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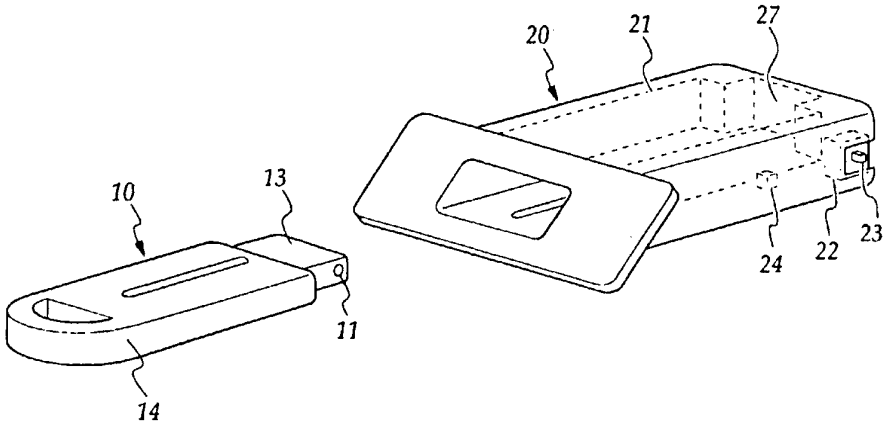
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(54) Title: DATA INTERFACE ASSEMBLY



(57) Abstract

A data interface assembly for the transfer of data between a processor unit and a smart card is disclosed which includes a receptacle (20) for receiving a smart card (10), the receptacle having electrical contacting means (25) for establishing electrical contact with electrical contacting means (12) on said smart card; and a solenoid (22, 26) for locking the smart card in the receptacle upon establishment of electrical contact between the respective electrical contacting means.

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"DATA INTERFACE ASSEMBLY"

BACKGROUND OF THE INVENTION

This invention relates to a data interface assembly.

This invention has particular but not exclusive application to data interface assemblies for the transfer of data between a processor unit and a smart-card and for illustrative purposes reference will be made to such application.

As used herein the expression "smart-card" means an identification card or security access device which includes memory and circuitry enabling the memory to be read from, written to or otherwise modified. Such cards can include electrically erasable programmable read only memory (EEPROM).

DESCRIPTION OF THE PRIOR ART

Smart-cards have electrical contacts for engagement with electrical contacts in a slot, keyway or other receptacle in which the smart-card is inserted. The memory storage and processor of the smart-card can be corrupted if electrical contact between the smart-card and its host circuit is inadvertently broken once established. It is therefore desirable that electrical contact not be broken during a transaction involving use of the smart-card, either by accidental withdrawal, bumping, jolting or by any other movement which even if slight can cause chattering of the electrical contacts.

In some known data interface assemblies this problem is addressed by providing a motorised feed assembly which engages the smart-card, and positively feeds the smart-card into its receptacle between driven rollers or the like, holds it in place during a transaction, and positively retracts the card after use.

SUMMARY OF THE INVENTION

The present invention aims to provide an alternative data interface assembly which will be reliable and

efficient in use.

This invention in one aspect resides broadly in a data interface assembly for the transfer of data between a processor unit and a smart-card, the data interface assembly including:

a receptacle for receiving the smart-card, the receptacle having electrical contacting means for establishing electrical contact with electrical contacting means on the smart-card; and

locking means for locking the smart-card in the receptacle upon establishment of electrical contact between the respective electrical contacting means.

The smart-card can be locked in the receptacle by any suitable means such as, for example, clamping means driven by a motor which is activated upon detection of the electrical contact between the respective contacting means, or the motor may drive a worm gear to linearly displace a bolt to lock the card in the receptacle. However, it is preferred that the locking means includes a solenoid, the smart-card being locked in the receptacle upon actuation of the solenoid in response to establishment of the electrical contact.

The solenoid may be activated to cause a bolt or other means to engage the smart-card for retention in the receptacle. In a preferred embodiment the solenoid includes an armature in the form of a plunger adapted to lockingly engage the smart-card on actuation of the solenoid.

It is preferred that the data interface assembly includes data transfer enabling means operable to allow data transfer for modifying data stored in the smart-card and/or the processor unit when the smart-card is locked in the receptacle by the locking means and to prevent such data transfer when the smart-card is not locked in the receptacle by the locking means.

The data transfer enabling means can be activated by a proximity detection device adapted to detect when the end of the smart-card is adjacent the end of the receptacle or,

alternatively, an auxiliary electrical contact can be established when the two ends come into contact. However, it is preferred that the data transfer enabling means includes sensing means for sensing the condition of the solenoid. Suitably the sensing means senses when the plunger lockingly engages the smart-card.

The sensing means may be a proximity detector as indicated above, or the sensing means could utilise a laser beam. However, it is preferred that the sensing means includes a photoelectric device.

In another aspect this invention reside broadly in a smart-card for use with a data interface assembly as described above, said smart-card including engagement means for engagement by the locking means.

The engagement means could be a hasp or any other means suitably engageable by the locking means, but it is preferred that the engagement means is an aperture in the smart-card for receiving a plunger. Alternatively the engagement means may be a slot or a recess in the smart-card.

The data interface assembly may also include a smart-card as defined above.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that this invention may be more easily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the
invention, wherein:-

FIG 1 is a perspective view of a smart-card and receptacle therefor;

FIGS 2A and 2B illustrate a side view of a smart-card before and upon insertion into a receptacle;

FIGS 3A and 3B illustrate a plan view of a smart-card before and upon complete insertion into a receptacle;

FIG 4 is a simplified schematic block diagram of a preferred embodiment of the data interface assembly;

FIG 5 is a simplified schematic block diagram of

another preferred embodiment of the data interface assembly.

DETAILED DESCRIPTION OF THE INVENTION

As is best seen in FIG 1, a smart-card 10 has a main housing 14 housing a microchip processor (not shown) and an engagement projection 13 having an aperture 11 extending transversely therethrough and a pair of electrical contacts 12 on the underside (as seen in FIG 2A). Receptacle 20 has a main slot 21 accommodating housing 14 and a recess 27 adapted to closely receive engagement projection 13. Recess 27 has a pair of electrical contacts 25 (as seen in FIG 2A) adapted to engage with contacts 12. As card 10 is inserted in receptacle 20, the leading edges of contacts 12 and 25 engage and electrical contact is maintained during the sliding action of the contacts as engagement projection 13 becomes fully engaged in recess 27.

As is best seen in FIG 3A which shows a cut-away view of receptacle 20, a solenoid 22 having a plunger armature 26 is positioned adjacent the end of recess 27 such that plunger 26 is aligned with aperture 11 in engagement projection 13 of smart-card 10 if the card is fully engaged in receptacle 20. A light source 24 is aligned with a photo-electric detector cell 23 such that a beam of light 30 is interrupted by plunger 26 when the plunger is in its retracted position (as seen in FIG 3A), but is not interrupted when the plunger is engaged in aperture 11 (as seen in FIG 3B). Preferably aperture 11 includes a chamfered edge for ease of insertion of the plunger 26.

With reference to FIG 4, in use smart-card 10 is inserted into receptacle 20 and electrical contacts 12 and 25 engage at their leading edge and electrical contact is maintained as card 10 becomes fully engaged in receptacle 20. Upon establishment of electrical contact, solenoid 22 is actuated and plunger 26 will engage in aperture 11 when card 10 is fully engaged in receptable 20. This allows a beam of light 30 to be detected by photoelectric cell 23 (as seen in FIG 3B). As the beam of light 30 is detected

by photoelectric cell 23, enabling circuit 33 is actuated allowing the transfer of data between card CPU memory 31 and system CPU memory 34.

In an alternative embodiment with reference to FIG 5, card 10 contains basic card data 35 such as identification of the establishment where the key assembly is valid or acceptable. As card 10 is being inserted to become fully engaged in receptacle 20, a basic data check 32 is actuated. If the basic data is in order, solenoid 22 is actuated and the system proceeds as hereinbefore described.

The data interface assembly of the present invention, unlike known motorised feed assemblies requires relatively little maintenance, is simple to repair and/or replace, and is thus relatively inexpensive and efficient in use.

Furthermore, because the smart-card is locked within the receptacle, there is no possibility of chattering due to breaking of electrical contact between the card and receptacle, for example, if the card is accidently bumped or jolted in use.

It will of course be realised that whilst the above has been given by way of an illustrative example of this invention, all such and other modifications and variations hereto, as would be apparent to persons skilled in the art, are deemed to fall within the broad scope and ambit of this invention as is herein set forth.

CLAIMS

1. A data interface assembly for the transfer of data between a processor unit and a smart card, said data interface assembly including:

a receptacle for receiving said smart card, said receptacle having electrical contacting means for establishing electrical contact with electrical contacting means on said smart card; and

locking means for locking said smart card in said receptable upon establishment of electrical contact between said respective electrical contacting means.

2. A data interface assembly as claimed in claim 1, wherein said data interface assembly includes data transfer enabling means operable to allow data transfer for modifying data stored in said smart card and/or said processor unit when said smart card is locked in said receptacle by said locking means and to prevent such data transfer when said smart card is not locked in said receptacle by said locking means.

3. A data interface assembly as claimed in claim 2, wherein said locking means includes a solenoid, said smart card being locked in said receptacle upon actuation of said solenoid in response to establishment of said electrical contact.

4. A data interface assembly as claimed in claim 3, wherein said solenoid includes an armature in the form of a plunger adapted to lockingly engage said smart card upon actuation of said solenoid.

5. A data interface assembly as claimed in claim 4, wherein said data transfer enabling means includes sensing means for sensing the condition of said solenoid.

6. A data interface assembly as claimed in claim 5,

wherein said sensing means senses when said plunger lockingly engages said smart card.

7. A data interface assembly as claimed in claim 6, wherein said sensing means is a photoelectric device.

8. A smart card for use with a data interface assembly as claimed in any one of the preceding claims, said smart card including:

engagement means for engagement by said locking means.

9. A smart card as claimed in claim 8, wherein said engagement means is an aperture in said smart card for receiving a plunger.

10. A data interface assembly as claimed in any one of claims 1 to 7, wherein said data interface assembly includes a smart card as claimed in claim 8 or claim 9.

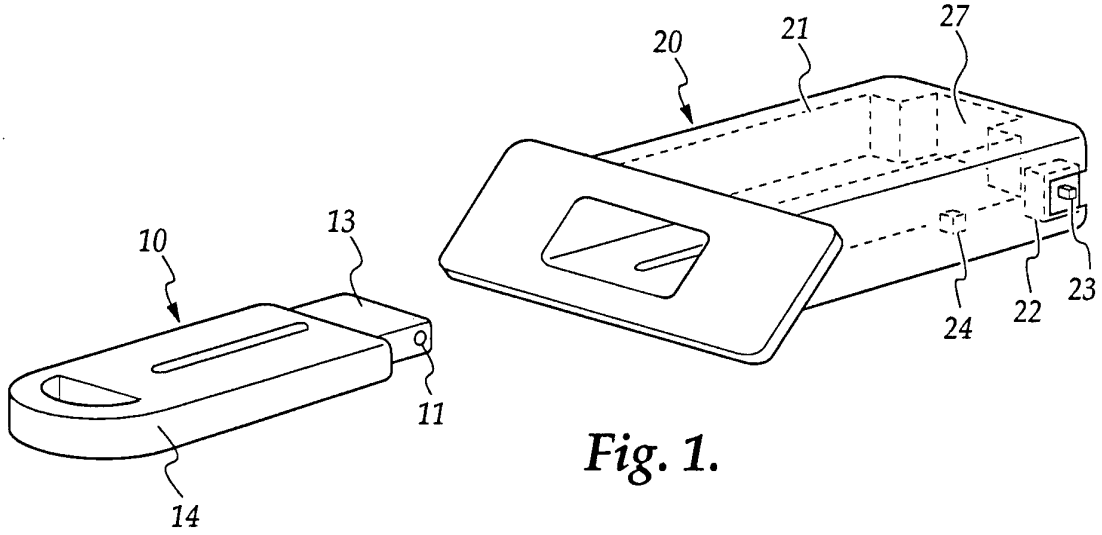


Fig. 1.

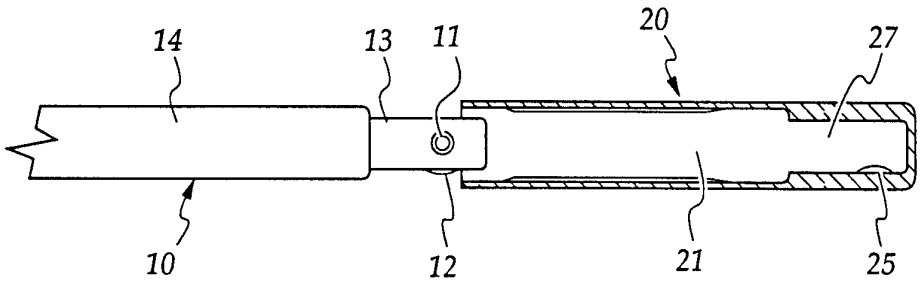


Fig. 2A.

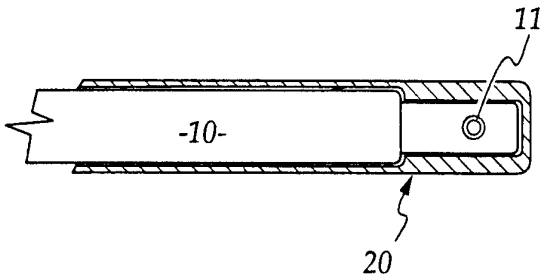


Fig. 2B.

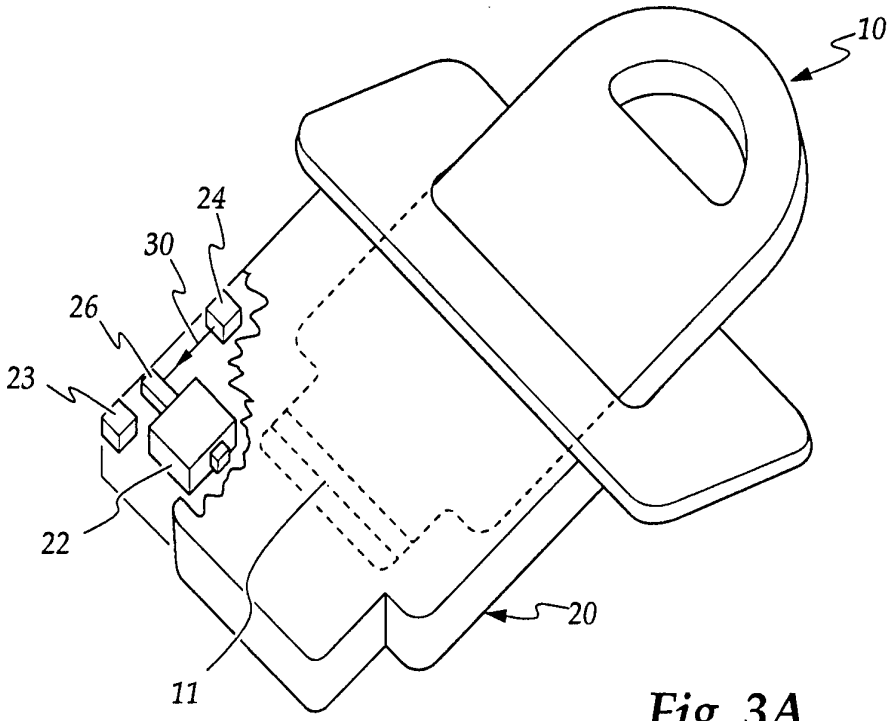


Fig. 3A.

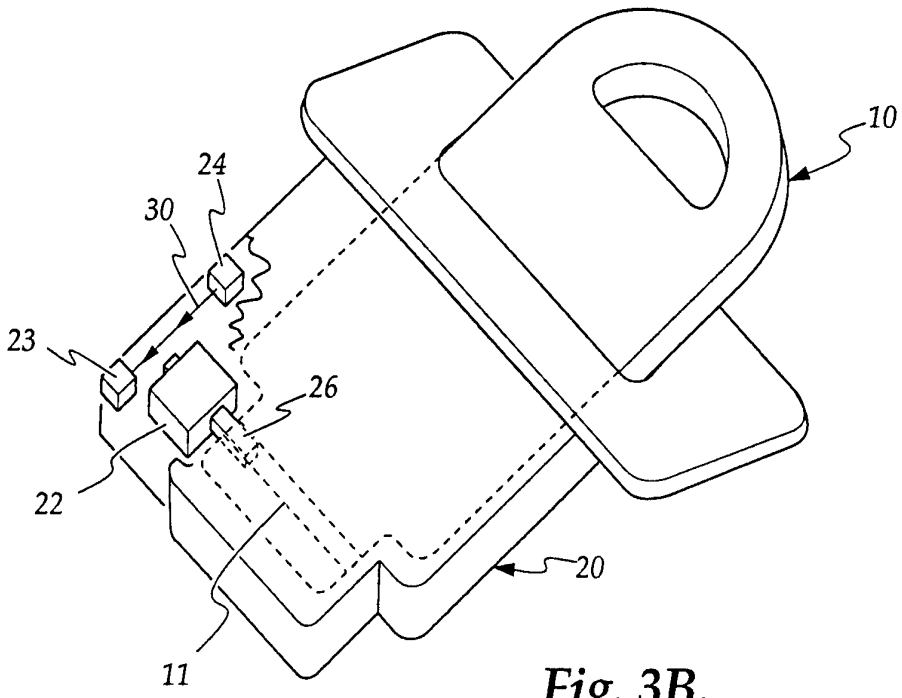


Fig. 3B.

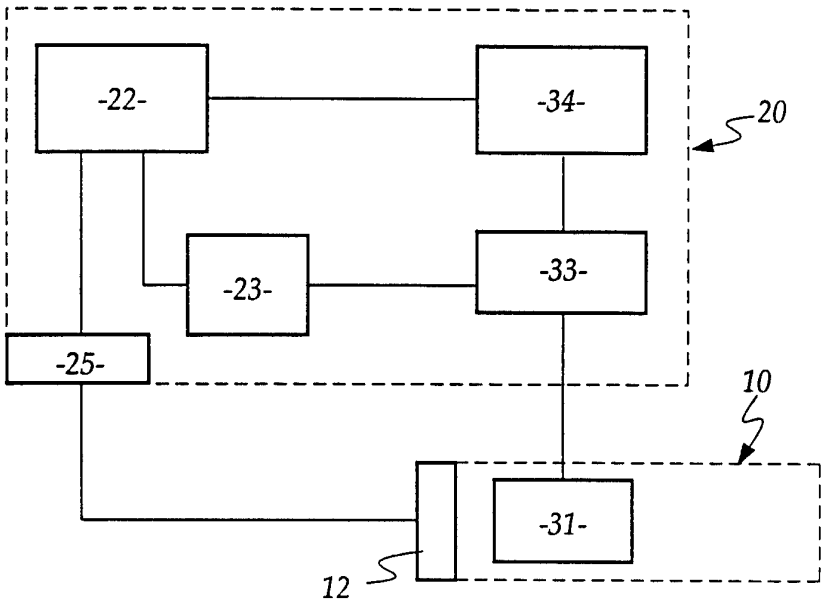


Fig. 4.

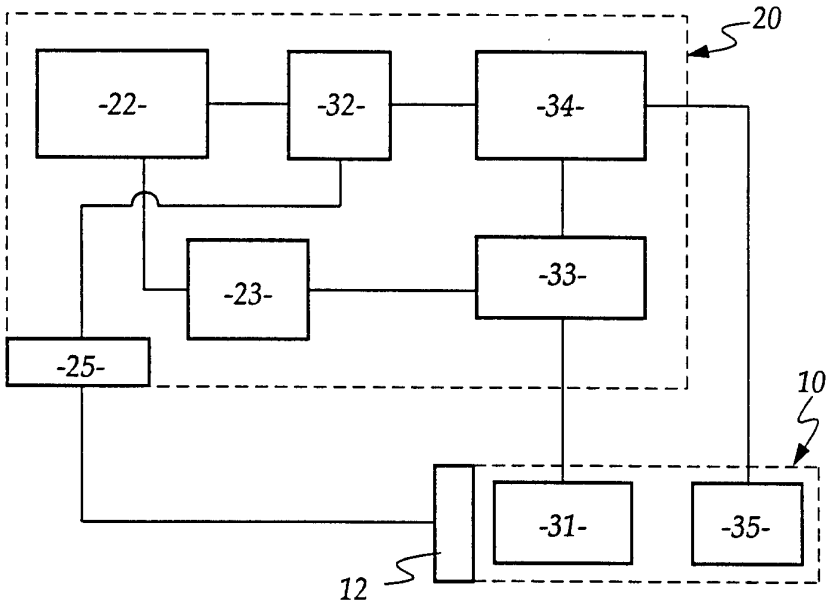


Fig. 5.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 94/00735

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.[6] G06K 7/015, 19/077

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC G06K 7/015, 19/077

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC as above

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	US,A, 5151847 (RAUTENBERG) 29 September 1992 (29.09.92) column 5 line 50-column 6 line 12 Figures 1-3, 5, 6, 7-9, 11	1, 2, 8
X	US,A, 5120946 (HUG et al.) 9 June 1992 (09.06.92) column 4 lines 33-52 Figures 2-4	1, 2, 8
X	US,A, 4984994 (YAMAMOTO) 15 January 1991 (15.01.91) column 6 line 58-column 7 line 17, column 8 line 1-column 9 line 50 Figures 1-8	1, 2, 8

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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11 May 1995	23 MAY 1995 (23.05.95)

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
Y	DE,A, 3627493 (YANNIKOS) 25 February 1988 (25.02.88) column 2 Figures 1-3	1, 8
Y	FR,A, 2607290 (CROUZET S A) 27 May 1988 (27.05.88) see whole document	1, 8
Y	US,A, 4575703 (SHISHIDO) 11 March 1986 (11.03.86) column 8 line 57-column 9 line 17 Figures 7-9	1, 2, 8
Y	FR,A, 2489558 (RADIOTECHNIQUE LA) 5 March 1982 (05.03.82) Page 5 line 33-Page 7 line 8 Figures 1-6	1, 2, 8

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU 94/00735

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member					
US 5151847	DE	4010398	JP	5040859		
US 5120946	DE	8902863	DE	59004533	EP	386664
US 4984994	JP	2011456	DE	3939308	GB	2226462
US 4575703	JP	58016280	CA	1204509	DE	3326522
	FR	2530845	GB	2124420	NL	8302629
	JP	59149576				

END OF ANNEX