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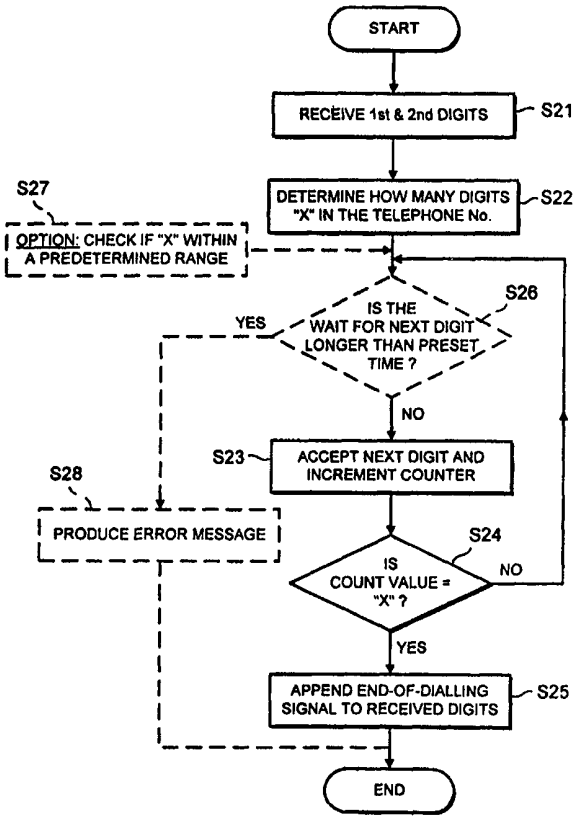
(54) Title: SENDING DIALLED NUMBER

(57) Abstract

A telephone dialling apparatus appends an end–of–dialling signal, for example a "SEND" signal, to a dialled telephone number by determining from first and second dialled digits how many digits constitute a telephone number to be subsequently dialled. After the dialling apparatus has determined that the correct number of digits have been dialled, it automatically apends the end–of–dialling signal to the telephone number. The dialling apparatus may be used in a system in which a fixed line telephone is connected to a mobile network via a fixed access unit.



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SENDING DIALLED NUMBER

TECHNICAL FIELD OF THE INVENTION

The invention relates to the sending of a dialled telephone number, and in particular, to eliminating the need to press a "SEND" button after dialling a telephone number intended for a mobile network, for example when dialling on a fixed line telephone connected to a Fixed Access Unit.

BACKGROUND

A Fixed Access Unit (FAU) is an unit that enables conventional fixed line subscriber equipment, for example conventional wired telephones and facsimile machines, to be connected to a mobile telephone network. The FAU acts as the interface between the mobile environment and the fixed environment.

The role of the FAU is to convert mobile network signals and protocols into signals and protocols recognised by the fixed network, and vice versa.

When making a telephone call from a mobile telephone, a caller has to press a "SEND" key after the dialled digits have been entered. The purpose of the "SEND" signal is to allow the dialling operation to be carried out before connecting to a radio channel, thereby reducing the time which the caller is connected to the radio channel. This is turn reduces both the cost of a call and the traffic on the mobile network.

This requirement of having to press a "SEND" button poses a problem when dialling from a fixed line telephone which is connected to a FAU.

Some prior art systems overcome this problem by requiring the user to press some other key on the conventional telephone, for example the "*" or "#"

keys, to send the dialled telephone number. This has the disadvantage that it does not allow the user to make any USSD (Unstructured Supplementary Services Data) or public MMI (Man Machine Interface) calls, whereby the "*" and/or "#" keys have other meanings.

Figure 1 shows the dialling procedure according to another prior art system. After receiving each dialled digit in step S1, a counter is incremented in step S2. The system then checks in step S3 whether the counter has reached a preset value corresponding to the expected number of digits making up the telephone number. If not, it returns to step S1 and waits for the next dialled digit to be entered. If the counter has reached the preset value in step S3, it assumes that the complete telephone number has been entered, and appends the "SEND" signal to the dialled digits in step S4. In other words, the system automatically appends a "SEND" signal after a predetermined number of digits have been dialled.

This type of system suffers from the disadvantage that it relies on a standard number of digits making up a telephone number. However, this is not always possible, for example, when making a combination of local, national and international calls.

Figure 2 shows the dialling procedure according to another prior art system. After the first dialled digit is received in step S10, a timer is started in step S11. In step S12, the system determines whether another digit has been entered before the timer has timed-out. If a digit has been entered within this time, the timer is reset and restarted in step S11, and the system again determines whether another digit has been entered before the timer has timed-out. If no digits are entered during this time, the system assumes that the caller has completed the dialling process, and

appends the "SEND" signal in step S13 to the dialled digits that have already been received. In other words, if a predetermined period of time has lapsed without a key being pressed, it is assumed that the caller has finished dialling. This type of system suffers from the disadvantage of increasing the call set-up time.

The aim of the present invention is to overcome the disadvantages mentioned above, by having a dialling apparatus that does not require the pressing of a "SEND" key, does not rely on a predetermined number of digits in the telephone number, and does not delay the sending of the dialled telephone number.

SUMMARY OF THE INVENTION

According to the invention, there is provided a dialling apparatus comprising;

means for determining from first and second dialled digits how many digits constitute a telephone number to be subsequently dialled;

means for determining when the digits constituting the telephone number have been dialled; and,

means for automatically appending an end-of-dialling signal to the end of the telephone number.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 shows a dialling procedure according to the prior art;

Figure 2 shows another dialling procedure according to the prior art;

Figure 3 shows a dialling procedure according to preferred embodiments of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE PRESENT INVENTION.

Figure 3 shows the dialling procedure in a telephone apparatus according to a preferred embodiment of the present invention.

In step S21, the telephone receives the first and second digits which represent the amount of digits constituting the telephone number to be dialled. This amount is determined in step S22. For example, if the caller wishes to dial the telephone number "864579" the caller would dial the number "06864579". The first two digits "06" indicate that there are six digits in the telephone number to be dialled. Similarly, if the caller wishes to dial"+441256864579", the digits "13+441256864579" would be entered. The first two digits "13" indicate that there are thirteen digits (including the symbol "+") in the number to be dialled.

Once the telephone has determined in step S22 how many digits constitute the telephone number, a count value is incremented each time it receives a subsequent dialled digit, step S23. In step S24, if the count value is not equal to the expected number of digits constituting the telephone number, the telephone receives the next digit and increments the count value, step S23, and checks again whether the count value is equal to expected number. Once the telephone has received the expected number of dialled digits in step S24, it automatically appends the end of dialling signal to the received digits, step S25.

According to another feature (also shown in Figure 3), the dialling apparatus has an additional step of checking that the first two digits are within a predetermined range, (as shown in dotted lines in step 27). The first digit will only have a range from 0-6 since the maximum size of a telephone number is 61

digits. Thus, the combination of the first and second digits is checked to verify that it is within a valid range, for example between 3 and 61.

According to yet another embodiment, (also shown in figure 3), the dialling apparatus has an additional feature of warning the caller if an incorrect number of digits have been dialled (also shown in dotted lines). As before in step S21, the telephone receives the first and second digits which represent the number of digits constituting the telephone number to be dialled. This number is determined in step S22.

The additional feature, shown in step S26, determines whether the dialling apparatus has been waiting for longer than a prescribed period for the next digit to be dialled. Assuming that the caller is dialling correctly, the next digit will be entered within the prescribed period, the count value updated as normal in step S23, and the count value checked in step S24 to determine whether it equals the expected number of digits constituting the telephone number. If the count value equals the expected number of digits constituting the telephone number in step S24, the end-of-dialling signal is appended to the received digits in step S25.

However, if the count value does not equal the expected number of digits in step S24, the dialling apparatus returns to step S26 to await the next dialled digit. In this respect, the operation of this embodiment is identical to that described in relation to the previous embodiment above. However, if the next digit is not entered within the prescribed period in step S26, the dialling apparatus provides the caller with a warning in step S28, for example an audible tone, indicating that an error has occurred. Such an error may occur if the caller has indicated that the

telephone number comprises 13 digits, and then forgets to dial one of these digits. In such a situation, after the twelfth number has been dialled, the apparatus would return to step S26 to await the thirteenth digit to be dialled. Step S26 prevents the apparatus from waiting indefinitely in this idle state by providing the error message in step S28 when a predetermined time has lapsed.

The invention described above enables an end-of-dialling signal to be appended to a dialled telephone number in a manner which avoids the disadvantages associated with the prior art.

The invention has the additional advantage of having inherent checks, since the first two digits must be within a predetermined range, and/or correspond to the number of digits subsequently dialled.

The dialling apparatus may form part of a fixed access unit, or a separate interface between a fixed access unit and a conventional telephone.

Although the invention has been described in relation to dialling on a fixed line (or conventional wired) telephone, it could also be used as a means of eliminating the need to press a "send" key on a mobile telephone.

CLAIMS

1. A telephone dialling apparatus comprising;

means for determining from first and second dialled digits how many digits constitute a telephone number to be subsequently dialled;

means for determining when the digits constituting the telephone number have been dialled; and,

means for automatically appending an end-of-dialling signal to the end of the telephone number.

2. A telephone dialling apparatus as claimed in claim 1, wherein the means for determining when dialling of the telephone number is complete comprises a counter for counting the number of dialled digits.

3. A telephone dialling apparatus as claimed in claim 1 or 2, wherein the dialling apparatus forms part of a fixed access unit, which receives dialled digits from a fixed line subscriber equipment.

4. A telephone dialling apparatus as claimed in claim 1 or 2, wherein the dialling apparatus forms an interface between a fixed line subscriber equipment and a fixed access unit.

5. A telephone dialling apparatus as claimed in any preceding claim, wherein the end-of-dialling signal represents a SEND signal.

6. A telephone dialling apparatus as claimed in any preceding claim, having means for providing an indication to a caller if the number of dialled digits does not correspond with the amount specified in the first two digits dialled.

7. A telephone dialling apparatus as claimed in claim 6, wherein the indication is given when the dialling apparatus is awaiting for a digit to be dialled for longer than a predetermined time.

8. A telephone dialling apparatus as claimed in

any one of the preceding claims, wherein the first and second digits are checked to determine whether they are within a predetermined range.

9. A telephone dialling apparatus as claimed in claim 8, wherein the predetermined range is from 3 to 61.

10. A telephone dialling apparatus substantially as herein described, with reference to, and as illustrated in, Figure 3 of the drawings.

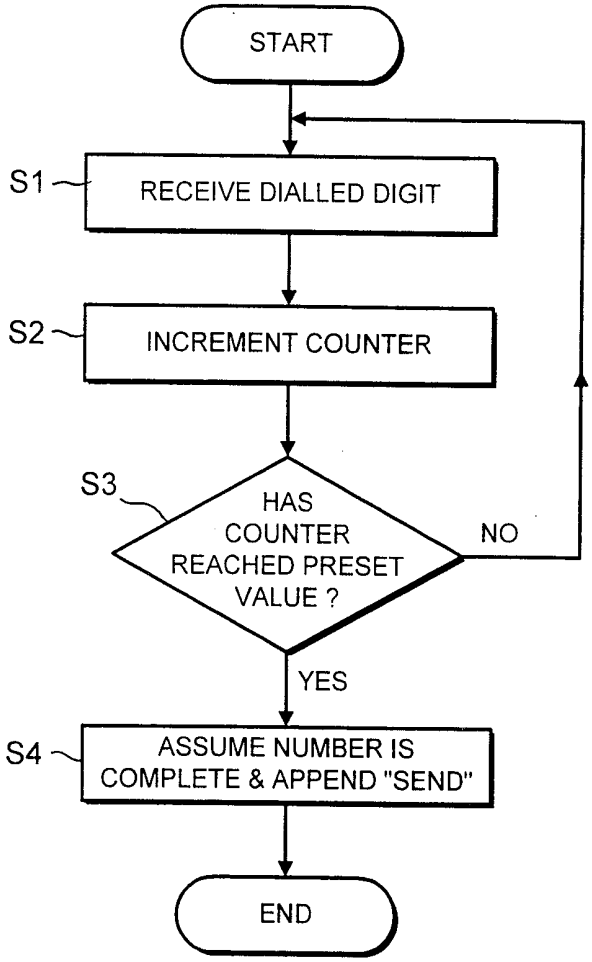
START
S1
RECEIVE DIALLED DIGIT
S2
INCREMENT COUNTER
S3
HAS COUNTER REACHED PRESET VALUE ?
NO
YES
S4
ASSUME NUMBER IS COMPLETE & APPEND "SEND"
END

FIG. 1

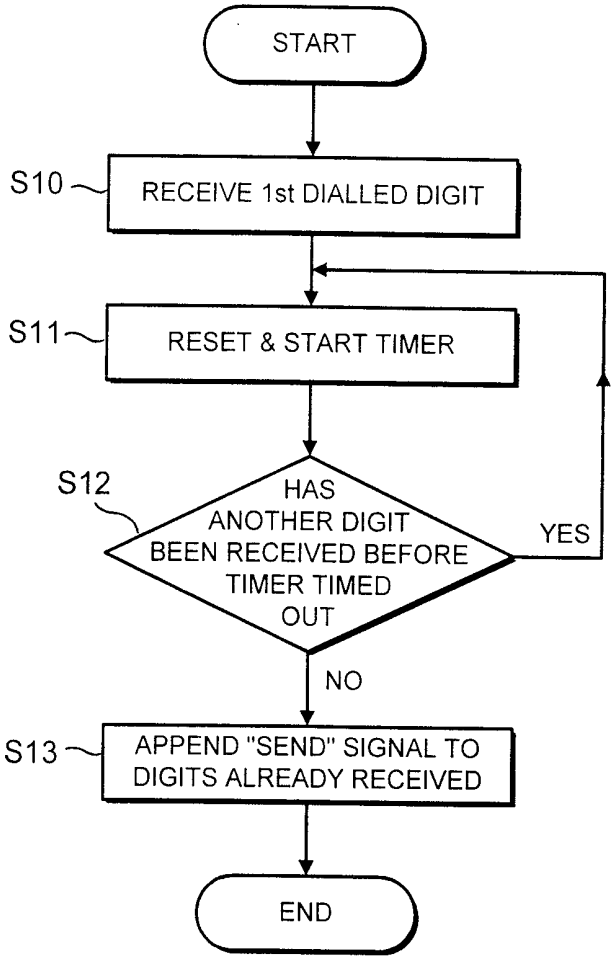
START
S10
RECEIVE 1st DIALLED DIGIT
S11
RESET & START TIMER
S12
HAS ANOTHER DIGIT BEEN RECEIVED BEFORE TIMER TIMED OUT
YES
NO
S13
APPEND "SEND" SIGNAL TO DIGITS ALREADY RECEIVED
END

FIG. 2

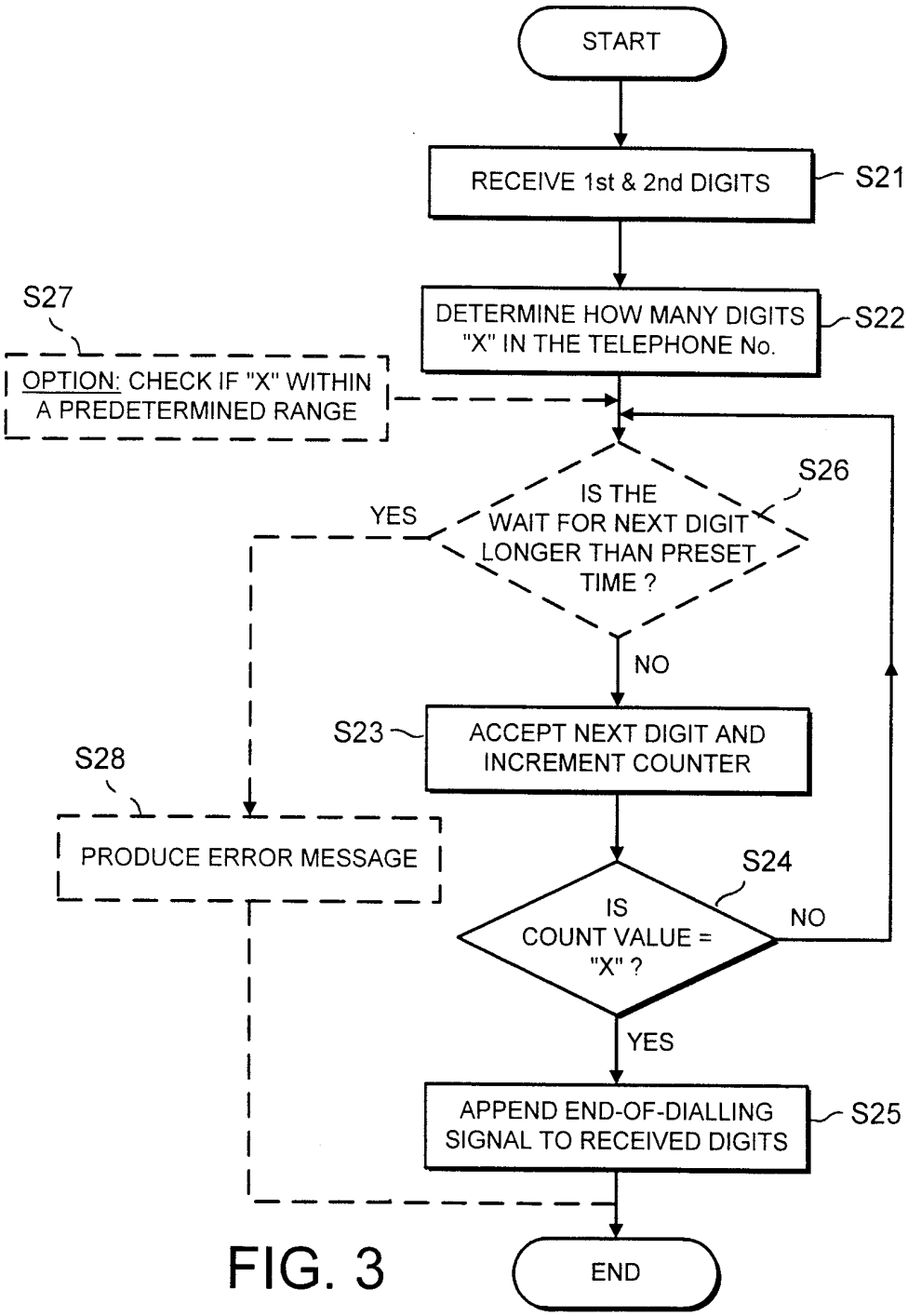
START
RECEIVE 1st & 2nd DIGITS
S21
DETERMINE HOW MANY DIGITS "X" IN THE TELEPHONE No.
S22
S27
OPTION: CHECK IF "X" WITHIN A PREDETERMINED RANGE
S26
IS THE WAIT FOR NEXT DIGIT LONGER THAN PRESET TIME ?
YES
NO
S23
ACCEPT NEXT DIGIT AND INCREMENT COUNTER
S28
PRODUCE ERROR MESSAGE
S24
IS COUNT VALUE = "X" ?
NO
YES
APPEND END-OF-DIALLING SIGNAL TO RECEIVED DIGITS
S25
END

FIG. 3

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/EP 99/07610

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/274 H04Q7/20

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 7 H04M H04Q

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

Electronic data base consulted during the international search (name of data base and, where practical, 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.
A	US 5 812 651 A (KAPLAN) 22 September 1998 (1998-09-22) abstract column 2, line 14 -column 4, line 3 column 4, line 48 -column 5, line 4 column 5, line 47 -column 7, line 20 column 9, line 10 - line 16 column 11, line 56 - line 65 figures 1-4,7 --- -/--	1-3,5-8, 10

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

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Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 775 997 A (WEST JR. ET AL) 4 October 1988 (1988-10-04) abstract column 2, line 9 - line 33 column 3, line 3 - line 13 column 6, line 25 - line 54 column 9, line 66 -column 10, line 63 column 11, line 13 - line 27 figure 2	1,2,4,5, 8,10
A	US 4 939 774 A (SAWADA) 3 July 1990 (1990-07-03) abstract column 2, line 49 -column 3, line 51 column 4, line 63 -column 6, line 31 column 6, line 47 - line 50 figures 2-5	1-3,8,10
A	GB 2 301 508 A (SAMSUNG ELECTRONICS CO LTD) 4 December 1996 (1996-12-04) abstract page 3, line 21 - line 29 page 4, line 1 - line 23 page 6, line 11 -page 9, line 12 figures 3,4	1,2,5,8, 10
A	US 5 535 260 A (DION ET AL) 9 July 1996 (1996-07-09) abstract column 1, line 13 - line 15 column 2, line 53 -column 3, line 13 column 5, line 55 -column 11, line 14 figures 5-7	1,2,5,8, 10
A	US 4 674 111 A (MONET ET AL) 16 June 1987 (1987-06-16) column 3, line 4 - line 8 column 6, line 53 -column 7, line 2	1,2,8,10

1

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Information on patent family members

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PCT/EP 99/07610

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5812651	A	22-09-1998	NONE		
US 4775997	A	04-10-1988	US	4658096 A	14-04-1987
			US	4922517 A	01-05-1990
			BE	905569 A	02-02-1987
			US	4737975 A	12-04-1988
US 4939774	A	03-07-1990	JP	2021757 A	24-01-1990
			JP	2646373 B	27-08-1997
			DE	3922657 A	18-01-1990
GB 2301508	A	04-12-1996	CA	2175305 A	28-11-1996
			CN	1139868 A	08-01-1997
			IT	MI960728 A	16-10-1997
			US	5963875 A	05-10-1999
US 5535260	A	09-07-1996	US	5594782 A	14-01-1997
			AU	686742 B	12-02-1998
			AU	1695995 A	11-09-1995
			BR	9506895 A	09-09-1997
			CN	1141709 A	29-01-1997
			EP	0746953 A	11-12-1996
			JP	9509542 T	22-09-1997
			NZ	279729 A	25-03-1998
			WO	9523486 A	31-08-1995
			AU	689215 B	26-03-1998
			AU	1698995 A	11-09-1995
			AU	687996 B	05-03-1998
			AU	1737995 A	11-09-1995
			AU	706261 B	10-06-1999
			AU	7319598 A	27-08-1998
			BR	9506893 A	09-09-1997
			BR	9506894 A	09-09-1997
			CN	1142306 A	05-02-1997
			CN	1151237 A	04-06-1997
			EP	0746954 A	11-12-1996
			EP	0746955 A	11-12-1996
			JP	9509543 T	22-09-1997
			JP	9509544 T	22-09-1997
			NZ	279750 A	19-12-1997
			NZ	281061 A	19-12-1997
			NZ	329077 A	29-04-1999
			US	5878344 A	02-03-1999
			US	5878339 A	02-03-1999
			WO	9523487 A	31-08-1995
			WO	9523488 A	31-08-1995
			US	5887259 A	23-03-1999
			US	5787354 A	28-07-1998
			US	5873037 A	16-02-1999
			US	5832378 A	03-11-1998
			US	5862475 A	19-01-1999
US 4674111	A	16-06-1987	NONE		