(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 296 417 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.03.2003 Bulletin 2003/13

(51) Int Cl.[7]: **H01R 13/66**, H01R 13/506

(21) Application number: **02020569.6**

(22) Date of filing: **17.09.2002**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **20.09.2001 DE 10146430**

(71) Applicant: **FCI**
75009 Paris (FR)

(72) Inventor: **Odörfer, Frank**
90480 Nürnberg (DE)

(74) Representative: **Beetz & Partner Patentanwälte**
Steinsdorfstrasse 10
80538 München (DE)

(54) Plug connector for airbag systems

(57) The present invention concerns a plug connector (1) for airbag systems or the like, with a housing (2), which has a plug portion (3) and a receptacle (4) for at least one electronic element (5). The housing (2) has a base body (6) with conducting elements and electronic elements assembled on both sides and openings (7) for connecting the conductor elements (8) with the said at least one electronic element (5).

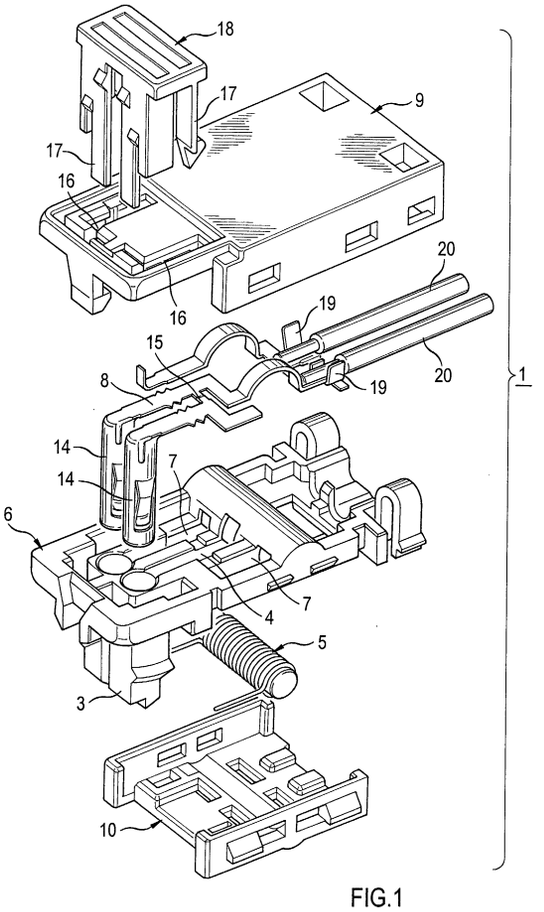

FIG.1

EP 1 296 417 A1

Description

[0001] The present invention relates to a plug connector for airbag systems or the like, according to the preamble clause of Patent Claim 1.
Such plug connectors serve for the connection of a priming cartridge of an airbag safety system for automotive vehicles, to their automatic monitoring and triggering vehicle electronics. The subject plug connectors are required to possess a high degree of compactness and reliability. On the one hand, these plug connectors must be completely reliable in terms of passing the triggering signal to the airbag cartridge and on the other hand, any interfering signals, which may be triggered in the vehicle electronics by, for example, undefined potential conditions during assembly, or by voltage surges, must not result in any unintentional triggering. For that reason, the so-called "make before brake" plug connectors and ferrite core chokes are provided, in order to prevent such voltage surges, or to moderate their effects. These elements must, on the one hand, be provided in the plug connector and on the other hand, the latter should nevertheless be constructed as flat as possible, because of the limited amount of space in the place where the airbag is to be built in, such as, for example, in the steering wheel of a motor car. At the same time, the soldered and crimped electrical joints must be completely secure. The high safety requirements run counter to efforts at miniaturisation.

[0002] The present invention has the object of making available a plug connector of the type mentioned in the introduction, which is as compact as possible, as economical to manufacture as possible and as easy to assemble as possible and which has the highest possible level of safety.

[0003] This object is solved as set out in the main Claim. The secondary Claims contain descriptions of the characteristics of preferred embodiments of the present invention.

[0004] The invention is based on the idea of splitting up the housing of the plug connector into a base body and two covers, where the base body has conducting elements and/or electronic elements on its upper and lower faces, which makes possible a very flat component construction, the conductor layout or elements layout being then protected only by the flat covers.

[0005] All parts and all connections are readily accessible for the purpose of soldering or crimping, so that the quality of the finished connection is easy to check.

[0006] Below, the invention is explained more fully by means of the description of an embodiment example and the diagrams, where

Fig. 1 is an exploded view of a connector according to the invention ;

Fig. 2 is a perspective view, from above and from below, of the base body of the housing ; and

Fig. 3 is a perspective view, from above and from below, of the ready-assembled plug connector.

[0007] Fig. 1 shows the components of an embodiment example plug connector for airbag systems according to the invention. Looking from top to bottom, the plug connector 1 has a secondary lock 18 with arms 17, an upper cover 9, a conductor element 8 with integrally formed contact elements 14 and connection straps 19 for connection with cables 20, a base body 6, a receptacle 4 for an electronic element 5, as well as a lower cover 10.

[0008] Fig. 2 is a perspective view of the lower face of the base body 6 on the left and of the upper face of the base body on the right. The diagram on the right hand side of Fig. 2 is a view of the connection cables 20, leading into the connection straps 19, where they are crimped and/or soldered. The conducting elements 8 fit closely into tracks provided for that purpose on the upper face of the base body 6. In particular, it can be seen that the tracks run over a semi-cylindrical projection, which forms the outer wall of a semi-cylindrical housing 12 for an electronic element 5. This figure also shows the lower cover 10 which is already locked to the sides of the base body 6, the plug elements 14 being inserted into the apertures provided for that purpose in the said base body 6. All conducting elements 8 with their integrally attached contact elements 14, are linked together by frames 15, so that assembly of conducting elements and plug elements can be assembled on the base body 6 as a self-contained rigid unit. Only then are the connecting frames 15 split up, thereby providing a simple, closely fitting arrangement of the conductor elements 8 on the base body 6.

[0009] The diagram on the left hand side of Fig. 2 shows the base body as seen from below, with the pass-through openings 7 in the base body, through which can be seen the lower faces of the conducting elements 8. In this instance, the electronic element 5 is a ferrite choke coil, whose ends 13 are soldered to one another on the lower face of the conductor elements 8 in the pass-through openings 7. The choke 5 has already been introduced in a closely fitting manner into its housing 12 and the soldered joints are readily accessible to the appropriate tools. A control of the quality of the soldered joints is also easy to carry out. The lower faces of the connection straps of the conducting elements 8 with the ends of the cables 20, are likewise located in an opening in the base body 6, which makes the crimping of the connection straps about the cable ends easier, because there is no synthetic material between the crimping tong cheeks.

[0010] Fig. 3 is a perspective view, from above and from below, of the plug connector, with the housing 2 closed by the upper cover 9 and the lower cover 10. The lower cover 10, which is already locked on the base body 6 and was already shown earlier in the right hand side diagram of Fig. 2, has the upper cover 9 clipped

over it, the snap-in lugs 11 in the side faces of the lower cover 10 being provided for that purpose. The arms 17 of the secondary lock 18 are inserted as far as the prelock position into the plug portion 3 of the base body 6 through a slot 16, which is provided in the upper cover, which covers the whole of the base body 6. Only when the plug connector 1 has been inserted fully into the corresponding socket on the airbag-priming cartridge can the secondary lock 18 be locked into its final position. Simultaneously, the upper cover 9 is locked onto the base body 6, so that no unintentional or unauthorised opening of the plug connector is possible.

[0011] The lower diagram in Fig. 3 is a perspective view, from below, of the ready-assembled plug connector 1, showing that the sides of the upper cover 9 almost completely surround the base body, including the lower cover 10 on three sides.

[0012] The plug connector according to the invention is very flat, owing to the assembly of components on both sides of the base body and to the flat covers, its assembly is very simple and easy to fit owing to easily accessible critical places such as soldered joints, crimped joints and the like and owing to the easy monitoring of its process of manufacture and of the securing of openings by means of secondary locking, safe in use.

Claims

1. A plug connector (1) for airbag systems or the like, with a housing (2) which has a plug portion (3) and a receptacle (4) for at least one electronic element (5), **characterised by** the fact that the housing (2) has a base body (6) with an assembly on both its sides of conducting elements and electronic elements, with openings (7) for the connection of the conducting elements (8) with the said at least one electronic element (5).

2. A plug connector according to Claim 1, **characterised by** the fact that the housing (2) is flat vertically to the direction of insertion, with a lower cover (10) which is lockable on the sides of the base body (6) by means of locking elements (11), to which an upper cover (9) can be locked.

3. A plug connector according to Claim 1 or 2, **characterised by** the fact that the base body (6) has a receptacle (12), which is open at the bottom to receive an electronic element (5), whose connection wires (13) are soldered in the openings (7) to the conductor elements (8) which are led through the said openings and are arranged on the upper face of the base body (6).

4. A plug connector according to one of the Claims from 1 to 3, **characterised by** the fact that the conducting elements (8) and the contact elements (14) are integrally formed from steel sheet and the connecting frames (15) are only split up after their incorporation in the base body (6).

5. A plug connector according to Claims from 1 to 4, **characterised by** the fact that the receptacle (4) separates the conductor elements (8) from the electronic component (5).

6. A plug connector according to any one of the preceding Claims, **characterised by** the fact that the upper cover (9) completely covers the base body (6) of the housing (2) and has recesses (16) for passing through of the arms (17), of a secondary lock (18), where a secondary lock (18) in locked position simultaneously secures the housing covers (9,10) in closed position.

7. A plug connector according to any one of the preceding Claims, **characterised by** the fact that the receptacle (12) for the electronic element (5) on the upper face of the base body (6), has a substantially semi-cylindrical form, whose central axis crosses the axis of the connection cable and is arranged between the cable connection ends (19) and the ends of the conducting elements (8) on the connector side.

8. A plug connector according to Claim 7, **characterised by** the fact that the conductor elements (8) are strips of steel sheet which are led on the surface of the base body in the receptacle (4).

9. A plug connector according to one of the Claims from 1 to 8, **characterised by** the fact that the electronic component (5) is a choke coil with ferrite core.

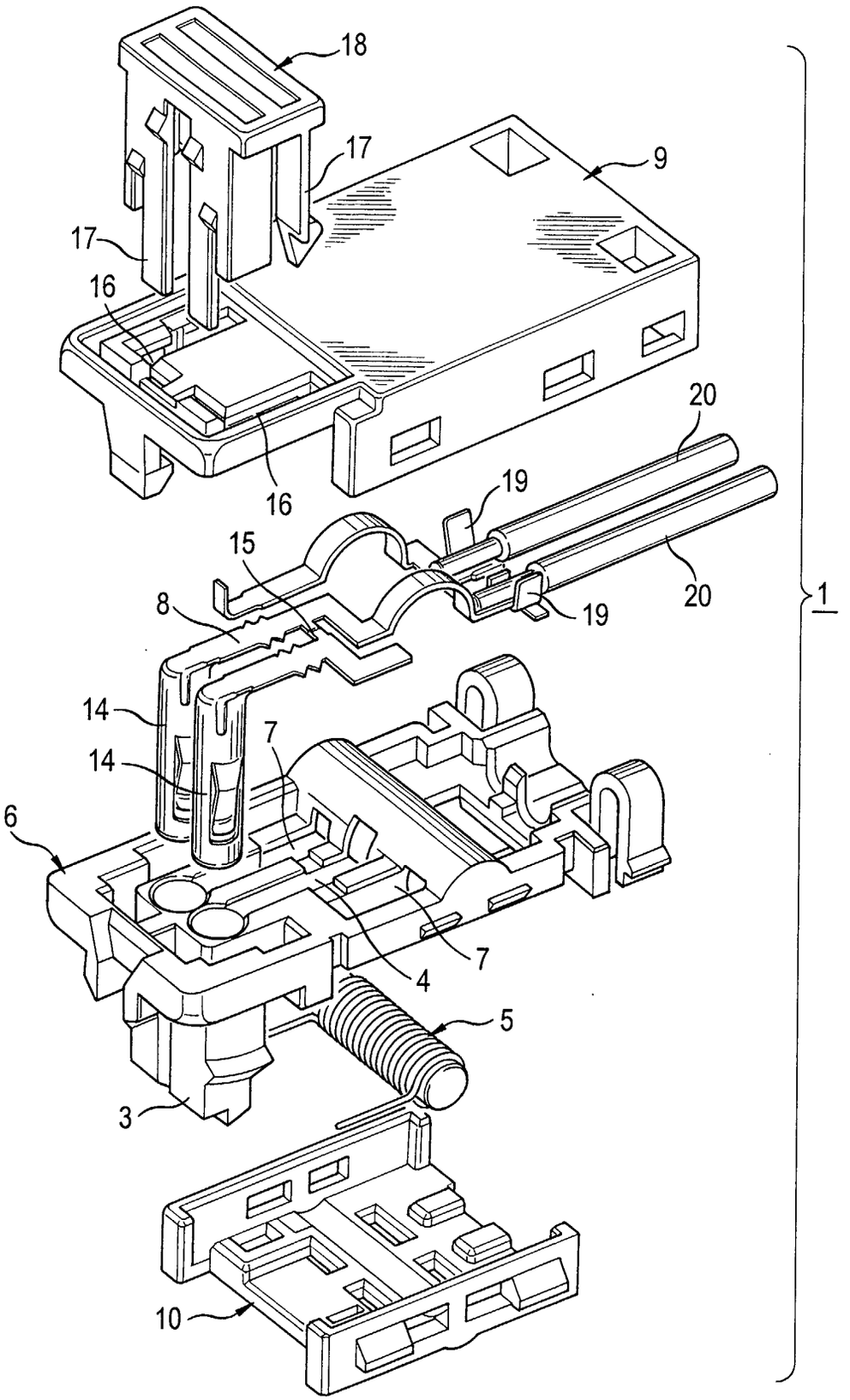

FIG.1

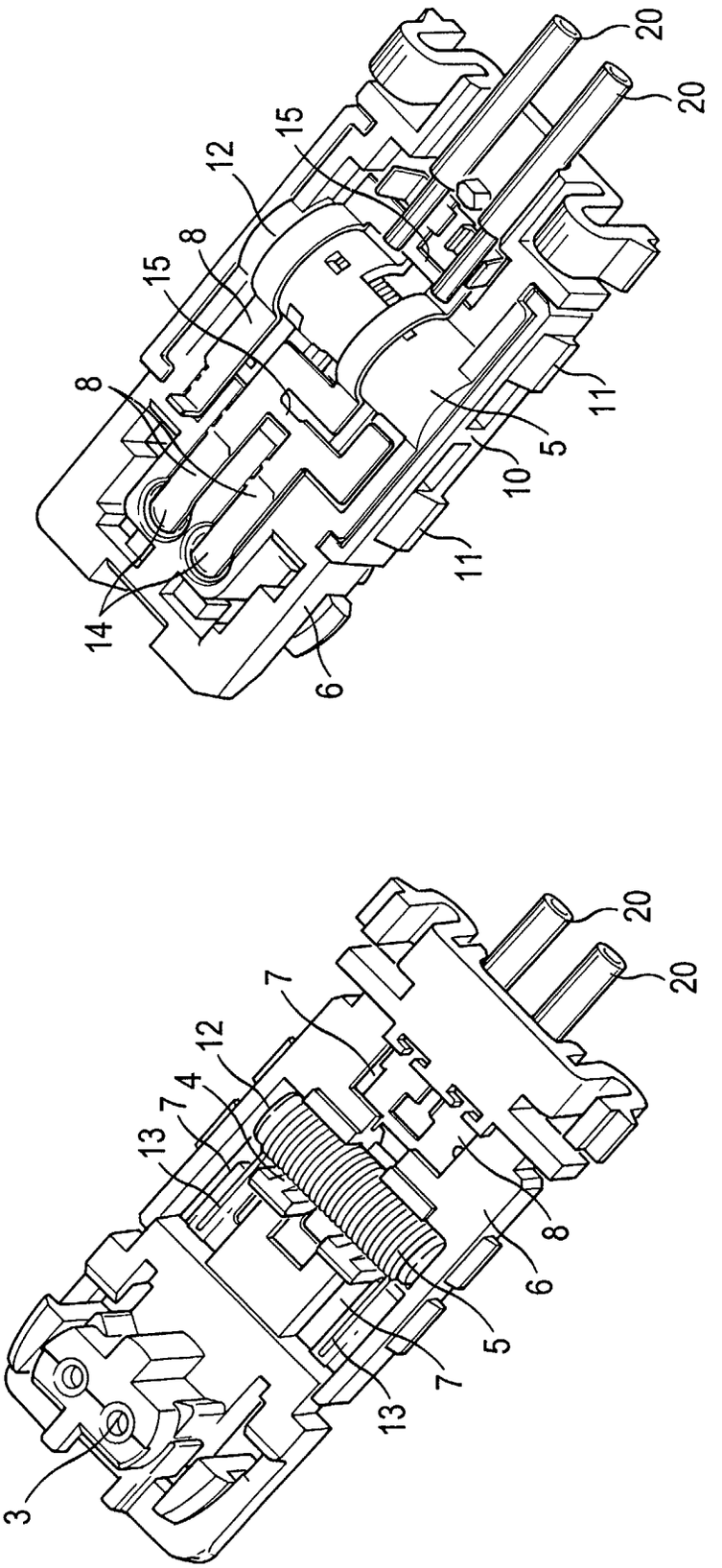

FIG.2

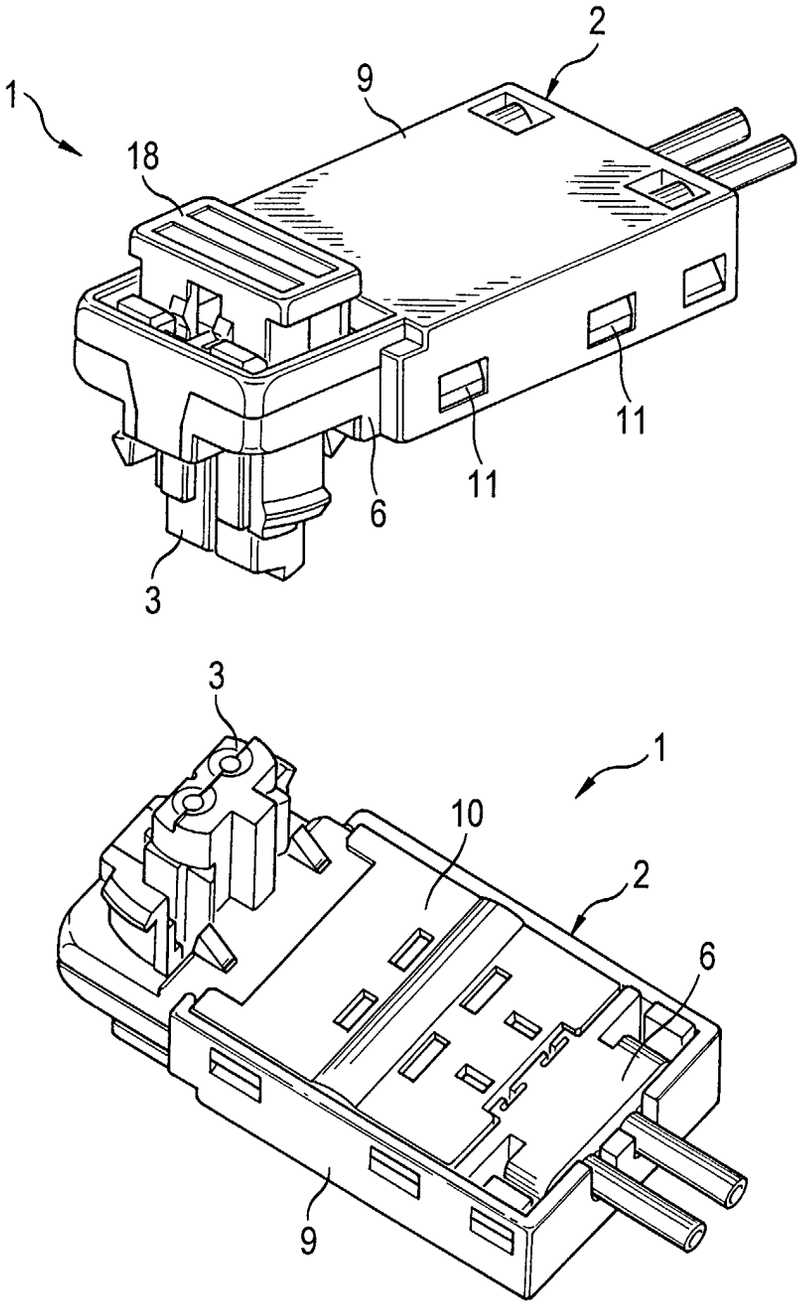

FIG.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 02 0569

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.7)
X	DE 44 13 756 C (AMPHENOL TUCHEL ELECT) 13 July 1995 (1995-07-13)	1,4,5,9	H01R13/66 H01R13/506
A	* the whole document *	8	
X	EP 0 889 551 A (FRAMATOME CONNECTORS INT) 7 January 1999 (1999-01-07) * the whole document *	1,2	
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 08, 30 June 1999 (1999-06-30) & JP 11 086971 A (SUMITOMO WIRING SYST LTD), 30 March 1999 (1999-03-30) * abstract; figures 1,12 *	6	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	7 January 2003	Marcolini, P

CATEGORY OF CITED DOCUMENTS

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

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 02 0569

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-01-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4413756 C	13-07-1995	DE 4413756 C1	13-07-1995
		FR 2719166 A1	27-10-1995
		GB 2288555 A ,B	25-10-1995
		IT MI950805 A1	23-10-1995
EP 0889551 A	07-01-1999	DE 19728448 C1	24-09-1998
		CA 2242029 A1	03-01-1999
		EP 0889551 A2	07-01-1999
		US 6033256 A	07-03-2000
JP 11086971 A	30-03-1999	JP 3303738 B2	22-07-2002
		BR 9803554 A	16-11-1999
		CN 1211092 A	17-03-1999
		EP 0902506 A2	17-03-1999
		US 6102732 A	15-08-2000
		US 6287139 B1	11-09-2001
		US 6276957 B1	21-08-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82