

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 May 2003 (01.05.2003)

PCT

(10) International Publication Number
WO 03/036795 A1

(51) International Patent Classification⁷: **H03K 17/94**,
H04M 1/00, B41J 5/08

(21) International Application Number: PCT/US02/00734

(22) International Filing Date: 11 January 2002 (11.01.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/682,796 19 October 2001 (19.10.2001) US

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

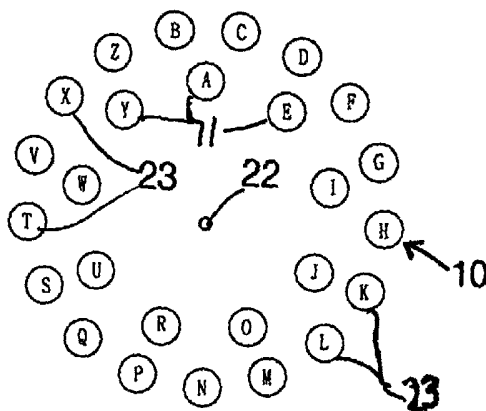
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **ROUNDED KEYPAD**



(57) **Abstract:** A rounded keypad device (10) capable of being operated with only one finger comprises the invention. The keypad device (10) includes a keypad having keys (11,23), which are positioned within a movement radius of the finger of an operator and have the English letters required for forming desired words or numbers or functions to be executed. The keys are arranged in a high using-frequency key section involving first set keys (11) among the keys of the keypad, the first keys (11) being assigned to English letters and functions that are relatively frequently used when inputting letters and function executing instructions. The first keys (11) being positioned in a round configuration which is defined around the eye's focal point (22) on the keypad and in a minimum movement radius of the finger of the operator, along a first virtual circle. The keypad also includes a second low-using frequency key section (23) comprising remaining second set of keys among the keys of the keypad, the second keys (23) being assigned to English letters and functions that are relatively infrequently used when inputting letters and function executing instructions. The second set of keys (23) is arranged in a rounded configuration concentric with the rounded configuration of the first set of keys (11) and having a radius larger than the minimum movement radius.



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ROUNDED KEYPAD**DETAILED DESCRIPTION OF THE INVENTION**

Reference will now be made in greater detail to preferred embodiments of the present invention. In the drawings, the same or similar elements are denoted by the same reference
5 numerals even though they are depicted in different drawings. Also, while specific items such as a circuit elements or the like are given in the following description, a person skilled in the art will readily recognize that they are rendered to facilitate understanding of a concept of the present invention and the present invention can be embodied not just by using the specific items. In the following description of the present invention, a detailed explanation of known
10 functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

FIG. 1 represents a prior art keyboard 30 for a computer; FIG. 2 represents a prior art keyboard 40 for a cellular phone or similar instrument; FIG. 3 is a plan view illustrating the key arrangement of a rounded keypad device 10 in accordance with a first embodiment of the
15 present invention.

Referring to FIG. 3, the rounded keypad device 10 according to this first embodiment of the present invention has twenty-six keys 11 which correspond to letters of the English alphabet. The twenty-six keys 11 define a circular arrangement as can be readily seen from FIG. 3. The twenty-six keys 11 which are arranged in the aforesaid circular layout are
20 positioned within a movement radius in which an operator's thumb for pressing keys 11 upon inputting English letters can be moved.

Describing in detail the arrangement of the twenty-six keys 11 which are part of the English alphabet, keys 11 of high using-frequency, that is, are assigned to letters which are frequently used are positioned around an eye's focal point within a minimum circular
25 movement radius in which the operating finger of the operator can be moved. The eye's

focal point 22 designates a first recognized center portion of a keypad 10 in the case that the operator views the keypad 10 for input of letters. With this feature, the operator can easily recognize and remember the key arrangement, and at the same time, the key arrangement can effectively satisfy the movement of the operating finger, generally the thumb.

5 Letters of high using-frequency can comprise vowels A, E, I O, and U, as well as consonants, W, and Y. In addition to these vowels and letters, other keys can be included with the vowels of high using-frequency. For example, even though J and R are consonants, they may also be arranged in such a way as to be included with the keys of high using-frequency.

10 Other keys of low using-frequency, that is, assigned to letters which are relatively infrequently used when inputting English letters, are arranged in a concentric circle outward of the keys of high using-frequency. That is to say, the keys 23 of low using-frequency are assigned to letters which are relatively infrequently used in comparison with the keys of high using-frequency. Letters of low using-frequency can comprise consonants including B, C,K
15 D, F, G, H, K, L, M, N, P, Q, S, T, V, X, and Z. It is to be readily understood that since the consonants J and R as well as W and Y are already included in the keys 23 of high using-frequency, they are not included in the keys 11 of low using-frequency.

 However, the above-described key arrangement merely exemplifies a preferred embodiment of the present invention and must not be understood to restrict the scope of the
20 present invention. Therefore, the present invention can be embodied in a manner such that the key arrangement is varied in conformity with each different situation.

 The keys 23 of low using-frequency are also positioned around the eye's focal point on the keypad within the movement radius in which the operating thumb of the operator can be moved to define a circular arrangement. However, as described above, the keys 23 of low
25 using-frequency are arranged outward of the keys 11 of high using-frequency.

The key arrangement which is proposed by the present invention is designed to enable the operator to more quickly press the letters of high using-frequency. In addition, this key arrangement was proposed in consideration of the fact that a moving characteristic of the operating finger or fingers tracks a circular path while implementing key input operations.

5 Further, it is to be noted that the letters are continuously arranged in their alphabetical order in order to improve key recognizability upon performing key input operations. In other words, the alphabet keys are successively arranged in their alphabetical order along a clockwise or counterclockwise direction.

10 On the other hand, in the case that the keypad device 10 according to the first embodiment of the present invention is actually applied to a product, when it is required to input special symbols, numerals and functions executing instructions, in addition to the alphabet keys, corresponding keys can be arranged in proper places and the process of arranging the corresponding keys can be accomplished by an adequate key co-assignment.

15 As a consequence, when arranging the keys 11 on the keypad device 10 according to the first embodiment of the present invention, the keys 11 which are assigned to the vowels and consonants which are relatively frequently used upon inputting English letters, are positioned around the eye's focal point on the keypad within the minimum movement radius in which the operating finger of the operator can be moved, in such a way as to define a circular arrangement. And, the keys 23 which are assigned to the consonants which are
20 relatively infrequently used upon inputting English letters are positioned around the eye's focal point on the keypad 10, within a maximum movement radius in which the operating finger of the operator can be moved and outward of the keys 11 of high using-frequency, in such a way as to define a second circular arrangement.

While not separately shown in the drawing, when it is necessary to input letters belonging to Latin languages, the above described key arrangement can be adopted as is. Further, the individual keys 11 and 23 may be of any size or physical form..

FIG. 4 is a plan view illustrating a key arrangement of a rounded keypad device 60 for
5 input of numerals/English letters in accordance with a second embodiment of the present invention. This keypad device shown in FIG. 4 can be used in a bank or a financial agency where numerals will be frequently inputted.

The keypad device according to this second embodiment of the present invention has keys 25 the number of which at least corresponds to the sum of the number of English letters
10 and the numerals 0 through 9. The keys define a circular arrangement as can be readily seen from FIG 4. The keys 25 are positioned within a movement radius in which an operator's finger for pressing keys can be moved.

In this second embodiment of the present invention, keys 25 of high using-frequency are assigned to numerals and thereby serve as numeral keys. In addition, keys 26 of low
15 using-frequency are assigned to English letters and thereby serve as alphabet keys.

The keys 25 of high using-frequency, that is, assigned to the numerals, are positioned around the eye's focal point 27 on a keypad 60 within a minimum movement radius in which the operating finger of the operator can be moved, in such a way as to define a circular arrangement. The keys 26 of low using-frequency assigned to the English letters, are
20 positioned outward of the keys 25 of high using-frequency within the movement radius in which the operating finger of the operator moves.

In the case of the second embodiment of the present invention, depending upon a choice of the operator, the keys 25 of high using frequency which are assigned to the numerals, can also be assigned to vowels of the English alphabet which are relatively

frequently used. This change can occur when the keypad device 60 has an input mode conversion function between the alphabet and the numerals.

In another feature of the present invention, it is also possible for the keys 26 of low using-frequency to be assigned to the numerals. In this case, in the key arrangement shown in FIG. 3, the keys 23 of low using-frequency which are assigned to consonants which are relatively infrequently used when inputting English letters, can also be assigned to the numerals. This change can occur when the keypad device 60 has an input mode conversion function between the consonants and the numerals.

FIGS. 5a-5b are plan views illustrating key arrangements of a rounded keypad device 70 for input of English letters function executing instructions in accordance with a third embodiment of the present invention. This keypad device shown in FIGS. 5a-5b can be used when function execution is frequently required for example, *SHIFT*, *ENTER*, *DELETE*, *BACK* and *SPACE*.

The keypad device according to this third embodiment of the present invention has keys 28 and 29 the number of which corresponds to the sum of the number of English letters and the number of functions to be executed. The keys 28, 29 and function keys 31 define a circular arrangement as can be readily seen from FIGS. 5a-5b. The keys 28, 29 and 31 which are thus arranged are positioned within a movement radius in which an operator's finger for pressing keys can be moved.

In this third embodiment of the present invention, keys 29 of high using-frequency are assigned to functions and thereby serve as function keys. In addition, keys 28 of low using-frequency are assigned to English letters and thereby serve as alphabet keys.

The keys 31 of high using-frequency, that are assigned to functions, are positioned in a circular arrangement around an eye's focal point on a keypad 70 within a minimum movement radius in which the operating thumb of the operator can be moved. The keys 28 of

low using-frequency assigned to particular English letters are positioned outward of the keys 29 of high using frequency within the movement radius in which the operating finger of the operator can be moved.

On the other hand, it is to be readily understood that the key arrangements shown in FIGS. 5a-5b are defined by adding function keys 31 to the key arrangement according to the first embodiment of the present invention.

Namely, the key arrangement which is proposed by this embodiment of the present invention is to configure a keypad device 70 which is most suitable for letter input and function execution, and is defined by adding the function keys to the key arrangement shown in FIG. 3, including the keys of high using-frequency and low using-frequency.

The functions to which the keys 29 of high using-frequency are assigned, can include *ENTER*, *SPACE*, *DELETE*, a direction changing function, *MODE*, *LOCK*, etc. which are relatively frequently used. The function keys shown in FIG. 5a are respectively assigned to *ENTER*, *SPACE*, *DELETE*, *MODE* and *LOCK*, and the function keys shown in FIG. 5b are further assigned to the direct changing function in addition to the functions given in FIG. 5a. In the meanwhile, the function keys 29 are positioned in place inward of the round type area of the high using frequency keys, about a virtual circle which has a radius smaller than the minimum movement radius of the high using frequency keys.

When it is required to input special symbols, etc., in addition to the function keys and the alphabet keys, such keys can be arranged using the same principle as mentioned above, depending upon its using frequency. In this case, the keypad device 70 according to this embodiment of the present invention is similar to the key arrangement having numerals keys.

FIGS. 6a and 6b are perspective views illustrating embodiments wherein the rounded keypad devices 75 and 80 according to the present invention actually serve as a key input device.

The keypad device according to the present invention is embodied in a case 72, 82 which can be used by the operator while being grasped by the hand, and the keys 73 which constitute each of the keypad devices 75 and 80 according to the above-described embodiments, are arranged on a surface 71, 81, of the case. The keys 73, which are arranged
5 in this way, are respectively fitted into key grooves that are defined on the upper surface of the case 72 and 82.

The key layout on case 72 and 82 generally has a rounded configuration. Of course, it is to be noted that the case 72 and 82 and key layout can be formed to have a variety of configurations such as an elliptical contour, etc. as occasion demands. The case 72 and 82
10 can delimit an upper part of a conventionally used computer mouse or can serve as a keypad of a portable radiotelephone.

The rounded keypad device 70, 80 according to the present invention provides advantages in that, since the rounded keypad device or thumb pad is capable of being operated with only one finger for an operator input of desired characters, numerals and
15 function executing instructions can be more quickly implemented.

Also, the rounded keypad device provides quickness and convenience while inputting information, of the same level as those of a computer keyboard and also provide the same accuracy in a reduced size format such as portable radiotelephones or the like.

Referring now to FIG. 7a of the drawings, the invention relates to a rounded keypad
20 10 having a plurality of buttons, keys, or the like 11 and 23 to input information into various systems. The concentric array of keys 11 and 23 on the rounded keypad 10 provides the fastest and easiest method of inputting of information compared to the conventional keyboard. FIG. 7a discloses an alphabet mode arrangement actuated by an English alphabet (Mode 1) switch 86. FIG. 7b discloses a symbol/number mode arrangement activated by

keypad configurations shown in FIGS. 8a-8h are an important aspect of the invention and can be used with any type keypad device.

While the invention has been explained by a detailed description of certain specific embodiments, it is understood that various modifications and substitutions can be made in
5 any of them within the scope of the appended claims, which are intended also to include equivalents of such embodiments.

CROSS-REFERENCE TO RELATED APPLICATIONS

None

**STATEMENT REGARDING FEDERALLY SPONSORED
RESEARCH OR DEVELOPMENT**

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Research and development of the present invention and application have not been federally sponsored, and no rights are given under any Federal program.

REFERENCE TO A MICROFICHE APPENDIX

Not applicable.

10

BACKGROUND OF THE INVENTION**FIELD OF THE INVENTION**

This invention relates to a device for inputting information into systems and particularly to a rounded keypad for inputting directions, numbers, letters, etc. into equipment such as computers, telephones, etc., using only one or both thumbs. The concentric array of keys arranged in a clockwise order provides the easiest, fastest way of inputting data. The geometric arrangement of the keys is an important feature of the invention.

**DESCRIPTION OF THE RELATED ART INCLUDING INFORMATION
DISCLOSED UNDER 37 CFR §§ 1.97-1.98**

20

Known data input means and function execution means usually comprise a conventional keyboard used with computers and the like or the limited arrangements appearing on calculators, portable radio telephones, electronic memo books, and the like. The present invention while utilizing available technology provides a unique push button rounded keypad, which is smaller and easier to operate than the prior art. The rounded keypad permits rapid input of data into computers, etc., and particularly hand held portable devices using one or both thumbs.

25

A keyboard of a computer system has a conventional key arrangement shown in FIG. 1 and is configured in a manner such that a user can quickly input desired letters, numerals,

and so forth and can quickly execute required functions. However, the keyboard of a computer system is not able to properly serve as portable information input means where it is carried by the user. That is to say, since the computer keyboard has a relatively large size, it cannot readily be applied to a rounded portable device such as a portable radiotelephone, a
5 Personal Digital Assistant (PDA) and the like. As a consequence, notwithstanding convenience of data entry, it is not possible to adopt the keyboard of a computer system in its present format as information input means for a rounded portable device.

To solve these problems, various rounded keypad devices have been proposed in the art as information input means which can be properly used in a portable radiotelephone and
10 other rounded keypad devices. A typical example of a rounded keypad device is the keypad device of a portable radiotelephone, which has the key arrangement shown in FIG. 2.

However, while the conventional keypad device of a portable radiotelephone has certain advantages, since it can be mounted in a narrow space and a user can input desired information while carrying it, the device suffers from defects in terms of efficiency in that
15 inputting information is slow. In other words, although the conventional keypad device can be used to some degree as a rounded portable device because of size, it cannot provide sufficient inputting of information similar to the keyboard of the computer system.

Keypads having a diversity of shapes, which can serve as miniaturized information input devices, have been described in the prior art. However, since most of these keypads are
20 manufactured with emphasis on miniaturization, they are not satisfactory from the standpoint of an operator's convenience in inputting information.

The prior art includes Patent 5,999,827 to Sudo, et al which discloses a communication terminal apparatus having a main body, a selection operation unit, an operation-inputting unit, a display unit, and a controller. The operation-inputting unit is

provided on the main body and changes functions based on the mode selected by the selection operation unit. A conventional calculator type keyboard is used.

Des. Patent 393,262 to Shimatsu, et al discloses a portable information storing and retrieving device wherein the controls are in a circular array about a center key.

5 Des. Patent 413,896 to Frye, et al discloses a key array for a handset wherein the keys are of different shaped configurations.

Patent 4,211,497 to Montgomery discloses a data input system wherein the keys of each keyboard are arranged such that the most often used keys are situated in the most readily accessible locations with respect to the fingers of the operator.

10 Patent 4,849,732 to Dolenc discloses a one hand key shell for operation by a single human hand with specific keys operable by specific fingers. The control keys may be used to manipulate text or other information entered into the attached device and operated by the thumb. The keyboard is divided into sections with five sets of keys.

Patent 5,059,048 to Sirkin discloses a keyboard for use with one hand having
15 curvilinear and linear rows of keys. The keyboard contains at least four vertical columns of keys, at least six horizontal rows of keys, at least 26 data entry keys, at least 11 multiple entry keys and at least 3 command keys.

Patent 5,479,163 to Samuelwicz discloses a circular tactile keypad for a controller of an electrical device. The keys are arranged in a clock face pattern with key findings ridges
20 emanating from the circular center.

Patent 5,332,322 to Gambaro discloses a handheld thumb actuated ergonomic keyboard input device for use with an electronic system such as a portable telephone. Only slight gestural movements of the thumb are required to actuate the limited number of individual keys on the keyboard.

Patent 5,500,643 to Grant discloses a one hand prehensile keyboard of the QWERTY type wherein the rows of keys are angled away from the top and bottom parallel axes of the keyboard so as to eliminate ulnar-deviation of the actuating hand.

None of the foregoing prior art patents discloses or suggests the rounded keypad
5 keyboard proposed by applicant that is adaptable for various languages and is unusually flexible nor do they disclose the geometry of the keypad proposed by applicant.

SUMMARY OF THE INVENTION

This invention relates to a rounded keypad wherein a plurality of control keys are mounted in a circular or other selected configuration to be operated by one or both thumbs.
10 The keys include a first group of high using frequency keys corresponding to letters of the English alphabet positioned in a circular type or rounded arrangement, which is defined by an eye's focal point on the keypad and by a minimum movement radius of the finger of the operator. A second group of low frequency keys is arranged concentrically about the first group. The invention also pertains to the arrangement of the keys per se on a keypad.

15 The keys may involve an alphabet mode arrangement activated by an English alphabet mode switch (Mode 1) or a symbol/number mode arrangement mode switch (Mode 2). Mode 3 involves a foreign language arrangement activated by a foreign language mode switch.

The rounded keypad also includes functions 1-3 with appropriate function keys
20 generally located in the center of the control keys. The function keys provide directions to the device receiving input from the rounded keypad such as "enter", "delete", "shift", etc.

Accordingly, the present invention represents an effort to solve the problems occurring in the related prior art, and an object of the present invention is to provide a rounded keypad device which is capable of being operated with only one finger, whereby

input operations of desired characters, numerals and function executing instructions can be quickly implemented.

Another object of this invention is to provide a miniaturized rounded keypad device which provides quickness and convenience in inputting information at the same level as a
5 keyboard of a computer system while applied to a portable radiotelephone or the like.

Still another object of this invention is to provide a rounded keypad device, which allows a user to easily recognize and remember a key arrangement and is configured to facilitate movement of an operating finger so that key input operations can be performed in a more convenient and quick manner.

10 A further object of this invention is to provide a new and improved is to provide a new and improved keypad having a unique geometric arrangement of keys.

In order to achieve the above objects, according to one aspect of the invention, there is provided a rounded keypad device capable of being operated with only one finger comprising: a keypad having keys which are positioned within a movement radius of the
15 finger of an operator and correspond to the letters of the English alphabet required for instructions and the number of functions to be executed. A high using-frequency key section comprises a first group of arranged keys among the keys of the keypad, the first keys being assigned to English letters and functions which are relatively frequently used when inputting letters and function executing instructions. The first keys are positioned in a circle type
20 arrangement which is defined by an eye's focal point on the keypad and by a minimum movement radius of the finger of the operator, along a first virtual circle. A low using-frequency second key section comprises the remaining keys among the keys of the keypad, the second keys assigned to English letters and function which are being relatively infrequently used when inputting letters and functions executing instructions. The second
25 keys are positioned outward of the circular area of the high using frequency key section,

along a second virtual concentric circle and have a radius larger than the minimum movement radius.

According to another aspect of the invention, the first keys involve a high using frequency key section and substantially comprise vowel keys, which are relatively frequently
5 used when inputting letters.

According to another aspect of the invention, the second keys constitute a low using-frequency key section and substantially comprise the consonant keys which are relatively infrequently used when inputting letters.

According to another aspect of the invention, each of the high and low using
10 frequency key sections defines a virtually elliptical or other rounded arrangement about a central point.

According to another aspect of the present invention, the rounded keypad device further comprises a function key section comprising one or more keys in a third group, said keys being assigned to functions which are relatively frequently used when inputting function
15 executing instructions. The third keys are positioned inward of the round or circular type area of the high using frequency key section, forming a third virtual circle which is concentric with the first and second virtual circles and has a radius smaller than the minimum movement radius.

According to still another aspect of the present invention, the first keys, which
20 constitute the high using-frequency key section, include numerical keys; and the second keys that constitute the low using-frequency key section, comprise alphabetical keys or other keyboard symbols.

According to still another aspect of the present invention, other international language character keys are added to the first group of keys and to the second group of keys.

According to still another aspect of the present invention, the whole set of non-English characters (such as Cyrillic) are mapped to the first and the second group of keys as in some U.S.-international keyboard formats.

According to yet still another aspect of the present invention, each of the high and low using-frequency key sections defines or all other possible rounded arrangements such as a virtual elliptical arrangement.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects and other features and advantages of the present invention will become more apparent after a reading of the following detailed description when taken in conjunction with the drawings, in which:

FIG. 1 is a plan view illustrating a prior art key arrangement of a computer keyboard which is employed for input of characters, numerals, symbols and function executing instructions;

FIG. 2 is a plan view illustrating a prior art key arrangement for a rounded keypad for a portable radiotelephone, which is employed as character input means;

FIG. 3 is a plan view illustrating the key arrangement of a rounded keypad device in accordance with a first embodiment of the present invention;

FIG. 4 is a plan view illustrating the key arrangement of a rounded keypad device for input of numerals/other keyboard symbols in accordance with a second embodiment of the present invention;

FIGS. 5a-5b are plan views illustrating key arrangements of a rounded keypad device for input of English letters/functions executing instructions in accordance with a third embodiment of the present invention;

FIGS. 6a-6b are perspective views illustrating different embodiments wherein the rounded keypad device according to the present invention actually serves as a key input device;

5 FIG. 7a discloses an alphabet mode arrangement actuated by an English alphabet (Mode 1) switch;

FIG. 7b discloses a symbol/number mode arrangement activated by a symbol/number switch (Mode 2);

FIG. 7c discloses a symbol/number mode arrangement activated by a symbol/number switch (Mode 3);

10 FIG. 7d discloses a pointer mode version of the invention activated by a pointer switch;

FIG. 7e discloses a page turning mode embodiment activated by a page switch;

FIG. 7f discloses phone mode embodiment activated by a phone switch;

15 FIG. 7g discloses right and left click buttons in the environment of the present invention;

FIG. 8a discloses an elliptical arrangement of keys;

FIG. 8b discloses a square arrangement of keys;

FIG. 8c discloses a hexagonal arrangement of keys;

FIG. 8d discloses an rectangular arrangement of keys;

20 FIG. 8e discloses a rounded corner arrangement of keys with 9 optional keys;

FIG. 8f discloses a circular arrangement of keys with 7 optional keys;

FIG. 8g discloses a circular arrangement of keys in alphabetical order and,

FIG. 8h discloses an arrangement of consonant keys in alphabetical order and an adjacent array of vowel keys.

25

CLAIMS

What is claimed is:

1. A keypad for inputting data to a device capable of being operated with only one finger comprising:

5 a plurality of keys positioned within a movement radius of the finger of an operator and corresponding at least to the sum of the number of English letters required for inputting desired words and the instructions of functions to be executed;

a high using-frequency key section comprising a first set of keys among the keys of the keypad, the first set of keys being assigned to English letters and functions
10 which are relatively frequently used when inputting letters and function executing instructions, the first keys being positioned in a round type configuration which is defined around an eye's focal point on the keypad and a minimum movement radius of the finger of the operator, along a first virtual circle; and

a low using-frequency key section comprising a second set of keys among the
15 keys of the keypad, the second set of keys being assigned to English letters and functions which are relatively infrequently used when inputting letters and function executing instructions, the second set of keys being positioned outward of the round type configuration of the high using-frequency key section, around a second virtual circle which is concentric with the first virtual circle and has a radius larger than the
20 minimum movement radius of the operator's finger.

2. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the first keys that comprise the high using-frequency key section, are substantially vowel keys that are relatively frequently used when inputting letters.

3. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the second set of keys that constitute the low using-frequency key section, comprise consonant keys that are relatively infrequently used when inputting letters.

5 4. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 further including:

a function key section constituted by one or more third keys;

function keys positioned anywhere within a movement radius of the finger of an operator; said keys comprising a third set of keys and;

10 the third keys being assigned to functions which are relatively frequently used when inputting function executing instructions.

5. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 further including:

15 a plurality of function keys positioned on the keypad device anywhere within a movement radius of the operating finger.

6. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 further including:

20 a function key section comprising one or more keys, the function keys being assigned to functions which are relatively frequently used when inputting function executing instructions; and,

the function keys being positioned inward of the round type area of the high using-frequency key section, in a third virtual circle which is concentric with the first and second virtual circles and has a radius smaller than the minimum movement radius.

7. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the first set of keys which constitute the high using-frequency key section, comprise numerical keys; and,

5 the second set of keys that constitute the low using-frequency key section, comprise other keyboard symbol keys or signs.

8. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

10 the first set of keys and the second set of keys permit mapping of any international alphabets or symbols.

9. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

each of the high and low using-frequency key sections define any possible virtually rounded arrangement.

15 10. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the first and second sets of keys comprise any size or physical form.

11. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

20 the first set of keys and the second set of keys are positioned in an alpha/numerical clockwise arrangement with the second set of keys being positioned concentrically and at a predetermined distance from the first set of keys.

12. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the keys of the first set and the keys of the second set alternate letter-wise in respective concentric circles.

13. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

5 the keypad device is operated with one thumb.

14. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the keypad device is operated with both thumbs to facilitate speed of operation.

10 15. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

the first set of keys and the second set of keys are positioned in an alpha/numerical clockwise arrangement with respect to each other with the second set of keys being positioned concentrically and at a predetermined distance from the first set of keys, said keys being substantially in alpha/numerical order in the first and second set of keys.

16. A keypad for inputting data to a device capable of being operated with only one finger in accordance with Claim 1 wherein:

20 the keys of the first and second set alternate and continue clockwise as close to alphabetical order as possible in respective concentric circles.

17. A keypad comprising:

a first set of keys comprising a plurality of individual keys having a center coinciding with the eye's focal point and having a predetermined rounded configuration, said keys being arranged in a predetermined order with thing the rounded configuration; and,

25

a second set of keys comprising a plurality of individual keys surrounding externally and concentrically the rounded configuration of the first set of keys being arranged in a predetermined order.

18. A keypad in accordance with Claim 17 wherein:

5 the first set of keys comprises keys substantially frequently used in input and the second set of keys comprises keys being less frequently used in input.

19. A keypad in accordance with Claim 17 wherein:

 the first and second set of keys each comprise a predetermined arrangement of keys positioned alphabetically in a clockwise pattern.

10 20. A keypad in accordance with Claim 18 further including:

 an arrangement of keys mounted on said keypad for executing predetermined functions.

21. A keypad in accordance with Claim 18 wherein:

15 either first set of keys or the second sets of keys comprise keys for inputting numeric characters.

22. A keypad in accordance with Claim 18 wherein:

 the first and second set of keys comprise keys for inputting predetermined international language characters.

23. A keypad in accordance with Claim 22 wherein:

20 the first set of keys comprise substantially vowel characters and the second set of keys comprise only consonants.

24. A keypad in accordance with Claim 22 wherein:

25 both the first and the second set of keys comprise consonant characters arranged in an alphabetically clockwise pattern, and vowel characters arranged in a different predetermined pattern adjacent to the clockwise pattern.

25. A keypad in accordance with Claim 17 further including:

a set of keys for selectively inputting different case characters and functions.

26. A keypad in accordance with Claim 17 wherein:

5 a third set of keys for selectively inputting different case characters and functions is positioned internally within the rounded first set of keys and near the eye's focal point.

27. A keypad in accordance with Claim 17 further including:

10 a plurality of keys for executing predetermined functions said keys being positioned within the rounded configuration of the first and second set of keys in a specific portion thereof.

28. A keypad in accordance with Claim 17 further including:

a plurality of keys for inputting predetermined symbol characters, said keys being positioned within the rounded configuration of the first and second set of keys in a specific portion thereof.

15 29. A keypad in accordance with Claim 17 further including:

a space key mounted on the keypad within the first set of keys.

30. A keypad in accordance with Claim 17 wherein:

the first set of keys comprise keys less frequently used in input and the second set of keys comprise keys used substantially more frequently in input.

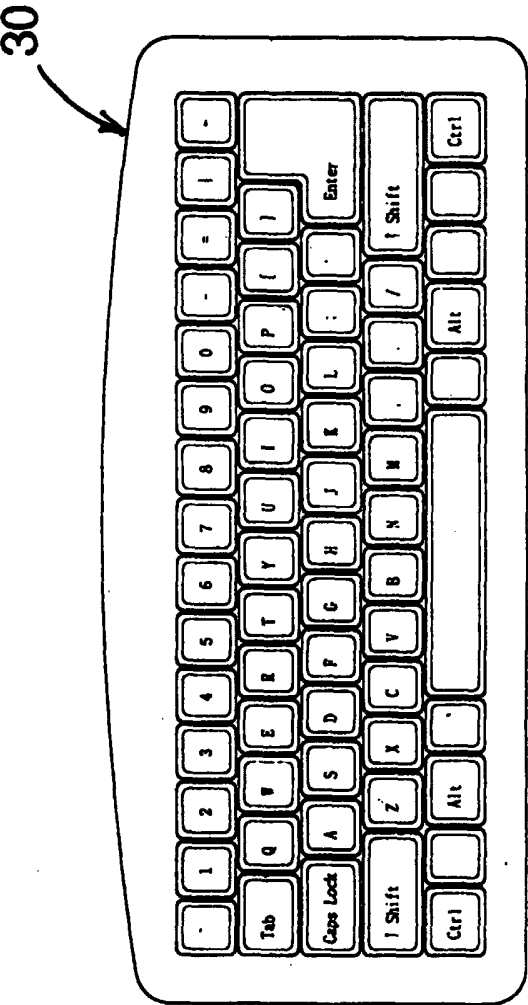
20 31. A keypad in accordance with Claim 22 wherein:

the first set of keys comprise only consonant characters and the second set of keys comprise substantially vowel characters.

32. A keypad in accordance with Claim 24 wherein:

25 the vowel characters are positioned in a straight line adjacent the rounded configuration of the second set of keys.

Fig 1



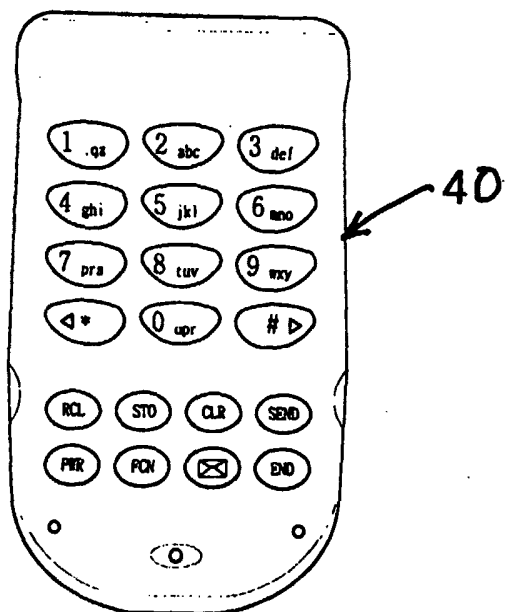


Fig 3

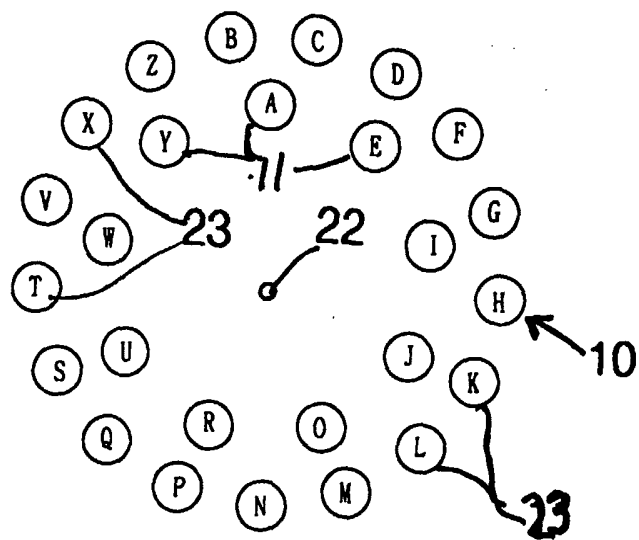


Fig 4

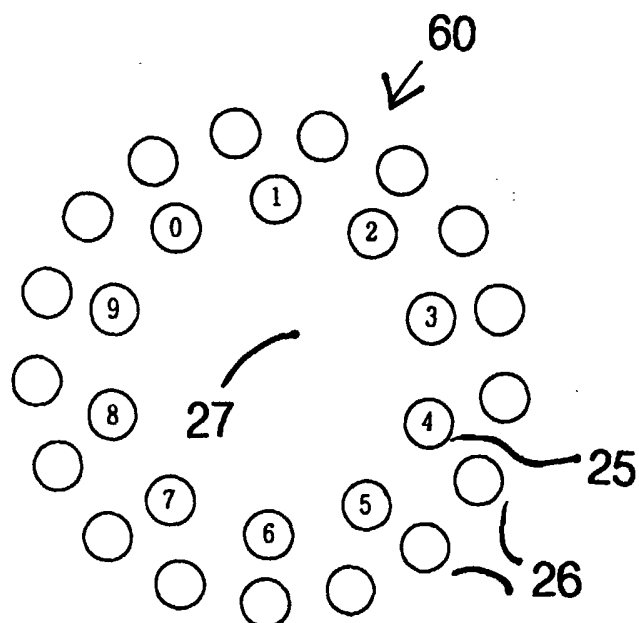


Fig 5a

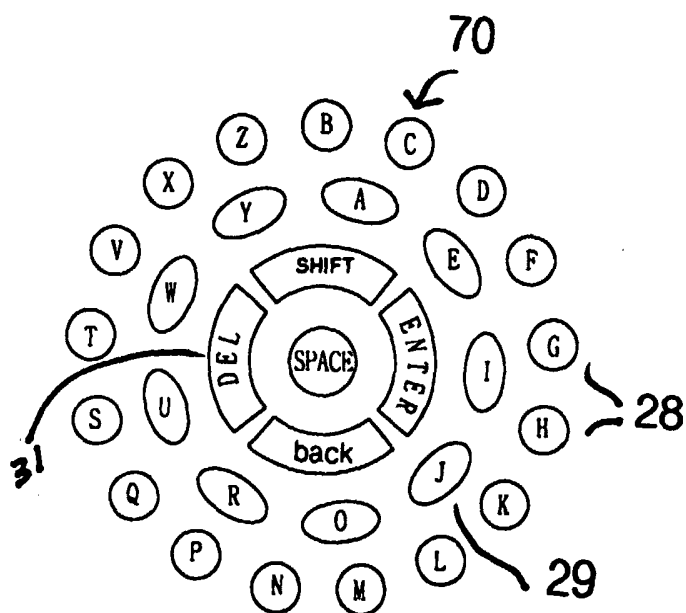


Fig 5b

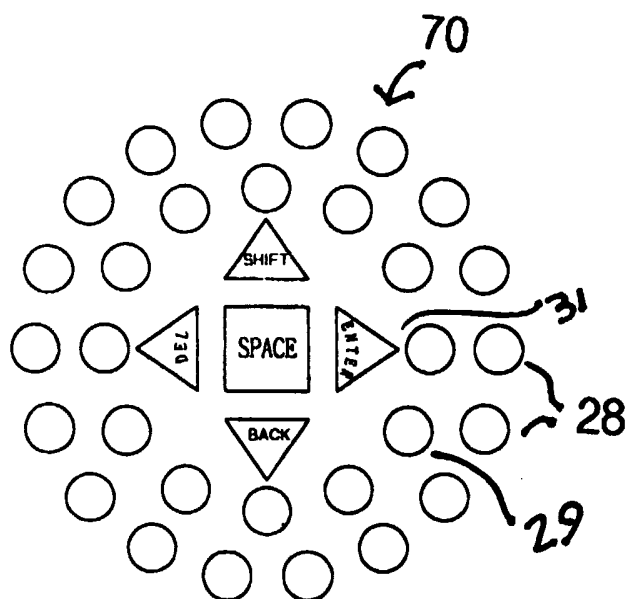


Fig 6a

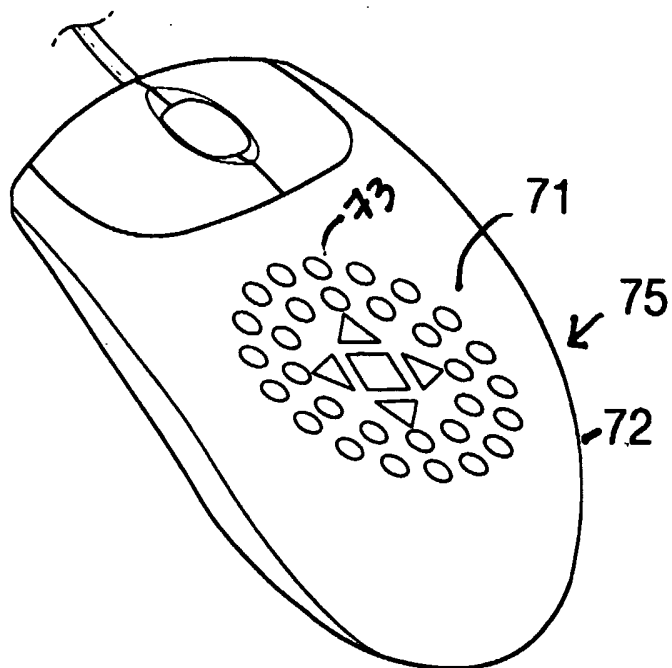


Fig 6b

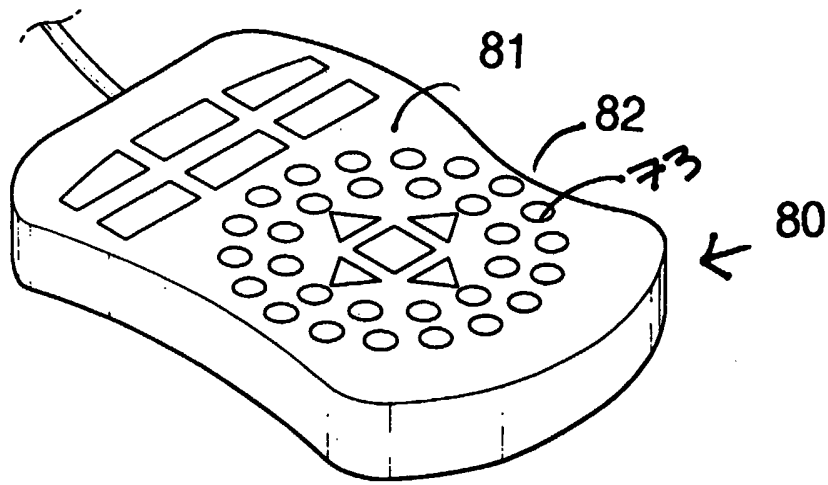
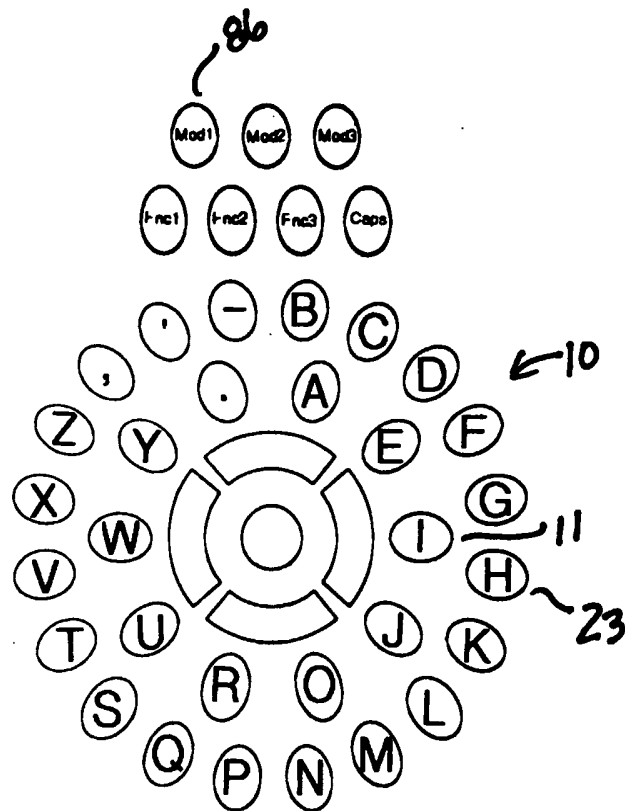
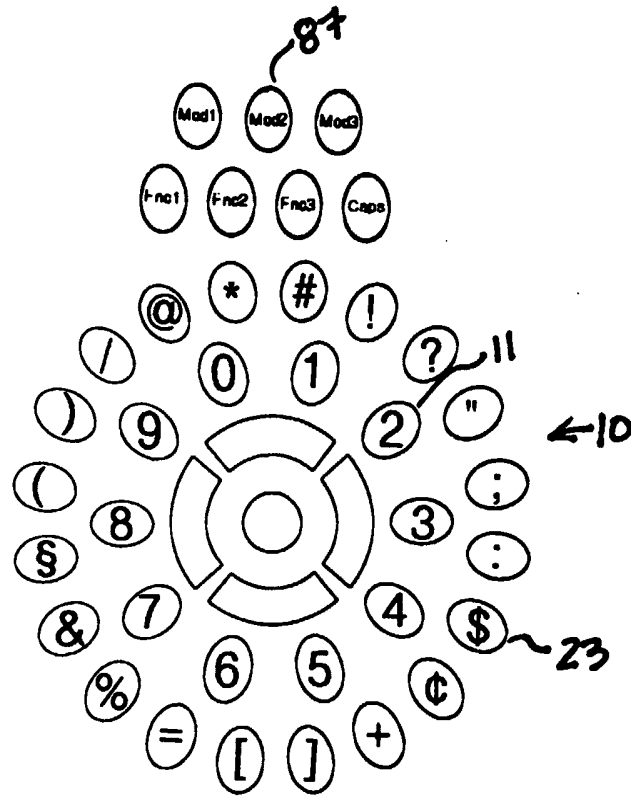


Fig 7a



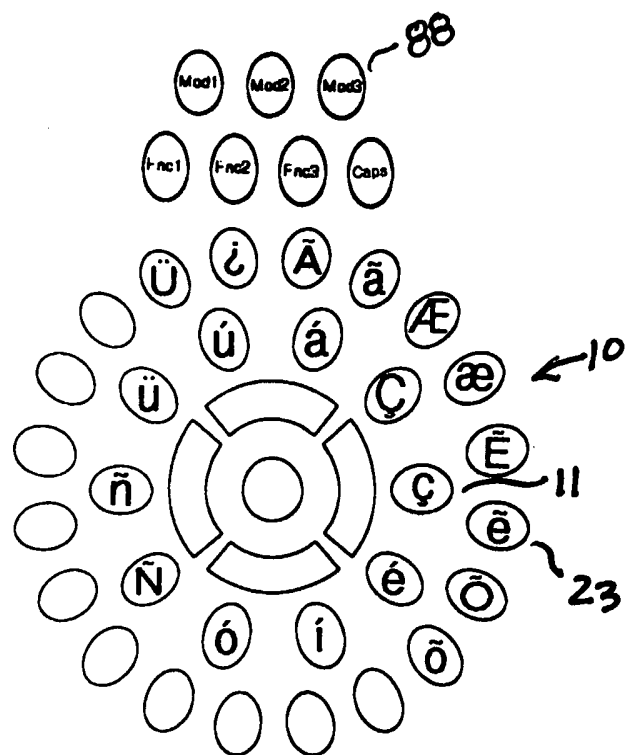
Mode 1

Fig 7b



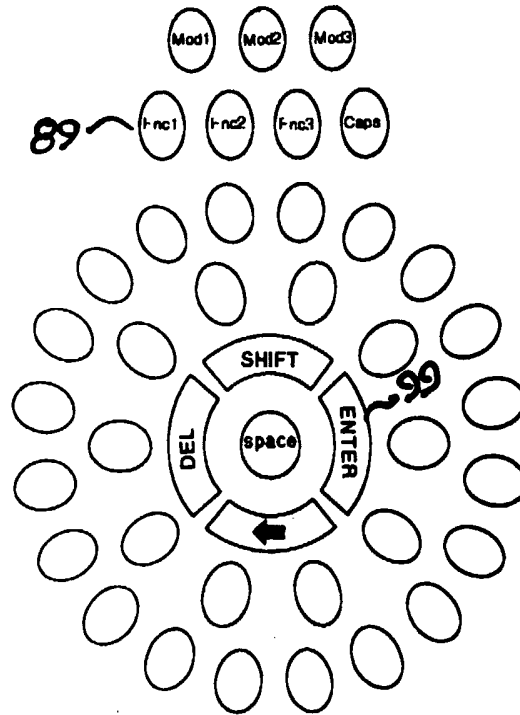
Mode 2

Fig7c



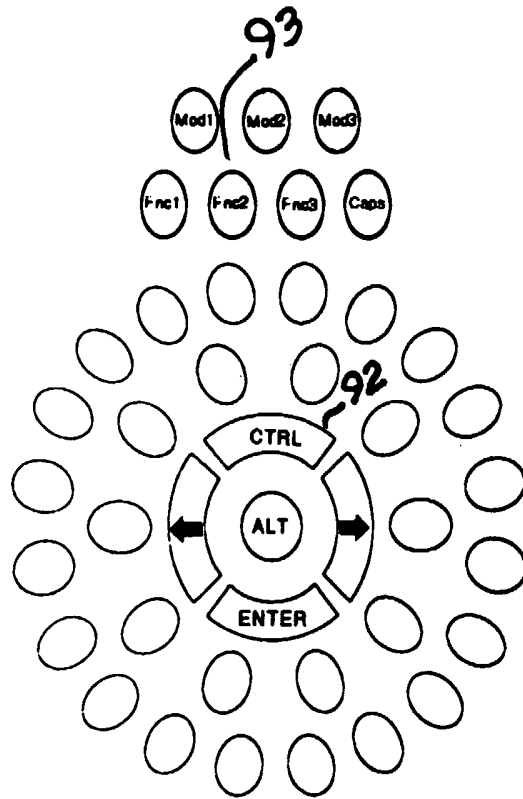
Mode 3

Fig7d



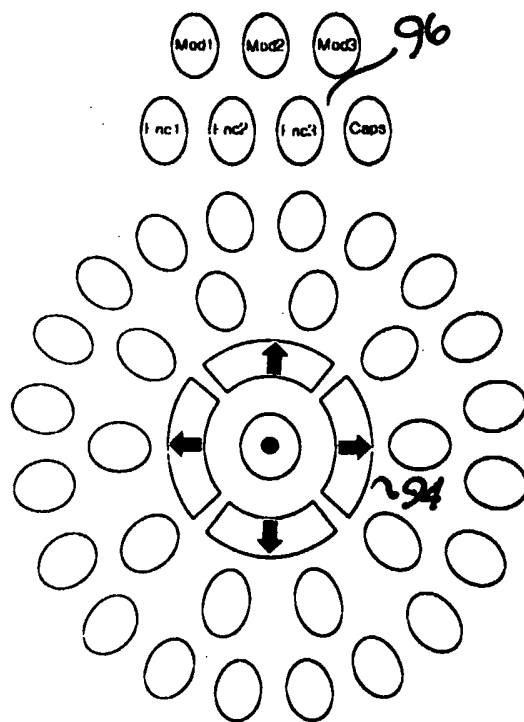
Function 1

Fig 7e



Function 2

Fig 7f



Function 3

Fig 7g

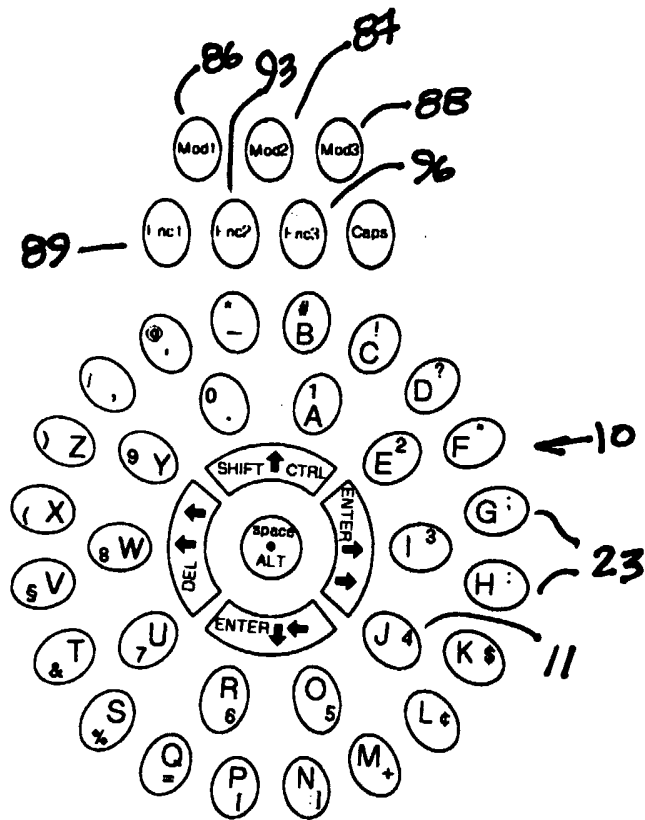


Fig 8a

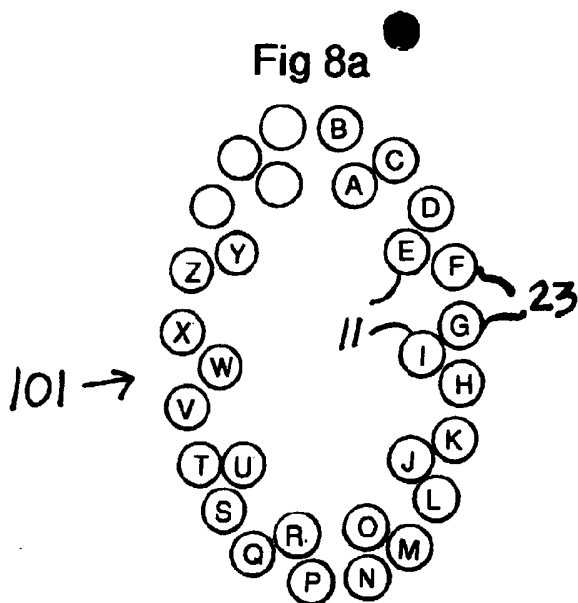


Fig 8b

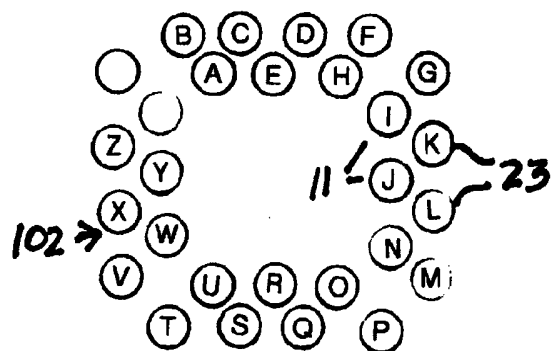


Fig 8c

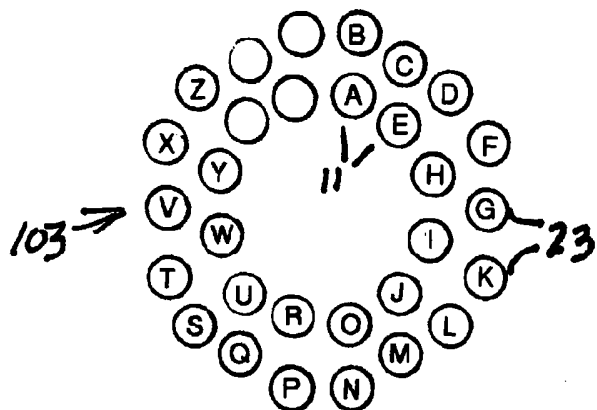


Fig 8d

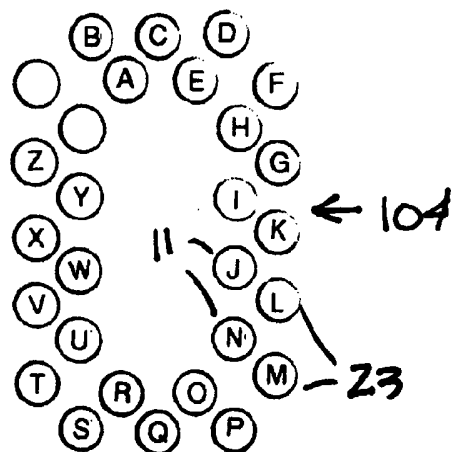


Fig 8e

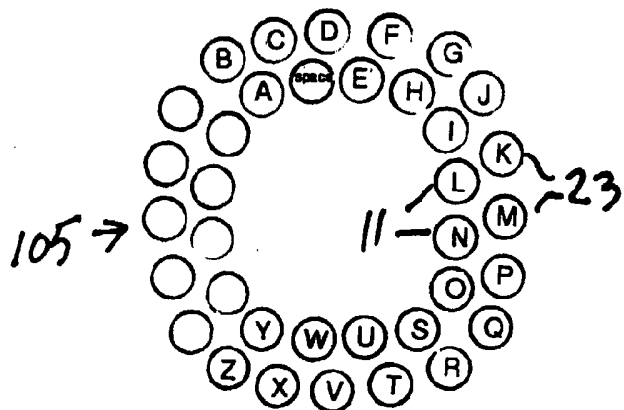


Fig 8f

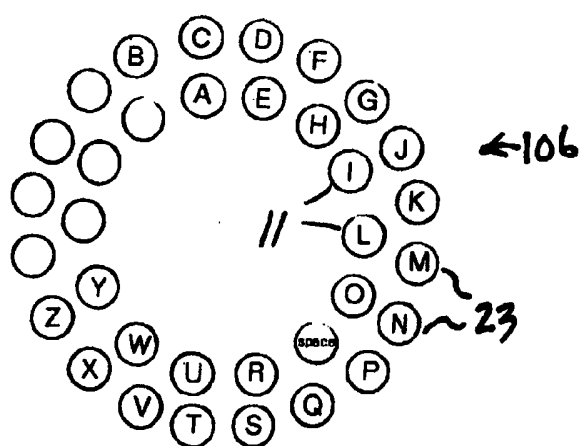


Fig 8g

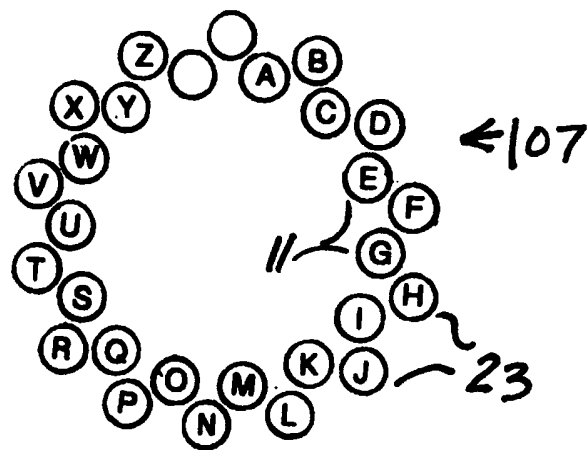
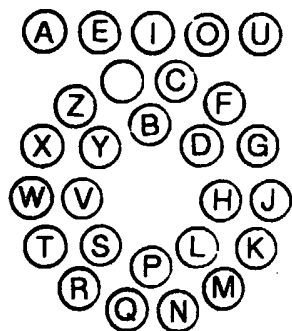


Fig 8h



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/00734

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H03K 17/94; H04M 1/00; B41J 5/08

US CL : 341/22; 379/369, 433; 400/486, 489

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)

U.S. : 341/22; 379/369, 433; 400/486, 489

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 practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,483,235 A (HANSON et al) 09 January 1996 (09.01.1996), see entire document.	1-32
A	US 6,067,358 A (GRANT) 23 May 2000 (23.05.2000), see entire document.	1-32
A	US 4,211,497 A (MONTGOMERY) 08 July 1980 (08.07.1980), see entire document.	1-32

☐

Further documents are listed in the continuation of Box C.

☐

See patent family annex.

* Special categories of cited documents:		"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

18 June 2002 (18.06.2002)

Date of mailing of the international search report

06 FEB 2003

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks

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Telephone No. 703/305-4700

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/00734

Continuation of B. FIELDS SEARCHED Item 3:

EAST

search terms; keyboard or keypad, circular