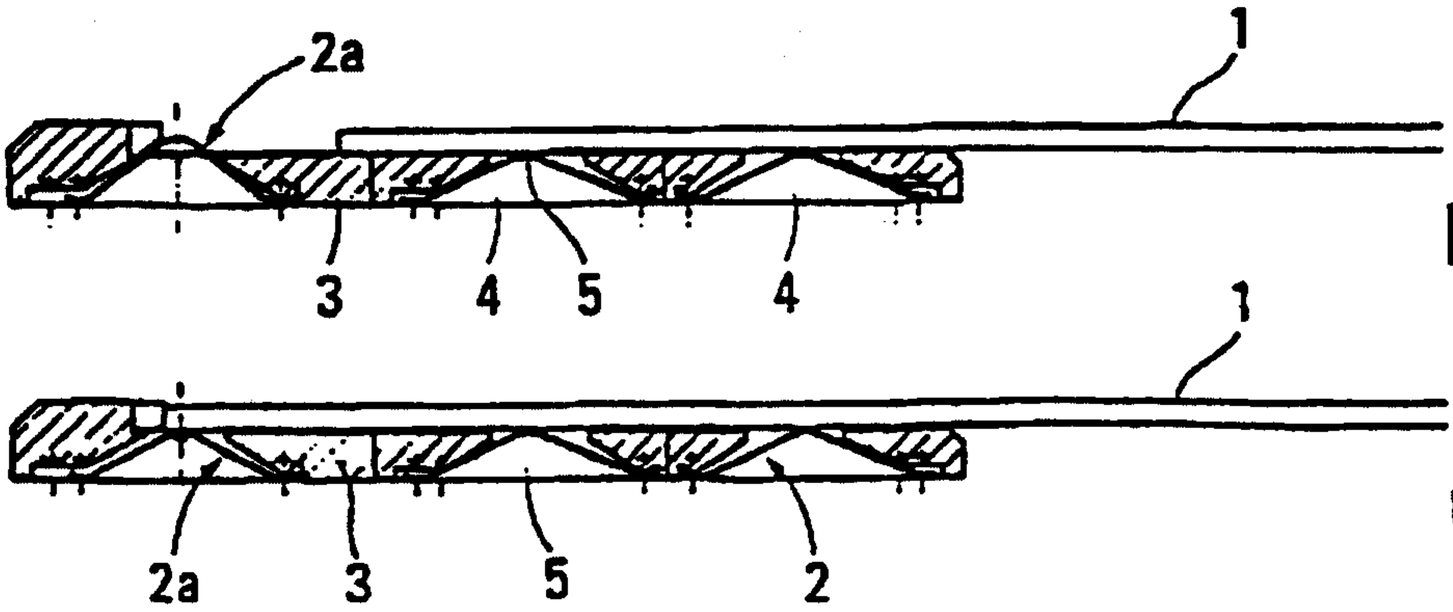


Fig.6

Fig.7

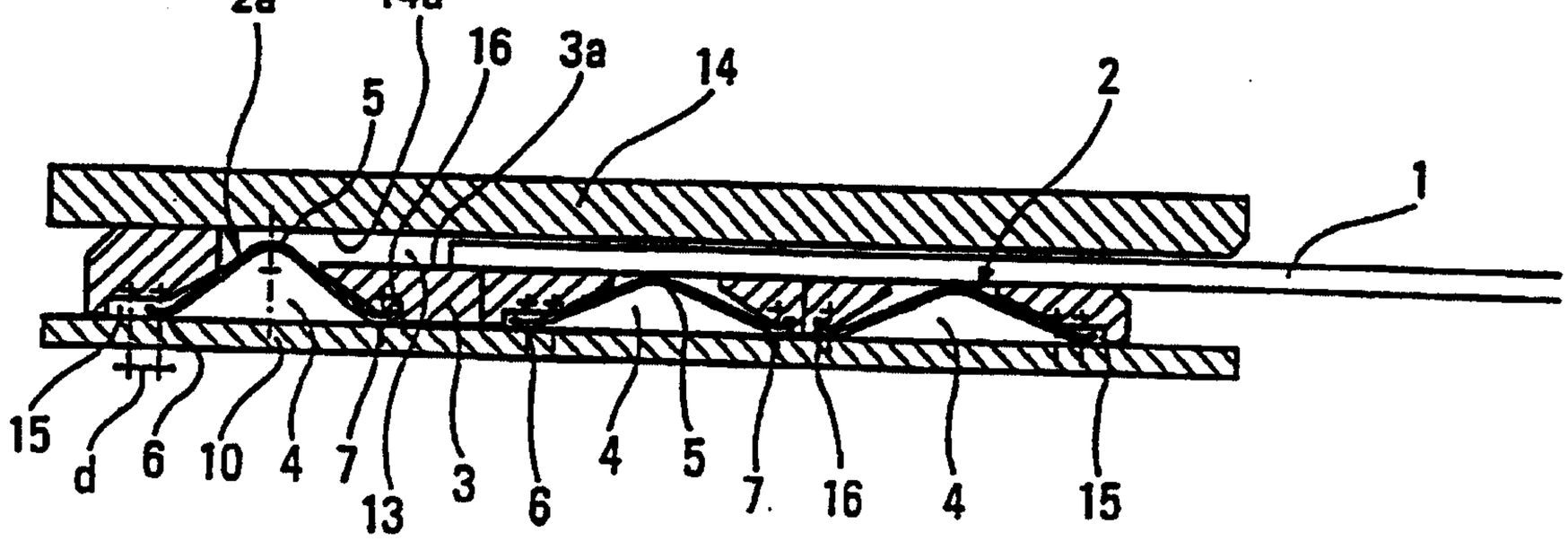

2a
14a
16
3a
14
5
2
1
15
d
6
10
4
7
13
3
6
4
5
7
16
4
15

Fig.8

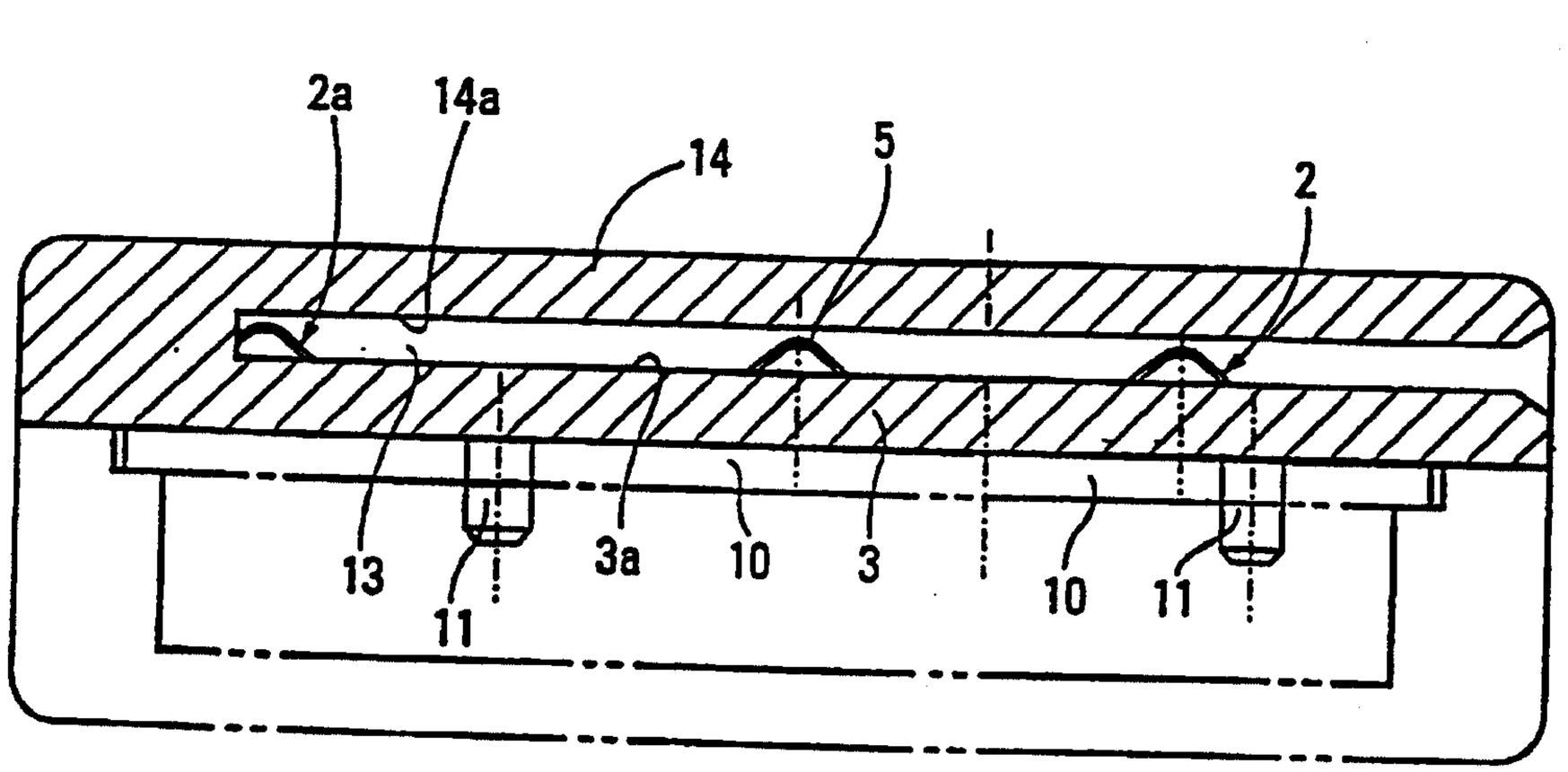

2a
14a
14
5
2
13
11
3a
10
3
10
11

Fig.9