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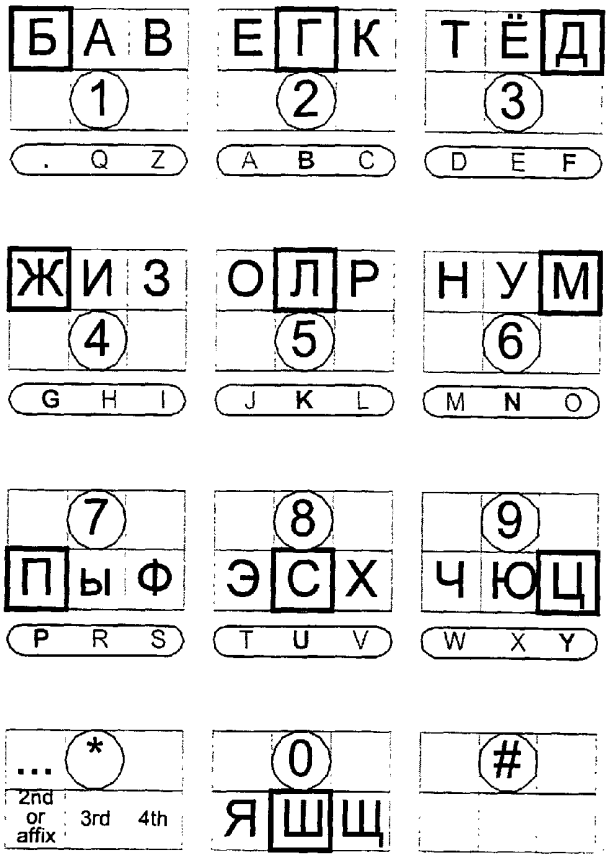
(54) Title: APPARATUS AND METHOD FOR INPUTTING ALPHABET CHARACTERS ON KEYPAD



(57) Abstract: Present invention provides convenient character input from keypad.

WO 02/067554 A1

APPARATUS AND METHOD FOR INPUTTING ALPHABET CHARACTERS ON KEYPAD

BACKGROUND OF THE INVENTION

(a) Field of the Invention

The present invention relates to an apparatus and method for entering characters from a keypad. More specifically, the present invention relates to an apparatus and method for entering characters from a keypad having a small number of keys such as a telephone keypad.

(b) Description of the Related Art

With the progress of mobile communications, a function of receiving and sending digital information such as text messages is added to a mobile station chiefly used for voice calls. Hence, the keypad provided on the mobile station for the entry of a telephone number additionally has a function of entering characters, thus reducing the size of the keypad used as an input means in the mobile station and hence limiting the number of buttons included on the keypad. Alphabets of every language are usually much more than 12 keys on the keypad. Therefore a need exists to represent every character with buttons on a telephone keypad alone or in combination of two or more different types.

SUMMARY OF THE INVENTION

The invention disclosed in the prior documents published by the present applicant (i.e., Application No. PCT/KR00/00601 and other documents of applicant) can be summarized as follows.

First, so-called "Part-Whole Selection Method (PWSM)" assigns characters to a given number of lattices provided to every button on the keypad in correspondence to the arrangement of buttons on the keypad, so that the user can enter a desired character (hereinafter, referred to as "target character") by pressing a first button for the target character in combination with a second button provided on the keypad in correspondence to the arranged position of the character in the lattices of the first button. For example, the user may enter "Б = [1]+[1]", "A = [1]+[2]" in FIG. 1.

The core of PWSM is using part of the lattice elements of every button including a base lattice element (BLE), for which the first button is identical to the second one, and particularly, in the Order of Proximity to a BLE that is most convenient in button combination. As such, the base lattice element forms the core of PWSM and a keypad making the use of the conception of the Base Lattice Element is called "Base Keypad (BK)".

Next, so-called "Base Repeat Selection Method (BRSM)" enables the user to select an character depending on the number of times of pressing a button on a Base Keypad designed to use PWSM in the order of proximity to a BLE, i.e., the Convenient Order of Button Combination (COBC) in PWSM. BRSM makes the user of a Repeat Selection Method (RSM) on the Base Keypad. Expediently, a keypad using only RSM is called "Plain Keypad (PK)", and a method of using RSM in a PK as is usual is referred to as "Simple Repeat Selection Method (SRSM)".

There is also a "Control Processing Method (CPM)", which includes an "Affix Control Processing Method (ACPM)" and a "Succession Control Processing Method (SCPM)". The affix control processing method is to enter affixed characters by a combination of affix control and basic character. The succession control processing method defines a group of characters assigned to a button as the relation among a representative character and its succession characters, and compounds the representative character and the priority associated with the representative character. For example, the user may enter as "А = Б+{vowel control} = Б + [*]" in FIG. 3.

The Affix Control Processing Method (ACPM) is in substance similar to the Succession Character Control Processing (SCPM). The latter is more general than the former, because a specific character group also includes affixed characters belonging to basic characters in a defined sequent order in SCPM. The ACPM has a close connection with the character group in shape because affixed characters are decomposed into an affix and a basic character, while SCPM is closely connected to sequent order and pronunciation.

The CPM are advantageous in that succession (or affixed) characters are not displayed on the keypad through the relation between a basic character and its succession (or affixed) characters to provide a simple arrangement of the keypad and enter character without ambiguity. A keypad that excludes succession characters is called "Succession Keypad (SK)" and one excluding affixed characters is called

"Abbreviated Keypad (AK)". Both SK and AK are referred to as "Concise Keypad (CK)". A keypad that displays all succession (or affixed) characters in contrast to CK is called "full keypad (FK)".

The full keypad also enables the entry of succession (or affixed) characters using CPM, while CK allows the user who memorizes the arrangement of the full keypad to perform the entry procedure on the full keypad. As described above, CK can be expanded to the FK and the user can expediently enter succession characters by CPM, which guarantees compatibility characteristic of the prior document.

The control processing method not only removes ambiguity but also simplifies the arrangement of the keypad by "hiding" the succession characters via the relation between a representative character and its succession characters as described in the prior documents. Expediently, this is called "Hiding Control Processing Method (HCPM)". The succession (or affixed) characters may be input by CPM even on the full keypad on which the succession (or affixed) characters are displayed, as described in the prior documents. Expediently, this is called "Non-hiding Control Processing Method (NCPM)".

In the keypad (expediently, "Consonant-Vowel Separated Keypad") which is configured by the buttons (expediently, "consonant buttons") on which the cosonant(s) is/are assigned and the buttons (expediently, "vowel buttons") on which the vowel(s) is/are assigned, applying Repeat Selection Method which is reflecting features of specific language can reduce ambiguity prominently. This method is called "LRRSM (Language Restricted Repeat Selection Method)" which is a kind of "LRIM (Language Restricted Input Method)".

The present invention is described on an extended line of prior documents (PCT/KR01/00180, PCT/KR01/00076, PCT/KR01/002267 and other documents) of applicant. The present invention especially provides examples of language which uses Kiril characters, such as Russian. Thus "RRRSM (Russian Restricted Repeat Selection Method)" is proposed for the explanation of "LRRSM (Language Restricted Repeat Selection Method)".

Hereinafter, the present invention will be described in detail by way of the following examples, which are not intended to limit the scope of the invention. First, the content of the prior documents will be explained by language as follows. It is apparent that although not specifically described, the content of the prior documents

related to a certain language is also applicable to other languages.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

1. Configuration of Russian

There are 33 alphabet characters in Russian, 10 vowels, 20 consonants, 1 semi-vowel (or 1 semi-consonant), and 2 sign characters (hard sign, soft sign).

The following displays the 33 Russian characters (capital and small) by dictionary order.

А Б В Г Д Е Ё Ж З И Й К Л М Н О П Р С Т У Ф Х Ц Ч Ш Щ Ъ Ы Ь Э Ю Я

а б в г д е ё ж з и й к л м н о п р с т у ф х ц ч ш щ ъ ы ь э ю я

There are voiced consonants and unvoiced consonants in 20 Russian consonants. Roman characters in parentheses represent pronunciation.

voiced consonants	п, т, к, ф, с, ш (p), (t), (k), (f), (s), (sh)	х, ц, ч, щ (x), (ts), (tsh),(sh?)	
unvoiced consonants	б, д, г, в, з, ж (b), (d), (g), (v), (z), (zh)		л, р, м, н (l), (r), (m), (n)

There are hand vowels and soft vowels in Russian vowels.

hand vowels	а (a), э (e), ы(i), о (o), у (u)
soft vowels	я (ja), е (je), и (i), ё (jo), ю(ju)

2. Applying Control Processing Method for inputting several characters

10 vowels and 20 consonants are regarded as basic characters and control processing method is applicable for inputting remaining 3 characters by regarding them as succeeding characters or affixed characters.

Some characters in Russian have likeness in pronunciation or shape. For example There is likeness between semi-vowel "Й" and vowel "И". Some examples which show likeness in pronunciation or shape are as follows.

1. case of vowel and semi-vowel : И- Й

2. case 1 of consonant and consonant : Ш- Щ - Ч- Ц

3. case 2 of consonant and consonant : Б- В

4. case of consonant and soft sign (i.e., soft consonant sign)/hard sing (i.e., hard consonant sign) : Б- Ъ- Ь, Б- Ъ, В- Ь...

5. case of vowel and soft sign/hard sign : Ы- Ь- Ъ, Ы- Ь,...

6. case of vowel and vowel : Е- Ё

7. case of consonant and vowel : З (consonant) - Э (vowel)

. . .

It is possible to classify 10 vowels and 20 consonants into 10 groups by 3 characters (i.e., 2 consonants and 1 vowel), and to assign 10 groups onto 10 numeral buttons from [1] through [0] on keypad. Thus it is possible using the representative consonants in each group for the memory of various codes and for the configuration of simple code.

It may natural applying control processing method in the first case of the above example, because the first case has a relationship between vowel and semi-vowel and there is obvious likeness in pronunciation and shape in the first case. On the other hand, It seems not natural applying control processing method in the seventh case, because seventh case has a relationship between consonant and vowel and there is no likeness in pronunciation in the seventh case. It may natural applying control processing method in the sixth case of the above example, because the sixth case has a relationship between vowels and there is obvious likeness in pronunciation and shape in the sixth case. But this embodiment dose not refine sixth case to assign 10 vowels in each numeral button.

It is possible to designate relationship between a basic character and an affixed character in the second case because there are likeness in pronunciation and shape. All of 4 characters in second case are consonants and there are likeness in pronunciation and shape. Thus there are several cases of relationship of basic consonant and affixed character, for example Ш- Щ, Ц- Щ, Ч- Ц, etc. Here, a succeeding character (i.e., an affixed character) can be related to some basic characters. For example "Ш- Щ" can be designated as "basic character - succeeding character (affixed character)" and at the same time "Ц- Щ" can be designated as "basic character - succeeding character (affixed character)". Or "Ц-

Ш - Щ" can also be designated as "basic character - 2nd succeeding character - 3rd succeeding character"

Next, the fourth case shows the relationship between consonant and soft sign/hard sign, and has likeness in shape. Thus a character can be designated as basic character and remaining character(s) can be designated as (an) affixed character(s). Various modifications are adaptable in this case like other examples. For example one of any characters among "Б", "Ъ", and "Ь" can be designated as a basic character and remaining characters can be designated as 2nd and 3rd succeeding characters. Or only hard sign can be designated as a succeeding character, for example, "Б (basic character) – Ъ (succeeding character)". In the fifth case, the vowel "Ы" is basic character and soft sign/hard sign is/are succeeding character(s). All of soft sign/hard sign can be designated as succeeding characters, or only one of soft sign/hard sign can be designated as a succeeding character (or an affixed character).

The following example shows the classification of 20 consonants into 10 groups by 2 characters. In this example, hard sign "Ъ" and soft sign "Ь" which dose not have phonetic value alone are regarded an affixed character (or a succeeding character) of consonant "Б" and vowel "Ы" respectively and is not marked on keypad. Just like soft sign "Ь", the vowel "Ы" means that the consonant after "Ы" is soft consonant. All of soft sign/hard sign can be designated as succeeding characters (affixed characters) of consonant "Б" (or vowel "Ы"), just like the above examples.

case 1 : Б В/ Г К/ Д Т/ Ж З/ Л Р/ М Н/ П Ф/ С Х/ Ц Ч/ Ш Щ/

case 2 : Б П/ Д Т/ Г К/ В Ф/ З С/ Ж Ш/ Л Р/ М Н/ Х Ц/ Ч Щ/

. . .

The above grouping (classification) is only example, other various modifications are available in the consideration of pronunciation. A character (one of any characters) in each group can be designated as representative character in the consideration of dictionary order, use frequency and other factors. The first case shows a example considering the likeness of pronunciation and shape, and the second case shows example considering pronunciation mainly. 10 vowels can be classified into 10 groups by 1 character and consonants and vowels can be classified into 10 groups by 3 characters (i.e. 2 consonants and 1 vowel). The grouping of

characters on the basis of similarity of pronunciation and assigning each group on the button provides naturality in the use of simple code stated in the prior document of applicant and minimizes ambiguity when Base Repeat Selection Method and Simple Repeat Selection Method is applied. Ambiguity is minimized because the characters similar to pronunciation appears in succession in a word is not frequent.

FIG. 1 shows the example that a consonant (one of any consonant) in each group is designated as representative character and is located on the base lattice element, and a vowel in each group is located on the lattice element next adjacent to base lattice element and remaining consonant is located on the lattice element next adjacent to base lattice element. Of course the vowel can be designated as representative character of each group and is located on the base lattice element and the consonants in each group are located on the remaining lattice elements.

In the FIG. 1, when part-whole selection method is applied for inputting the characters marked on the keypad, Б = [1]+[1], А = [1]+[2], В = [1]+[3]. When Base Repeat Selection Method is applied, the entries are given as Б = [1], А = [1]+[1], В = [1]+[1]+[1]. When part-whole selection method is applied, and [*] button is used for the control button, and the control is set to be selected after representative character, the entry is given as Й = И+{affix} = [4]+[5] + [*]. Under the same condition, the entry of hard sign "Ъ" is given as Ъ = Б+{affix} = Б+[*] = [1]+[1] + [*]. If soft sign Ь is regarded as a succeeding character (or an affixed character) of Ъ, the entry of Ь is given as Ь = Ъ+{affix} = Ъ+[*] + [*] = [1]+[1]+[*] + [*] (i.e., applying chain-type control processing method). When the soft sign and hard sign are considered as succeeding characters (or affixed characters), example of entry is applicable similarly.

The summary of the above example is that 3 characters except 10 basic vowels and 20 basic consonants are input by the Control Processing Method.

3. Applying Repeat Selection Method for inputting a basic consonant and a basic consonant on the same button

In the above example of grouping of 20 consonants, a consonant (one of any consonants) in each group can be extracted to be designated (can be designated on the basis of use frequency or other factors) as 10 representative characters (expediently, "10 representative consonants"), and 10 vowels can be designated as

"10 representative vowels". And then based on a pair of a representative consonant and a representative vowel on each button, Repeat Selection Method can be applied for the selection of representative consonants and representative vowels, and then 3 character (soft sign, hard sign and semi-consonant) and 10 consonants (expediently, "10 succeeding consonants") which is not designated as representative consonants among 20 consonants can be input by Control Processing Method. For the entry of 10 representative consonants and basic vowels, a representative consonant can be selected by pressing the corresponding button once (i.e., one stroke of corresponding button) on which the representative consonant is assigned, and a basic vowel can be selected by pressing corresponding button twice on which the basic vowel is assigned. It is possible to apply the opposite case for inputting representative consonants and basic vowel.

This presents that for some languages such as Korean and Hindi and other languages in which consonants and vowels alternately appear in a word, a pair of a representative consonant and a basic vowel is assigned to each button, and then repeat selection method can be applied with less ambiguity for the entry of a word.

When 10 representative characters are selected by pressing corresponding button once and basic vowels are input by pressing corresponding button twice, 10 succeeding consonants are input by control processing method, and the control is set to be selected by after representative character, on the FIG. 2, entries are given as Б = [1], А = [1]+[1], В = Б + {2nd} = [1] + [*]. When the hard sign "Ъ" is regarded as succeeding character of "Б", entries are given as Ъ = Б + {3rd} = [1] + [*]+[*], which is setting relationship "Б (basic consonant) – В (2nd succeeding consonant) – Ъ (3rd succeeding consonant)". Soft sign "Ь" and semi-vowel "Й" can be regarded as succeeding character and can be input by control processing method. For example, it is possible to set relationship "Б (basic consonant) – В (2nd succeeding consonant) – Ъ (3rd succeeding consonant) – Ь (4th succeeding consonant)" or "И (basic vowel) – Й (2nd succeeding character)".

4. Applying CPMERC(Control Processing Method Except Representative character)

In the case of Russian, like the example of Korean and Japanese of prior document of applicant, only the representative character is set to be selected by

pressing corresponding button once, and other characters are input by the control processing method. For example when [*] button is used as "consonant control button" and [#] button is used as "vowel control button", the entries of characters which are assigned on [2] button is given as Г = [2], Е = [2]+[*], К= [2]+[#]. The examples of the entries of characters are applicable on the keypad shown in FIG. 1, but to provide intuition, it is possible to allocate representative characters on the center of each button and to allocate consonants (succeeding consonants) on the left-side of representative characters and to allocate vowels on the right-side of representative characters. Refer to FIG. 3. The position of succeeding consonants and vowels can be changed. Or all of consonant control and vowel control can be assigned on a button ([*] button or [#] button) and Repeat Selection Method can be applied for the selection of controls.

In this case, the 3 characters which are not marked on keypad and are regarded as succeeding character (or affixed characters) can be input by one more press (i.e., using control button repeatedly) of the control button which is used for the input of a basic character of the succeeding character(or affixed character). For example, When В is representative character among the characters which is assigned on [1] button, soft sign "Ь" is regarded as the affixed character of character "Б", the entries are given as Б = В +{consonant control} = [1]+[*], and Ь = [1]+[*]+[*]. When Б is a representative character, the entries can be given as Б = [1], В = Б +{consonant control} = [1]+[*], and Ь = [1]+[*]+[*]. It is similar when "Ъ" is regarded as affixed character of "ы". When the hard sign "Ъ" is regarded as the affixed character of soft sign "Ь", the entry of "Ъ" can be given as Ъ = Ь +[*] = [1]+[*]+[*]+[*], with one more stroke of control button.

Here, 3 characters which are not marked on the keypad can be marked and the Control Processing Method can be applied for the entry of the 3 characters.

The method in which a representative character assigned on a button is selected by pressing corresponding button once (in other words, applying Repeat Selection Method only to the representative character) and other characters are input by the Control Processing Method is expediently called "CPMERC (Control Processing Method Except Representative Character). The character input method without any ambiguity, such as CPMERC, Part-Whole Selection Method, and so on, is expediently called "Deterministic Input (or Selection) Method"

On the contrary, the character input method with inherent ambiguity, such as Repeat Selection Method is expediently called "Non-deterministic Input (or Selection) Method".

5. Construction of Full Keypad

It is possible to classify 3 ~ 4 characters into groups, and to assign 4 characters on the first column button ([1], [4], [7] button) and third column button ([3], [6], [9] button) applying HSC (Horizontal Straight Combination) and VAC (Vertical Adjacent Combination), and to assign 3 characters on the second column button ([2], [5], [8] button). Thus 33 characters can be arranged on 3*3 keypad (i.e., [1] ~ [9] buttons) in a balanced manner.

When classifying characters with 3 ~ 4 characters, order of characters in dictionary, use frequency, pronunciation, etc can be considerations as described in the prior document of applicant. The simplest way is classifying characters by dictionary order like current standard English keypad. Pronunciation or shape can also be considered to group characters as described above.

One of example of classifying vowels into 9 groups on the basis of pronunciation or shape is as follows. Grouping vowel "Е" and "Ё" into one group, and semi-vowel "И" and "Й" into another group, and remaining 8 vowels into 8 groups by one vowel may form 9 groups. Next, it is possible to utilize and transform the above example of 10 groups of consonants in order to form 9 groups by classifying 22 consonants by 2 ~ 3 consonants. In the following example, the group "/С Х/" is eliminated in the above case 1 of 10 groups of consonants and "С" is added in group "/ШЩ/" and "Х" is added in group "/Ж З/". Various modifications are available in this example.

9 groups : В Б/ Г К/ Д Т/ Ж З С/ Л Р/ М Н/ П Ф/ Ц Ч/ Ш Щ Х/

FIG. 4 shows the example of assignment and allocation of 9 groups of consonants and 9 groups of vowels on keypad. Even though only FIG. 4 is proposed in present invention, it is obvious that various modifications are available in the range of present invention. The consonant which is similar in pronunciation and shape is arranged on an adjacent lattice element on each button in order to improve

location identification of characters and in order to show a different arrangement of FIG. 1. But it is possible to arrange in the order of "consonant – vowel – consonant" like the example of other languages of prior document of applicant. The vowel can also be allocated on the base lattice element.

When Part-Whole Selection Method is applied on FIG. 4, the entries are given as В = [1]+[1], Б = [1]+[2], Э = [1]+[3], ъ = [1]+[4].

EFFECT OF THE INVENTION

Present invention provides convenient character input from keypad.

WHAT IS CLAIMED IS:

1. A method for recognizing alphabet characters input on a keypad, some characters are recognized by the Control Processing Method on the basis of similarity of pronunciation or shape of Russian alphabet.

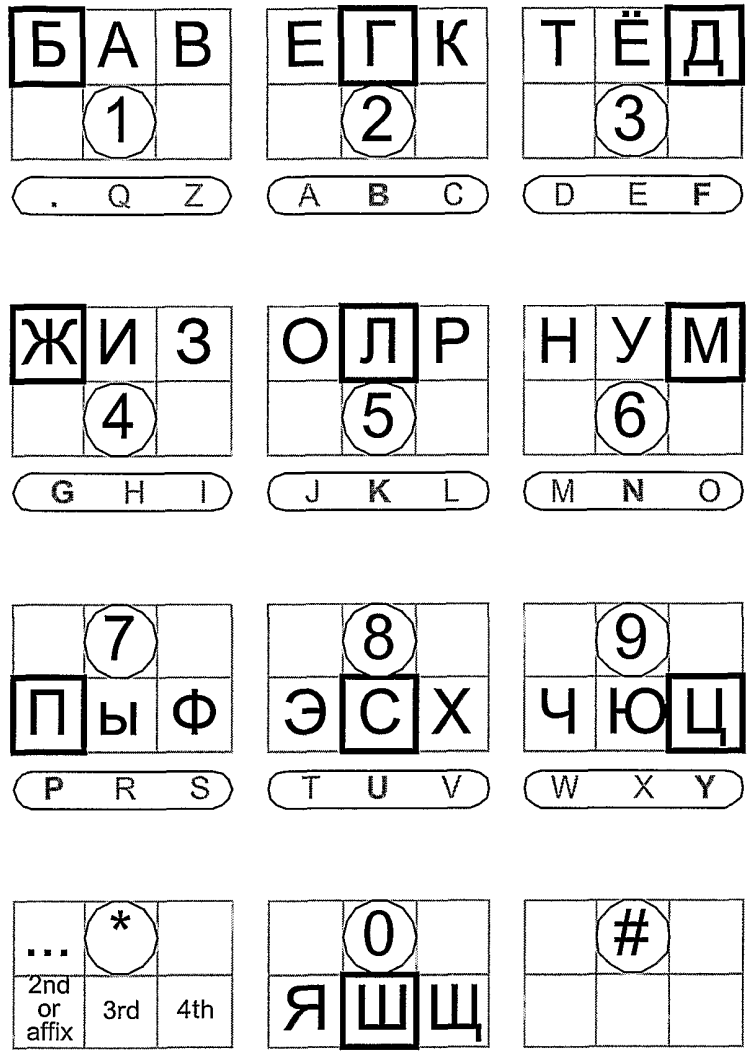
2. A method for recognizing alphabet characters input on a keypad, hard sign, soft sign and semi-consonant in Russian are recognized by Control Processing Method.

3. A method for recognizing alphabet characters input on a keypad, 10 consonants are designated as representative characters (i.e., 10 representative consonants) out of Russian consonants, and characters are recognized by Control Processing Method Except Representative Character.

4. A method for recognizing alphabet characters input on a keypad, 10 consonants are designated as representative characters (10 representative consonants) out of Russian consonants, and 10 representative consonants and 10 basic vowels are recognized by the Repeat Selection Method.

5. The method of claim 4, remaining characters which are regarded as succeeding characters of 10 representative consonants or 10 basic vowels are recoginzed by Control Processing Method.

FIG. 1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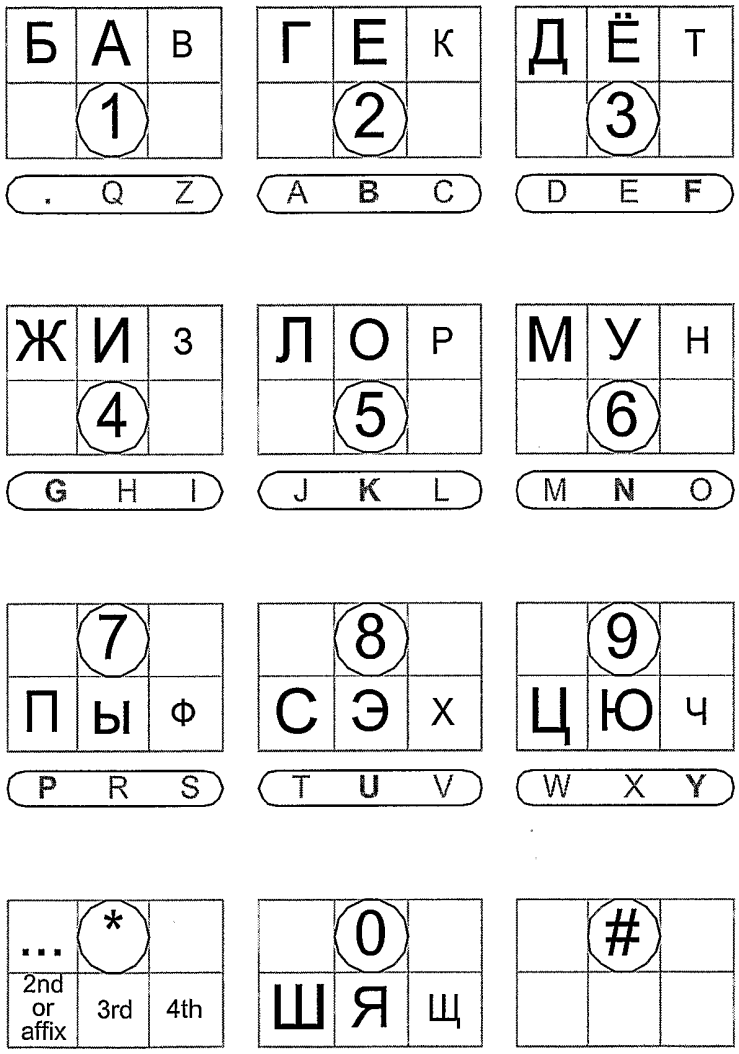
1
. Q Z
Е Г К
2
A B C
Т Ё Д
3
D E F
Ж И З
4
G H I
О Л Р
5
J K L
Н У М
6
M N O
7
П ы Ф
P R S
8
Э С Х
T U V
9
Ч Ю Ц
W X Y
...
*
2nd or affix
3rd
4th
0
Я Ш Щ
#

FIG. 2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. Q Z
Г Е К
2
A B C
Д Ё Т
3
D E F
Ж И З
4
G H I
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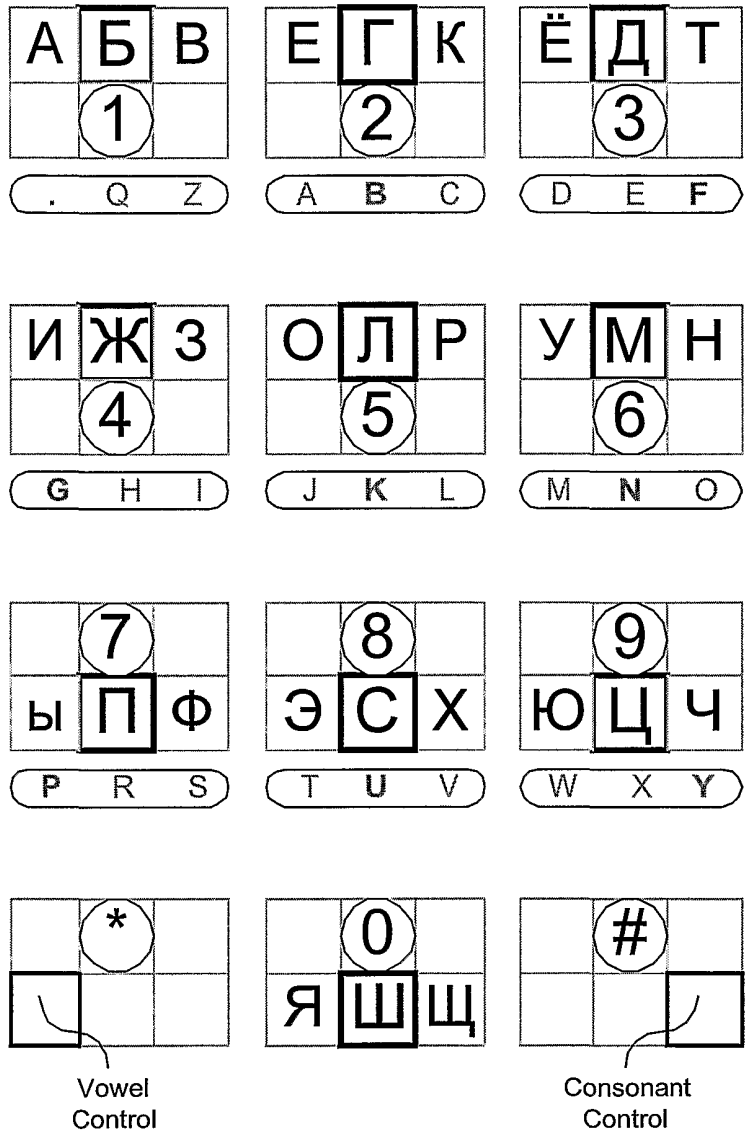
5
J K L
М У Н
6
M N O
7
П Ы Ф
P R S
8
С Э Х
T U V
9
Ц Ю Ч
W X Y
...
*
2nd or affix
3rd
4th
0
Ш Я Щ
#

FIG. 3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1
. Q Z
Е Г К
2
A B C
Ё Д Т
3
D E F
И Ж З
4
G H I
О Л Р
5
J K L
У М Н
6
M N O
7
ы П Ф
P R S
8
Э С Х
T U V
9
Ю Ц Ч
W X Y
*
Vowel Control
0
Я Ш Щ
#
Consonant Control

FIG. 4


В Б Э
ъ 1
. Q Z
К Г А
2
A B C
И Т Д
3 Й
D E F
Ж З О
Х 4
G H I
Р Л У
5
J K L
ы Н М
6 ь
M N O
Ё 7
П Ф Е
P R S
8
Ч Ц Ю
T U V
9 С
Я Щ Ш
W X Y
*
0
#

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR02/00247

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04M 1/23

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)

IPC7 H04M 1/23, G06F 3/02, G06F 3/023

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

KR: IPC as above

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

JAPIO, USPTO, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 1999-73809 A (Samsung electronics co.) 05 October 1999 See the whole document	1-5
A	KR 2000-42790 A (Samsung electronics co.) 15 July 2000 See the whole document	1-5
A	US 5,392,338 A (Danish International, Inc.) 21 Feb. 1995 See the whole document	1-5
A	US 6,016,142 A (Trimble Navigation Limited) 18 Jan. 2000 See the whole document	1-5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevence

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 MAY 2002 (03.05.2002)	03 MAY 2002 (03.05.2002)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 1999-73809	05-10-1999	NONE	
KR 2000-42790	15-07-2000	NONE	
US 5,392,338	21-02-1995	NONE	
US 6,016,142	18-01-2000	NONE	