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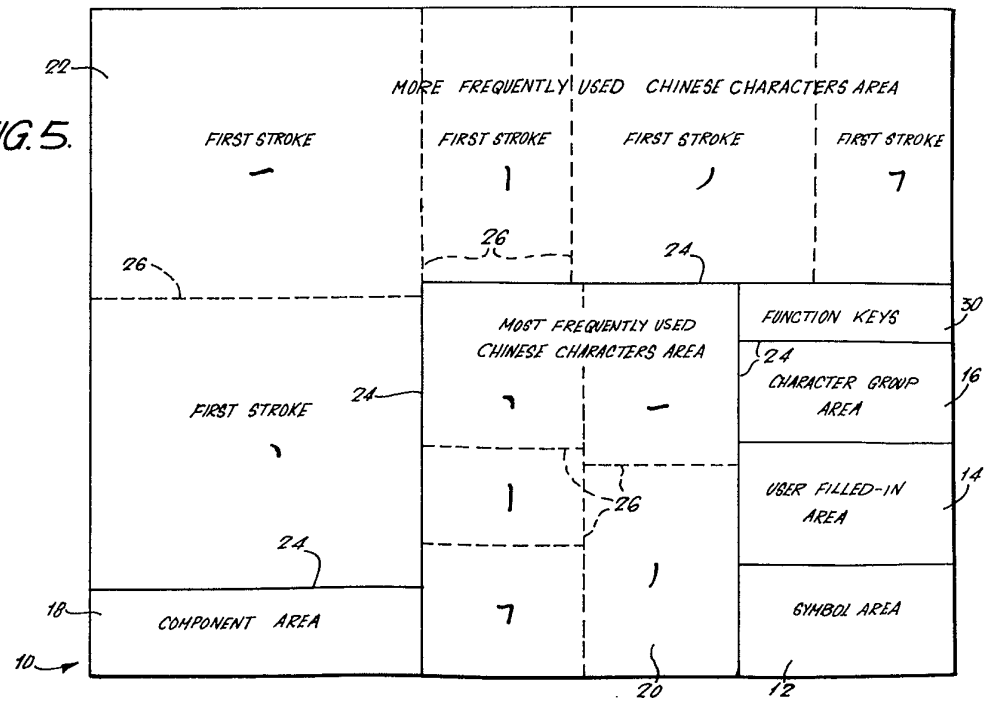
(54) **Improvements in keyboards**

(57) A Chinese keyboard is divided into a number of areas, a first area 20 containing the most frequently used group of characters, a second area 22 containing frequently used but not the most frequently used characters, a third area 18 containing components of characters to be combined with one another and/or the characters in the first and second areas, whereby infrequently used characters are formed by combining from 2 to 5 characters and/or components from the first, second and third areas, the characters in the first and second areas being in turn arranged in five sub-areas 26 delineated within those first and second areas according to the first strokes of the characters, the characters in said sub-area being in turn arranged according to the order of their second strokes and in turn their third and so on strokes.

FIG. 5.



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1.

另 叻

FIG. 2.

口 力

FIG. 3.

暈 暉

FIG. 4

景 晾

FIG. 6.

POINT	丶
HORIZONTAL STROKE	一
VERTICAL STROKE	丨
LEFT-FALLING STROKE	丿
TURN STROKE	乛

FIG. 7.

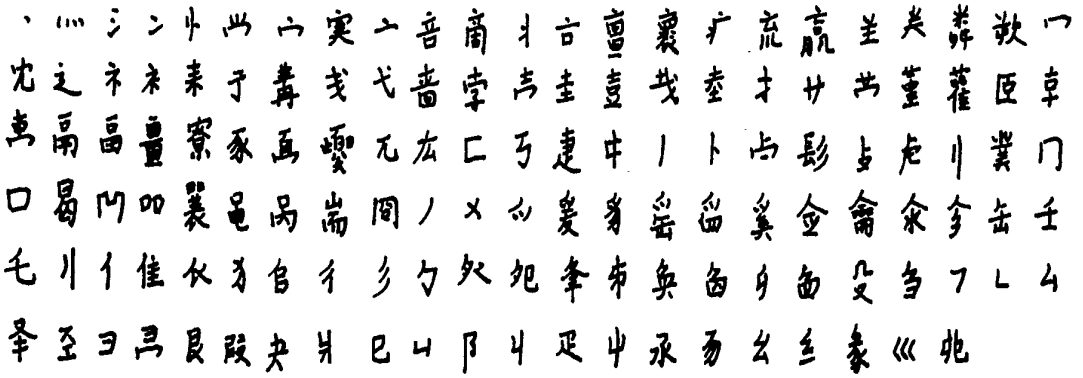

FIG. 5.

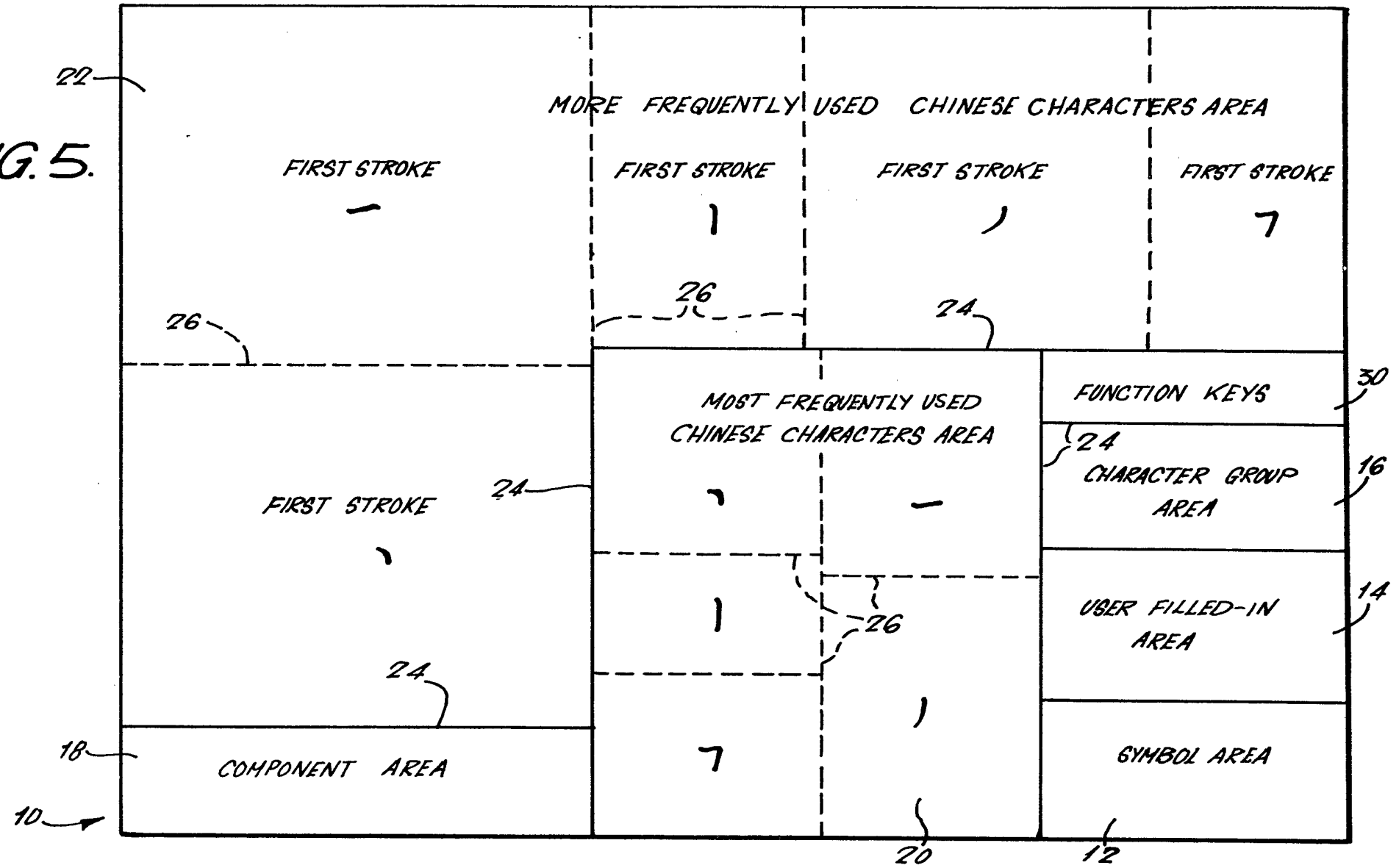

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FIG. 8.

FIG. 9.

EXAMPLE NO.	CHARACTER TO BE FOUND	CONSTITUENT PARTS AND INPUT KEYS
1	憹	《忄 农》
2	恁	《任 心》
3	闇	《门 音》
4	馔	《食 巳 巳 共》
5	潺	《氵 尸 子 子 子》

FIG. 10.

日 京

FIG. 11.

华

FIG. 12.

華

FIG. 13.

马 华

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FIG. 14.

驯化

FIG. 15.

驊華

FIG. 16.

TONE	SYMBOL	DIGIT
FIRST	—	1
SECOND	/	2
THIRD	✓	3
FOURTH	\	4

FIG. 17.

十 CAN BE INPUTTED BY 〖NA〗

ノ CAN BE INPUTTED BY 〖NO〗

; CAN BE INPUTTED BY 〖SHI〗

左 BY 〖na〗

の BY 〖no〗

FIG. 18.

FIG. 19.

FIG. 20.

)-L

FIG. 21.

(()-L))

FIG. 22

LETTER	INPUT BY
Æ	((A E))
Ê	((E ^))
∴	((· 3))
∵	((: ·))
≠	((= /))
⑤	((5))
∧	)-x
∨	)-+

FIG. 23.

石油输出国组织

FIG. 24

((石油输出国组织 5

FIG. 25.

氩 氦 氖

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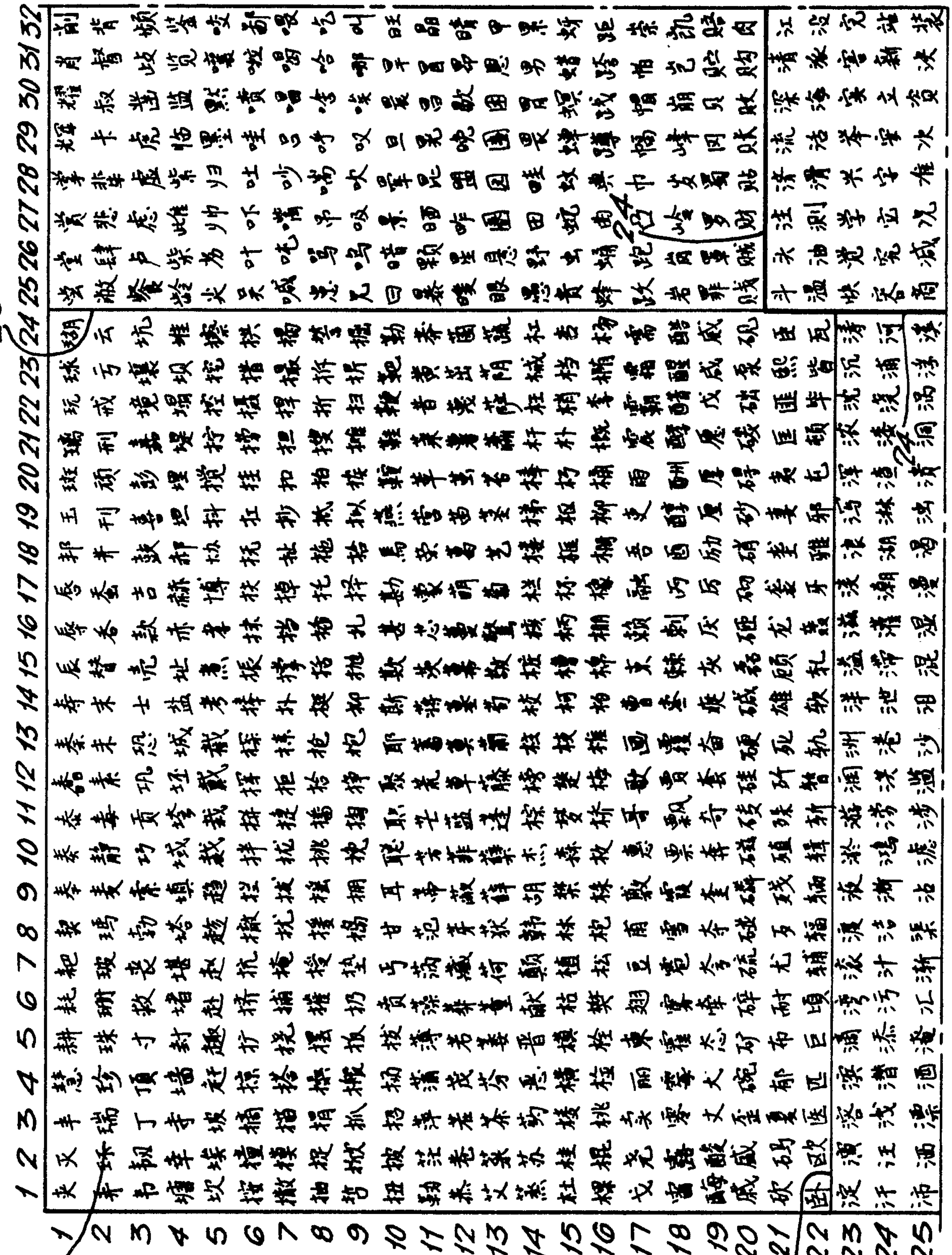
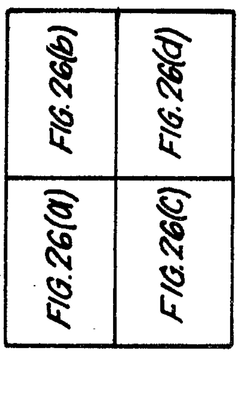


FIG. 26(a)



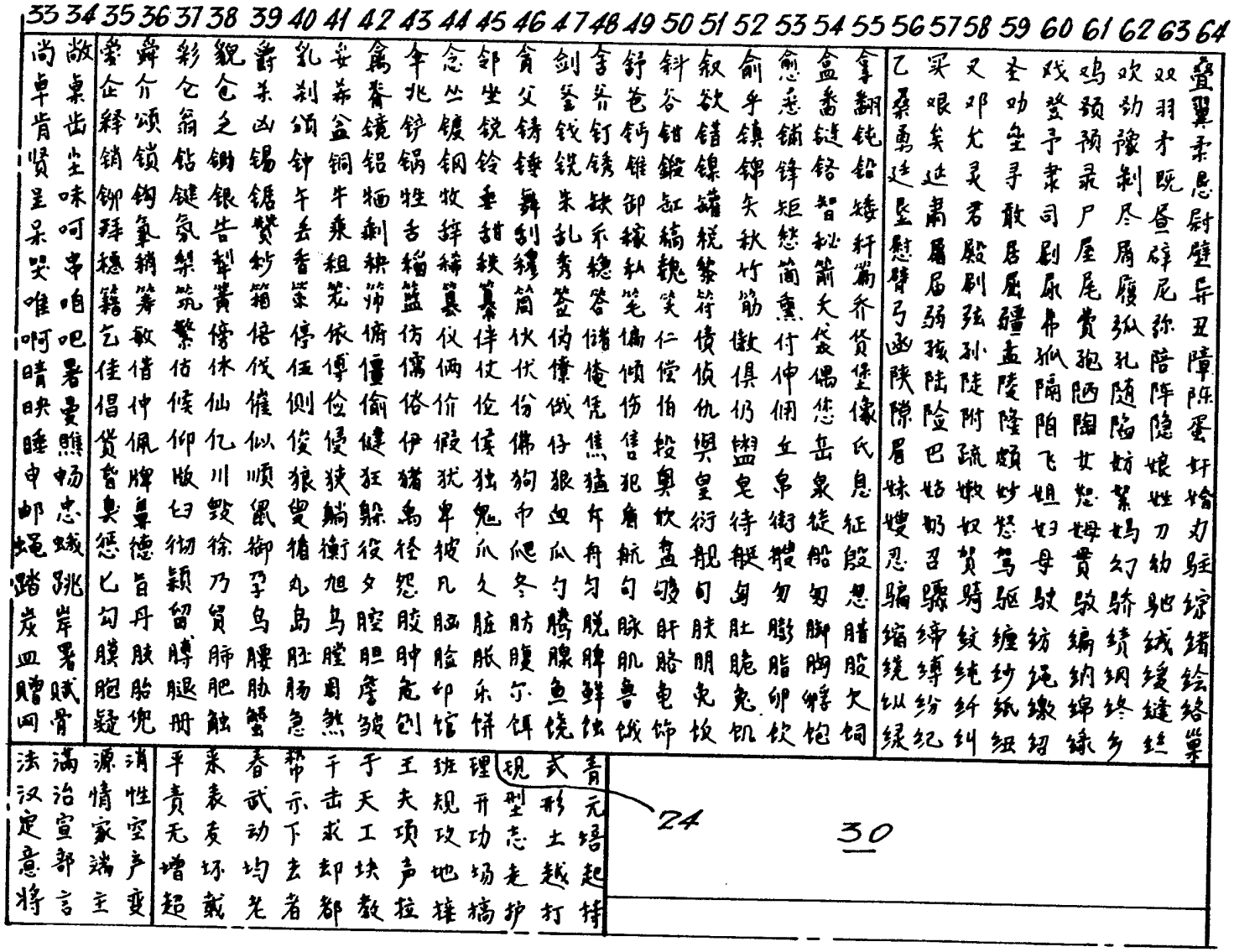


FIG. 26(b)

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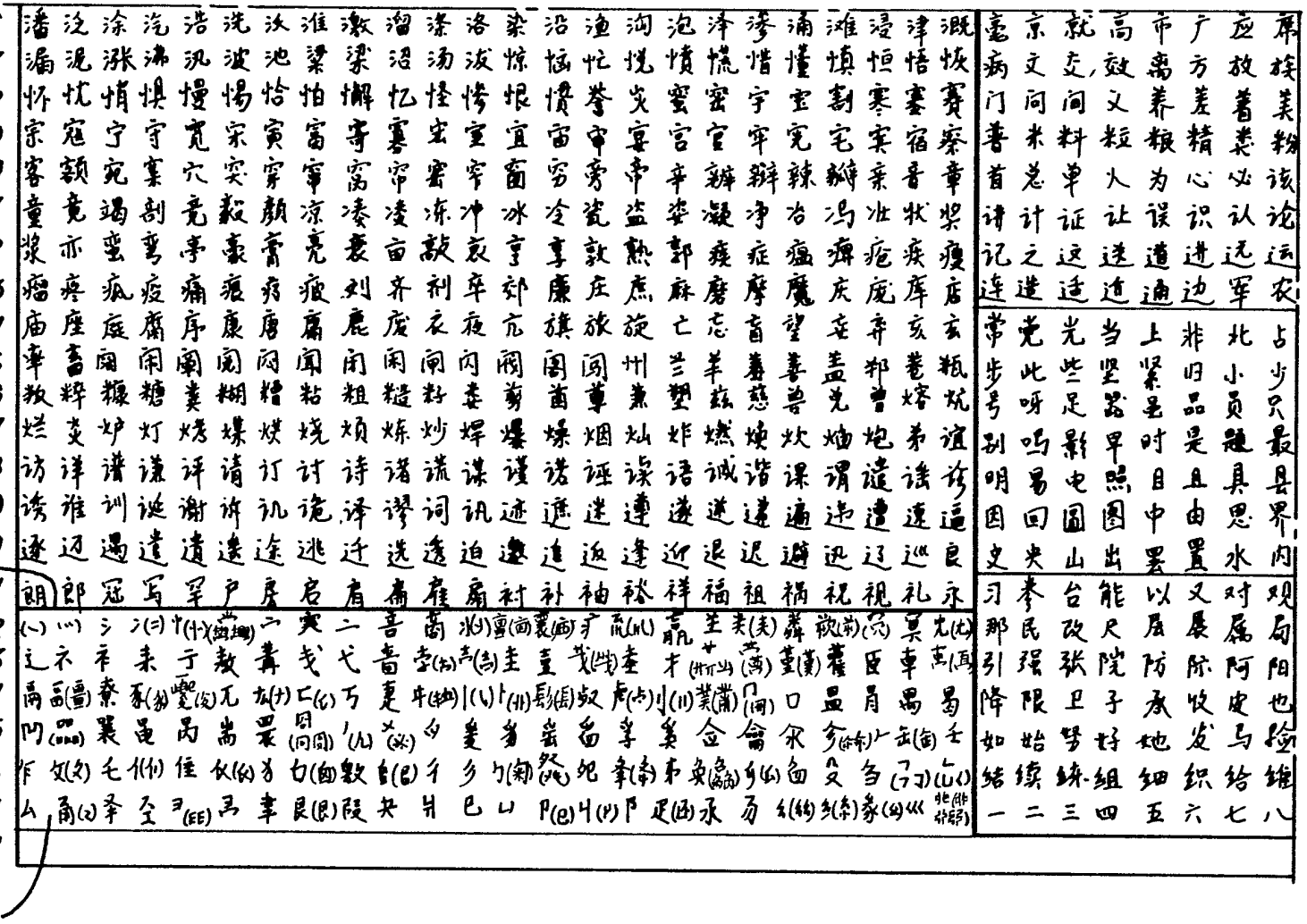
FIG.26(C)



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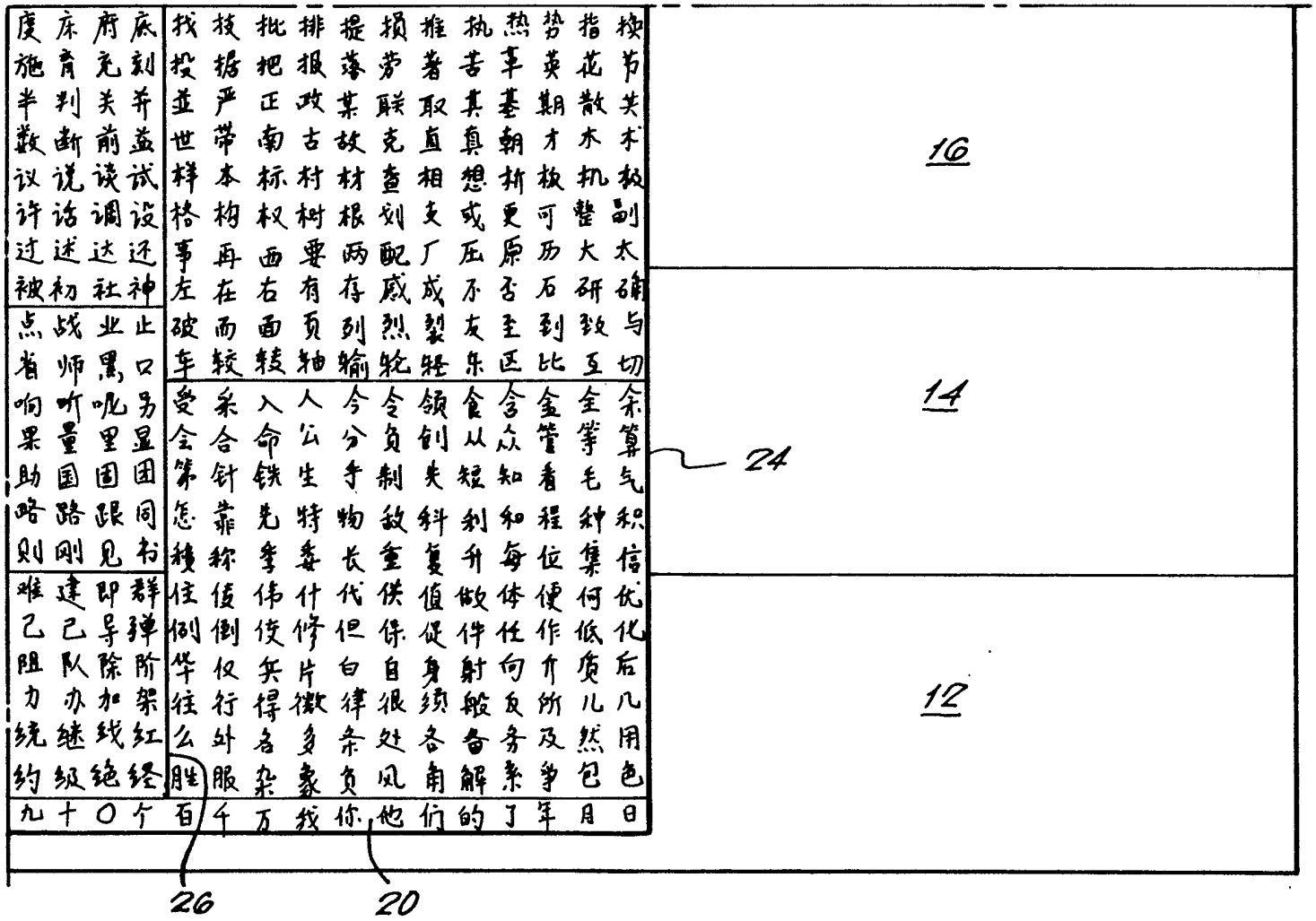

FIG. 26(d)

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SPECIFICATION

Improvements in keyboards

This invention relates to a keyboard, particularly for inputting Chinese characters. In one particular form, the keyboard can be used for inputting 14,000 different Chinese characters, letters of various languages and over 500 different symbols.

One keyboard of this invention is a specially designed large Chinese keyboard which is relatively smaller and only contains about 2,600 different Chinese characters and 100 English letters and symbols, but it can be used to input conveniently over 11,000 Chinese characters not contained in the keyboard, letters of Japanese, Greek, Russian and other western languages and over 500 miscellaneous symbols.

The keyboard could be a touch-pen keyboard or a keyboard with multi-characters per key.

Large Chinese keyboards used in Japan normally contain 2,000 to 4,000 different Chinese characters. If more Chinese characters are needed, the keyboard must be made larger or divided into several pages. It is not convenient to operate.

In fact the number of Chinese characters actually in use in China is over 10,000. Therefore, in order to input the Chinese characters not contained in the keyboard, the above keyboard used in Japan has a special key which is struck and then followed by four digits representing the specific character not contained in the keyboard. It is difficult for the operator to remember these digits and a dictionary must often be referred.

Prior to the present invention, various middle sized Chinese keyboards containing several hundred keys have been developed in Taiwan and Hong Kong. They used radicals to compose Chinese characters and each key on the keyboard represents a radical. The main drawback of this approach is that the frequently used Chinese characters have to be divided into several radicals and inputted by striking more than one key. Furthermore, the operator must consider how to compose each character with radicals when he is typing and this can be a burden for the operator. Another drawback is the ambiguity of the composition. Some exceptional rules or special treatment must be added to input those characters which have the same radical composition. The two characters shown in Figure 1 are, for example, both composed of the two radicals shown in Figure 2. Therefore they would have an identical coding. Further examples of pairs of characters where there is the same problem are shown in Figures 3 and 4.

The arrangement of Chinese characters on a large keyboard is critical for the operating speed. A phonetic ordering method is widely used in Japan. But in China, this approach has problems because the people in the southern part of China have their dialects and many of them speak with regional accent.

Another approach is a radical index method which has been widely used in Chinese dictionaries and might be adopted for a Chinese keyboard. Sometimes, however, it is rather difficult to determine the radical of certain Chinese characters.

It is therefore an object of this invention to provide a Chinese keyboard which can be used by trained operators at relatively high typing speed as well as by occasional users without any training.

According to the invention there is provided a large Chinese keyboard which is divided into a number of areas, the areas being delineated from one another in the keyboard, a first area containing the most frequently used group of Chinese characters, a second area containing frequently used but not the most frequently used Chinese characters, a third area containing components of Chinese characters to be combined with one another and/or the characters in the first and second areas, whereby infrequently used Chinese characters are formed by combining from 2 to 5 characters and/or components from the first, second and third areas, the characters in the first and second areas being in turn arranged in five sub-areas delineated within those first and second areas according to the first strokes of the characters, the characters in said sub-area being in turn arranged according to the order of their second strokes and in turn their third and so on strokes.

The invention also extends to the method of using the keyboard to input characters, symbols, letters and so on.

In one preferred embodiment of a keyboard according to the invention the large Chinese keyboard has 2,000 to 5,000 keys and:

divided into six delineated areas: most frequently used Chinese characters area, more frequently used Chinese characters area, area of components for inputting Chinese characters not contained in the first and second areas, symbol area, Chinese character-group area and a user filled-in area,

the Chinese characters areas and component area of the keyboard all being sub-divided into five delineated sub-areas according to the categories of the first strokes of the characters or components, and in each sub-area the Chinese characters being arranged in the order of the categories of their second strokes, or if necessary their third and so on strokes,

over 11,000 Chinese characters not contained in the keyboard are intuitively composed of two to five Chinese characters and/or components on the keyboard with different characters having different coding,

a selection key for selecting either the simplified or complex form of the Chinese characters, that selection also being applied to the characters not contained in the keyboard, and

the Chinese phonetic alphabets with tones, Japanese, Russian, Greek letters and over 500 symbols which are not contained in the keyboard being inputted by using a string of English letters and symbols bracketed within special opening bracket and closing bracket keys.

An example of such a keyboard is shown in Figure 5, the keyboard 10 being for example of a size of 38.5 cm by 28.5 cm, although more generally it could be from 30 cm to 50 cm by 20 cm to 40 cm in size.

On the lower right of the keyboard 10 is a symbol area 12, a user filled area 14 and a character group area 16. On the lower left is a component area 18, in the middle is an area 20 for the most frequently used Chinese characters whilst on the top and left side of the keyboard is an area 22 for the frequently used characters.

Area 20 of the most frequently used Chinese characters can contain, for example, 600 characters, or more generally from 400 to 1200 characters, whilst the area 22 for the frequently used, but not most frequently used characters can contain 1,800 different, or more generally from 1000 to 4000 characters. In such a case, these two areas 20 and 22 of the keyboard plus the user filled-in area 14 and the character-group area 16 can contain about 2,600 different Chinese characters. This corresponds to a hit rate of around 99.3% when statistics on various publications of over 21 million Chinese characters were considered. In other words, an extremely high proportion of all Chinese characters occurring regularly in Chinese publications would be contained in the keyboard of present invention without any necessity to combine characters and/or components from the area 18.

The various areas 12 to 22 are delineated from one another, e.g. by means of the solid lines 24 or by differently coloured areas.

The strokes of Chinese characters can be classified into five categories: points, horizontal stroke, vertical stroke, left-falling stroke and turn as shown in Figure 6.

The Chinese character areas 20 and 22 and the component area 18 are each divided into five sub-areas 26 according to the categories of the first strokes of the characters or components. The five sub-areas are differentiated by different colours or demarcation lines such as the broken lines 26 on the keyboard to facilitate searching and location.

In each sub-area, the Chinese characters are arranged in the order of the categories of their second strokes, that is, the Chinese characters with the point as their second stroke are arranged first, then the characters with the horizontal stroke, ..., and last, the characters with the turn as their second stroke. The order of characters whose first two strokes are the same will be determined by the third stroke, and so on.

It is thus very easy to determine the stroke category of a Chinese character and so even a novice can quickly find the desired character on the keyboard. Therefore, the keyboard can be used by library readers who would only occasionally access the information retrieval system and do not like to spend a long time, e.g. more than an hour's learning to grasp the rules guiding various small or middle sized Chinese keyboards before using a Chinese terminal of which the keyboard 10 is a part.

When a Chinese character is not contained in the areas 20 and 22 of the keyboard. On the lower left part of the keyboard is a component area containing over 100 keys. Each key in this area represents a component which itself is not a Chinese character but can be used as a component in composing various infrequently used Chinese characters. Example of such components are shown in Figure 7. Over 11,000 Chinese characters not contained in the keyboard can be composed of two to five of these components and/or Chinese characters in the areas 20 and 22 on the keyboard.

In the symbol area 12 of the keyboard, there are two special symbols, called for convenience special opening bracket and special closing bracket and shown in Figure 8. These brackets are never used in any Chinese publications and are non-printing symbols, i.e. they will not, if operated on their own, provide any print-out. A string of components and/or Chinese characters bracketed within the pair of special brackets represents a single Chinese character not contained in the keyboard in areas 20 and 22.

Some examples of how infrequently used characters can be formed are shown in Figure 9.

In Example 1 the first key is a component in the component area and the second is a Chinese character.

In Examples 2 and 3 the two keys are both Chinese characters on the keyboard.

In Example 4 all the keys are Chinese characters on the keyboard.

Finally in Example 5 the first key is a component key and the remaining four are Chinese character keys.

The order of forming a Chinese character with components and/or other Chinese characters where characters are to be built up in this way is from upper to lower, from left to right and from outside to inside.

As compared with the middle sized keyboards developed in Taiwan and Hong Kong, the keyboard of the present invention has the following advantages:

1. The 2,600 Chinese characters on the keyboard have the hit rate of 99.3%; thus the overwhelming majority of the Chinese characters actually ocurring in publications will be found on the keyboard. Only 0.7% of the characters has to be composed and inputted by striking more than one key.

2. Over 2,000 Chinese characters on the keyboard and over 100 components can be used to compose characters not occurring on the keyboard. As a result, the composition is more convenient, obvious and intuitive than a middle sized keyboard. Most characters are divided into only two parts and their composition is self-explanatory.

3. Within the range of 14,000 Chinese characters, different characters have different compositions and no ambiguity would occur. For example, the characters in Figure 4 would appear to have the same components, namely those shown in Figure 10, and so it would be difficult to differentiate between them in the middle sized keyboard. However in the keyboard of the invention the characters shown on the left of Figure 4 will be on the keyboard itself whilst the characters on the right of Figure 4 can be comprised of its components.

The result of using the above composition method to input infrequently used Chinese characters is smaller keyboard and higher typing speed for 99.3% of the Chinese characters actually occurring in publications.

Simplified Chinese characters are used in main-

land of China, but the original complex forms are still used in Taiwan and Hong Kong, and so needed in some special Chinese publications; sometimes the complex and simplified forms are intermixed in the same publications. According to a preferred feature of the invention, the keyboard has a special selection key for selecting either the simplified form or the complex form. When this special selection key is pressed, succeeding Chinese characters are all of the complex form. For example, striking the key shown in Figure 11 would input the complex form shown in Figure 12. This selection key can also be applied to the composition of the characters not contained in the keyboard. For example, when the special selection key is not pressed, striking the keys shown in Figure 13 would input the character shown in Figure 14, but if the selection key is pressed, the same string would input the corresponding complex form shown in Figure 15.

The keyboard of the present invention can also be used to input the Chinese phonetic alphabet, Japanese, Russian, other western languages and various mathematical symbols.

In the symbol area 12 of the keyboard, there are in upper and lower case 26 English letters and some frequently used symbols. Because the keyboard is mainly used to input Chinese characters, there is no place on the keyboard for Chinese phonetic alphabet, Japanese, Russian and other western languages. However in Chinese publications, sometimes Chinese characters are intermixed with Chinese phonetic alphabets, Japanese or Russian; and in the Chinese scientific materials, Greek letters and various mathematical symbols are often used. A convenient and natural method is therefore preferably provided to input these letters and symbols.

There are four tones for the Chinese phonetic alphabet which are normally represented as shown in Figure 16. The keyboard can use the digits 1 to 4 to represent the four tones. The digit is appended to the phonetic alphabet and bracketed within the special brackets pair.

For example, the first tone of E is inputted by striking E 1 within the special brackets, whilst the third tone of A is inputted by striking A 3 within the special brackets, and so on.

Japanese letters can be represented by the combination of two or three English letters which has the same pronounciation with the Japanese letter it represents. Hinakana syllabary uses upper case English letter; Katakana syllabary uses lower case.

Examples are shown in Figure 17.

Greek letters can be represented by the corresponding English letter which is similar in shape or pronounciation and bracketed within the special brackets.

For example, the upper case Greek letters delta can be inputted by striking a Capital D within the special brackets whilst the lower case Greek delta can be inputted by striking a lower case d within the special brackets.

In the symbol area 12 of the keyboard, besides the special brackets, there can be an extra composing symbol such as that shown in Figure 18 which is never used in publications. This symbol combined with the character which follows immediately always forms a new character not contained in the keyboard. This method can be used to input Russian, Roman numerals and various mathematical symbols.

Upper case Russian letters would be inputted by striking the extra symbol and a English letter which is similar in shape or pronounciation. For example, the upper case letter shown in Figure 19 can be inputted by striking what is shown in Figure 20 and when this string is bracketed within the special brackets as shown in Figure 21, it becomes corresponding lower case Russian letter.

Roman numerals are inputted by striking the extra symbol and an Arabic numeral. For example, Roman numeral I can be inputted by striking the extra symbol and 1 whilst IX can be inputted by striking the extra symbol and 9.

German, French, Italian, Spanish, Vietnamese letters different from 26 English letters and various symbols are also inputted by composition method. Examples are shown in the Table forming Figure 22.

In the function key area 30 of the keyboard are positioned keys such as insertion or deletion keys.

On the right side of the keyboard is the area 16. This contains, for example, 128 keys with each key representing a group of characters. When it is struck, the corresponding group consisting of a string of Chinese characters will be inputted into a computer and displayed on the screen. The contents of some of the character-group keys are predefined and cannot be altered by the users; others may be arbitrarily defined by the individual user. The user defined character-group keys are labelled with numerals. For example, if a user wants to define key 5 as the character-group shown in Figure 23, the keys shown in Figure 24 should be struck.

From now on, every time key 5 in area 16 is struck, the seven Chinese characters shown in Figure 23 will be inputted into computer.

On the lower right of the keyboard is the area 16 of 128 keys. These keys are to be denominated by the user with his specific frequently used characters. For example, characters shown in Figure 25 are seldom used by ordinary users and so are not contained in the keyboard, but among chemists and workers in the related fields these characters are frequently used and should be included in the keyboard. In this way user can fill his special characters into that area 16 of the keyboard 10.

An example of a keyboard according to the invention showing the positioning of various chinese characters, components, symbols and so on is shown in Figure 26, the reference numerals on Figure 26 being the same as those used in Figure 5.

CLAIMS

1. A large Chinese keyboard which is divided into a number of areas, the areas being delineated from one another in the keyboard, a first area containing the most frequently used group of Chinese characters, a second area containing frequently used but not the most frequently used Chinese characters, a third area containing components of Chinese charac-

ters to be combined with one another and/or the characters in the first and second areas, whereby infrequently used Chinese characters are formed by combining from 2 to 5 characters and/or components from the first, second and third areas, the characters in the first and second areas being in turn arranged in five sub-areas delineated within those first and second areas according to the first strokes of the characters, the characters in said sub-area being in turn arranged according to the order of their second strokes and in turn their third and so on strokes.

2. A keyboard as claimed in Claim 1 in which the first area is arranged in a central most readily accessible part of the keyboard with the second and third areas around it.

3. A keyboard as claimed in Claim 1 or Claim 2 having from 2,000 to 5,000 keys.

4. A keyboard as claimed in any preceding claim in which the first area contains from 400 to 1200 keys.

5. A keyboard as claimed in any preceding claim in which the second area contains from 1000 to 4000 keys.

6. A keyboard as claimed in any preceding claim which has a fourth area containing symbols, a fifth area containing groups of Chinese characters where operation of one key inputs a number of characters, and a sixth area having keys for which a user can select particular characters, groups of characters, symbols as required to suit these regular requirements.

7. A large Chinese keyboard with 2,000 to 5,000 keys being:

(a) divided into six delineated areas: most frequently used Chinese characters area, more frequently used Chinese characters area, area of components for inputting Chinese characters not contained in the first and second areas, symbol area, Chinese character-group area and a user filled-in area,

(b) the Chinese characters areas and component area of the keyboard all being sub-divided into five delineated sub-areas according to the categories of the first strokes of the characters or components, and in each sub-area the Chinese characters being arranged in the order of the categories of their second strokes, or if necessary their third and so on strokes,

(c) over 11,000 Chinese characters not contained in the keyboard are intuitively composed of two to five Chinese characters and/or components on the keyboard with different characters having different coding,

(d) a selection key for selecting either the simplified or complex form of the Chinese characters, that selection also being applied to the characters not contained in the keyboard, and

(e) the Chinese phonetic alphabets with tones, Japanese, Russian, Greek letters and over 500 symbols which are not contained in the keyboard being inputted by using a string of English letters and symbols bracketed within special opening bracket and closing bracket keys.

8. A keyboard as claimed in any preceding claim in which the component area contains the components shown in Figure 7.

9. A keyboard as claimed in Claim 7 or Claim 8 in which the symbol area contains three non-printing special symbols not used in publications, a string of keys within two of these symbols causing the string to represent a single Chinese character, or a letter of western languages or a symbol, and third special symbol combined with one of on-the-keyboard characters which follows immediately forming a new letter or symbol not contained in the keyboard.

10. A keyboard as claimed in any of claims 7 to 9 in which some of the character-group keys are predefined and others can be defined by users with the following procedure:

first strike a special key symbol,
strike the group of characters, and
then strike the character-group key to be defined.

11. A keyboard as claimed in any preceding claim in which a Chinese phonetic alphabet which tone is inputted by a Chinese phonetic alphabet without tone and a digit used within special non-printing symbol keys.

12. A large Chinese keyboard as claimed in any preceding in which a Japanese letter is represented by the combination of two or three English letters which has the same pronounciation as the Japanese letter is represents. Hinakana syllables using upper case English letters and Katakana syllables using lower case English letters.

13. A keyboard as claimed in any preceding claim in which a Greek letter is represented by a English letter which is similar in shape or pronounciation to the Greek letter it represents bracketed within a pair of special composing keys.

14. A keyboard as claimed in any preceding claim in which a Russian letter is inputted by striking a special composing symbol and an English letter which is similar in shape or pronounciation to the Russian letter it represents.

15. A keyboard as claimed in any preceding claim in which a Roman numeral is inputted by striking a special composing symbol and an Arabic numeral.

16. A large Chinese keyboard substantially as herein described with reference to Figure 5, or Figure 26, of the accompanying drawings.

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