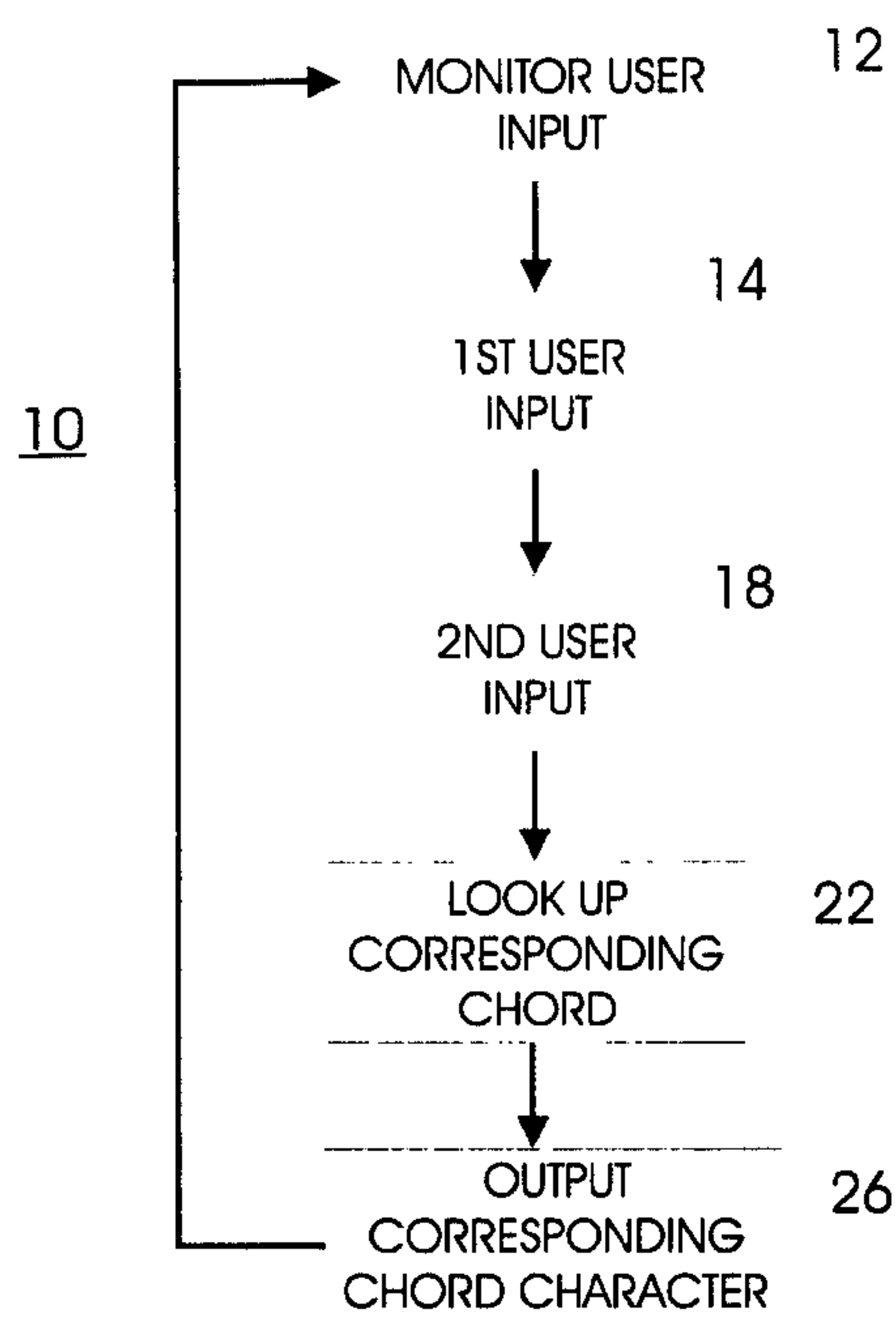




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(54) **METHODE ET APPAREILLAGE D'ENTREE
ALPHANUMERIQUE**
(54) **ALPHANUMERIC INPUT METHOD AND APPARATUS**



(57) A data input method and apparatus for inputting data are provided. The Applicants' method for inputting text includes providing the user with an apparatus comprising twelve keys. From two combinations of twelve keys, the user can produce a full set of alphanumeric text. These two combinations are referred to as chords. By monitoring and correlating a value representative of the chord combination, the user can emulate an entire 104 key keyboard. As embodied on devices which include a display device, the Applicants' method includes displaying a dynamic guide which assists the user in chord entry and completion by displaying the possible characters available from a first input. The method and apparatus can be implemented on any device providing a minimum of twelve keys or a display device which allows for the representation and selection of twelve keys.

ABSTRACT

A data input method and apparatus for inputting data are provided. The Applicants' method for inputting text includes providing the user with an apparatus comprising twelve keys. From two combinations of twelve keys, the user can produce a full set of alphanumeric text. These two combinations are referred to as chords. By monitoring and correlating a value representative of the chord combination, the user can emulate an entire 104 key keyboard. As embodied on devices which include a display device, the Applicants' method includes displaying a dynamic guide which assists the user in chord entry and completion by displaying the possible characters available from a first input. The method and apparatus can be implemented on any device providing a minimum of twelve keys or a display device which allows for the representation and selection of twelve keys.

ALPHANUMERIC INPUT METHOD AND APPARATUS**BACKGROUND OF THE INVENTION**

The invention relates to input devices and a method for inputting alphanumeric data. In particular, the invention relates to a method of inputting full alphanumeric data into a computerized device using a limited number of keys and an apparatus for guiding and facilitating the entry of the alphanumeric input method. The method and apparatus are suitable for inputting data into any computerized device with sufficient accuracy and speed to make composing documents and entering data practical without the need for a full-sized keyboard.

It is commonly known in the art to use a keyboard for textual input into a computerized device. However, existing keyboards are not suitable for use in small or mobile devices where a full-sized keyboard is impractical or otherwise unavailable. Recently, handwriting recognition programs have been implemented to allow text to be generated without the use of a keyboard. However, these handwriting recognition programs are often slow, inaccurate and require the user to learn a non-intuitive writing method and grasp an uncomfortable stylus for a long period of time. Further, handicapped persons often do not have the range of motion needed to type on a full-sized keyboard or use a pen-based input device. Moreover, existing text input methods require new users to memorize unfamiliar key placements or complex combinations of key strokes or pen strokes. While alternative methods for alphanumeric input have been proposed, most of this development has focused on data entry using either alternate layouts of traditional keyboards or data entry on small devices such as telephone keypads.

SUMMARY OF THE INVENTION

As such, there exists a need for a simple, efficient, user-friendly input device which facilitates for the input of a full range of alphanumeric characters using only a limited number of keys. Accordingly, the present invention provides an alphanumeric input method and apparatus which is suitable for effective alphanumeric data entry without a full-sized keyboard.

Accordingly, the invention provides a simple and efficient method for inputting full alphanumeric data using a limited number of available inputs and an apparatus for effecting the method. The Applicants' input method is suitable for any device in which

twelve or more keys can either be physically embodied or graphically represented. The twelve key user interface can be a physical twelve key input keypad such as the numeric keypad on a standard keyboard or graphically represented on a display screen.

Alphanumeric data is inputted through the simultaneous or sequential selection of two
5 'chord' combinations on a twelve key user interface where each two chord corresponds to a specific alphanumeric character or key on a standard keyboard. As embodied herein, the display screen responds to the user input to provide chord completion guidance and chord combination memory reinforcement while inputting data. Specifically, after receiving user input, the display screen adjusts to provide the user with available chord completion
10 combinations based on the first input.

The Applicants' input method uses twelve keys or graphical representations of twelve keys, and a simple chording technique. Regardless of the particular device upon which the Applicants' invention is embodied, the Applicants' chording method comprises two inputs being selected at the same time or in succession. For example, the input or
15 selection of the 0 and 1 keys corresponds to the output of a letter 'a'. All chords are reversible, so sequential or simultaneous selection of the 0+1 chord will produce the same key emulation as selection of the 1+0 combination. As embodied on devices with a touch-sensitive input device, the user may alternatively enter a chord by placing their stylus on the first input selection, dragging the stylus to the second input selection and removing the
20 stylus to complete the chord selection.

Using the Applicants' method, there are sufficient 2-key combinations from the twelve keys of the Applicants' apparatus to emulate all of the characters on a standard 104 key 'AT' keyboard. Using only twelve keys and two-key chord combinations, the user can achieve full AT keyboard (the standard 104 key Windows keyboard) character set
25 emulation. Non-alphanumeric keys included on a standard keyboard including, the SPACE, SHIFT and CAPS LOCK keys are entered by using combinations of the same 2 input chord method. Alternatively, other character sets can be typed using the disclosed method, including but not limited to the Palm OS character set and character sets for the romantic languages.

30 While alternative methods of 'chording', alternative 'chord-sets', and character arrangements could be implemented and are intended to be incorporated herein, the Applicants have discovered that the preferred method embodied by the present application was unanimously favored by test groups. The Applicants' chord-set arranges letters in

alphabetic sequence. Specifically, the Applicants' chord method maps out as shown in the following chart:

2 Key Chord Combination	Emulate Keystroke Produced		2 Key Chord Combination	Emulated Keystroke Produced
0+1	a		0+.	SPACE
0+2	b			
0+3	c			
0+4	d			
0+5	e			
0+6	f			
0+7	g			
0+8	h			
0+9	i			
1+2	j			
1+3	k			
1+4	l			
1+5	m			
1+6	n			
1+7	o			
1+8	p			
1+9	q			
2+3	r			
2+4	s			
2+5	t			
2+6	u			
2+7	v			
2+8	w			
2+9	x			
3+4	y			
3+5	z			

The Applicants' testing and experimentation reported that the above alphabetic sequencing of the characters was the most intuitive to individuals testing the input method and that the above method was considered to be the most ergonomically comfortable for efficient single-handed alphanumeric data entry.

5 The Applicants' alphanumeric input method is further embodied in an apparatus referred to herein as the guide. In one embodiment, the apparatus is a hand-held computer device including software for generating a graphical on-screen representation of twelve keys. Depending on the device upon which the guide is displayed, the specific keys and orientation of the guide are altered as appropriate. For example, as embodied in a software
10 application suitable for the Windows family of operating systems, the graphical representation of the guide looks visually similar to a standard numeric keypad. On a keypad, chords can be executed through either the simultaneous or sequential entry of inputs. In conjunction with the software which translates chords into alphanumeric characters, the software displays a dynamic on-screen guide, which serves as an interactive
15 typing assistant and guide for chord completion. Further, the guide reinforces the combination of chord sequences for the user. As the user enters data, the graphical representations of key descriptions on the guide change when a key is depressed to 'guide' users to chord completion. In the case of touch-screen equipped devices such as the Palm Pilot or Windows CE devices, the guide is also the apparatus used to input the
20 alphanumeric data. In an alternative embodiment for devices which do not have display features, such as telephones, the guide can either be omitted or supplanted with an audio feedback device which pronounces the corresponding alphanumeric text provided from a completed two-key chord.

The Applicants envision the invention being incorporated into any computerized
25 device, thereby allowing efficient alphanumeric typing within a minimal space. These devices include, but are not limited to desktop computers, laptop computers, notebook computers, personal digital assistants, cellular telephones and digital touch screen devices.

As embodied in a PalmPilot personal digital assistant, the Applicants' alphanumeric input method and apparatus includes a Keyboard Replacement portion (as an
30 input device and guide). Either in addition to the Keyboard Replacement portion or as an alternative to the Keyboard Replacement portion, the Applicants' alphanumeric input method and apparatus also includes a Graffiti area override portion (as an input device) for the PalmPilot personal digital assistant.

As embodied in software for the Windows-family of operating systems, the Applicants' alphanumeric input method and apparatus includes a keyboard keypad (as an input device) and a keypad guide (guide). Alternatively, the present invention could be embodied in any device with a sufficient number of input keys to accommodate the Applicants' chording method described herein.

Operationally, the Applicants' alphanumeric input method and apparatus includes software for monitoring user input, correlating sequential or simultaneous user input into a respective chord and displaying the corresponding alphanumeric character. Such software can be written in any software language as dictated by consumer demands for any device such device upon which the Applicants' method is being implemented.

The software embodiment of the Applicants' invention is a relatively small program which can be efficiently written to allow for nearly instantaneous compilation of the corresponding alphanumeric character, thereby allowing data to be quickly and efficiently entered into the device.

The Applicants' method and apparatus have numerous advantages over existing text input devices. First, the use of a guide allows the user to type alphanumeric text quickly and easily without previously memorizing chords. Further, in combination with the Applicants' chord method, the present invention allows for the efficient entry of alphanumeric data using a limited number of inputs suitable for use on a wide range of devices.

It is a principal advantage of the invention to provide an alphanumeric input method and apparatus which allows for the entry of a wide range of alphanumeric characters from a limited number of keys.

It is another advantage of the invention to provide an alphanumeric input method and apparatus that is suitable for use in connection with a wide range of devices including personal digital assistants, telephones, cellular phones, computer keyboards and keypads.

It is another advantage of the invention to provide an alphanumeric input method and apparatus that is suitable for inputting alphanumeric data in any device with a limited number of input selections.

It is yet another advantage of the invention to provide an alphanumeric method and apparatus which embodies a structure and design which allows the user to efficiently input full alphanumeric data using a limited number of input selections.

Various other features and advantages of the invention are set forth in the following detailed description, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

5 Figure 1 is a flowchart of the method of text input of the present invention.

Figure 2 is a flowchart of the method of text input of the present invention including the dynamic display guide.

Figures 3A and 3B depict the entry of a chord using the Applicants' text input method as implemented on a Windows-based operating system.

10 Figure 4 depicts the keyboard replacement as implemented on the PalmPilot operating system.

Figure 5 depicts Graffiti replacement as implemented on a PalmPilot.

Before one embodiment of the invention is explained in detail, it is to be understood that the invention is not limited in its application to the details of the construction and the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As seen in Figure 1, the method 10 embodying the invention includes monitoring user input 12, accepting a first user input 14, accepting a second user input 18, correlating 22 the chord combination of the first input 14 and second user input 18 to a single alphanumeric character 22 and outputting 26 the result of the correlation 22. Figure 2 shows the method of Figure 1, further including the steps of updating 30 the guide 40 (see FIGS. 3A and 3B) in response to the first user input 14 to display possible chords 22 which can be completed based on the first user input 14 and updating 34 (as represented in Figures 1 and 2). As seen in FIG. 3B, the guide 40 after the second user input 18 to display the character 44 corresponding to the completed chord.

30

By way of example, Figure 3A shows the first input 14 is a "0". The dynamic display 38 of the guide 40 updates 30 (as represented in Figures 1 and 2) after the first input 14 to display the possible chords which begin with the "0" key. As seen in Figure

3B, the second user input 18 is a "1", which results in the software correlation 22 of the sequential inputs 14, 18 to display 34 and output 26 the alphanumeric character "a" 26. The dynamic display 38 of the guide 40 indicates completed chord character 44 defined by the first user input 14 and second user input 18.

5 As seen in Figure 4, as embodied on a PalmPilot device 46 (as depicted in Figure 5), the keyboard replacement portion 48 provides twelve input selections 50 which dynamically change in response to the user's input 14, 18. As depicted in Figure 5, the Applicants' Graffiti replacement 54 software replaces the PalmPilot's 46 pre-installed Graffiti text input software (not shown). When installed and enabled on a PalmPilot 46 or
10 similar device (not shown), the user 58 selects 14 touch sensitive portions of the Graffiti replacement 54 software to input text 60. The New Memo 52 portion of the PalmPilot 46 interface remains unchanged.

 Various features and advantages of the invention are set forth in the following claims.

CLAIMS

What is claimed is:

1. A method of generating an alphanumeric character on a computer using the method comprising:
 - 5 selecting a first input;
 - selecting a second input;
 - combining the first and second inputs such that the combination of the first input and second input correspond to represent a single alphanumeric character; and
 - displaying the alphanumeric character on the computer.
- 10 2. A method in accordance with claim 1 wherein:
said dynamic guide displays available alphanumeric characters based on said first user input.
- 15 3. A method in accordance with claim 1 wherein:
said dynamic guide displays said corresponding single character based on said second user input.
- 20 4. A method in accordance with claim 1 wherein:
said single character produced in response to said correlation of said first user input and said second user input is identical to correlation of said second user input and said first user input.

5. A data input apparatus comprising:
an input device for generating multiple input commands;
a computer connected to the input device for receiving the multiple input
commands, the computer including a processor that analyzes the multiple input commands
5 or generates a single alphanumeric character in response to the multiple input commands;
means connected to said first input means and said second input means for
analyzing said first input selection and said second input selection;
means for generating a value corresponding to said analysis of said first input
selection and said second input selection wherein said value corresponds to an
10 alphanumeric character; and
means for outputting said corresponding alphanumeric character.
6. The data input apparatus of claim 5 wherein said apparatus further includes display
means for displaying available alphanumeric characters based on said analysis of said first
15 input.
7. The data input apparatus of claim 5 wherein said alphanumeric character further
includes non-alphanumeric characters.
- 20 8. The data input apparatus of claim 5 wherein said means for outputting said
corresponding alphanumeric character is a computer capable of accepting alphanumeric
characters.
9. The data input apparatus of claim 5 wherein said first input means and said second
25 input means comprise keyboard buttons.
10. The data input apparatus of claim 5 wherein said first input means and said second
input means comprise selections made to a touch-sensitive pad.

11. A software-based method for inputting alphanumeric data using a limited number of input selections, said software algorithm effecting the acts of:
monitoring user input;
combining sequential user inputs; and
5 providing a single character output based on said user input.
12. A method of inputting alphanumeric characters using computer hardware and software to allow for the input of alphanumeric text with a limited number of input selections, said method comprising the acts of:
10 using said computer software and hardware to monitor user input;
registering a first user input;
altering the display of said computer hardware to correspond to said user input;
correlating using a computer processor said first user input and sequential user
inputs to a single alphanumeric character;
15 altering the display of the computer hardware to correspond to the sequential user
inputs; and
outputting the corresponding alphanumeric character.
13. The method of claim 12 including the additional steps of altering said display of
20 said computer hardware after said first user input to display all single alphanumeric
correlations based on said first user input.
14. The method of claim 13 wherein said method includes using a computer processor
to correlate sequential keystrokes to a single alphanumeric character, and outputting the
25 product of the corresponding alphanumeric character.
15. The method of claim 13 wherein said method includes using a computer processor
to correlate simultaneous keystrokes to a single alphanumeric character, and outputting the
product of the corresponding alphanumeric character.
30
16. The method of claim 13 as implemented on a computer programmed to execute
said method wherein said method is implemented in hardware or hardware and software.

17. The method of claim 13 as implemented on a computer programmed to execute said method wherein said method is implemented in a logic circuit or other component of a programmed computer.
- 5 18. The method of claim 13 as implemented on a computer programmed to execute said method wherein said method is implemented in computer memory encoded with executable instructions representing a computer program that can cause a computer to perform the steps of said method.
- 10 19. A method in accordance with claim 1 wherein:
said first user input is simultaneous with said second user input.
20. A method in accordance with claim 1 wherein:
said first user input is sequentially followed by said second user input.

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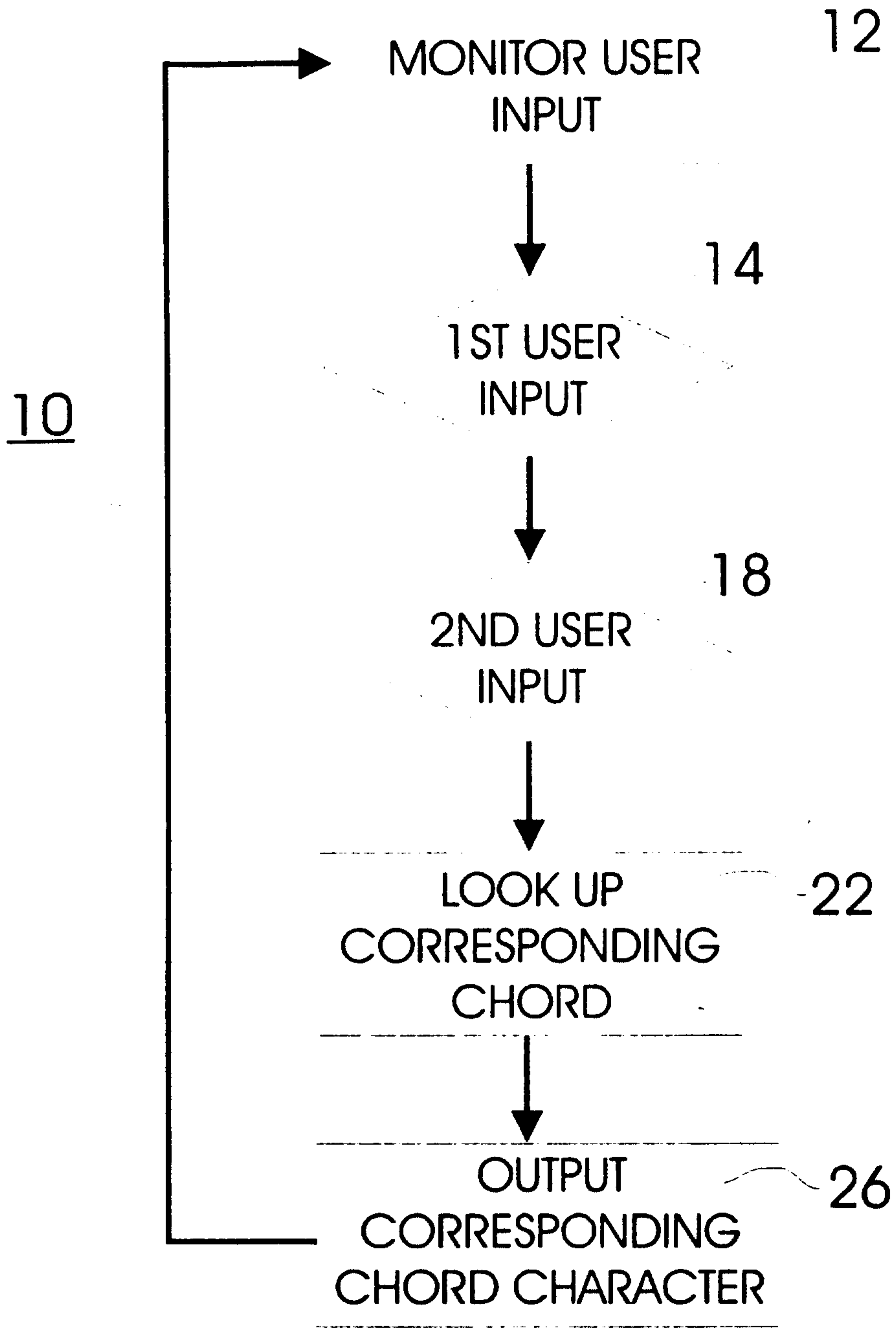


FIG. 1

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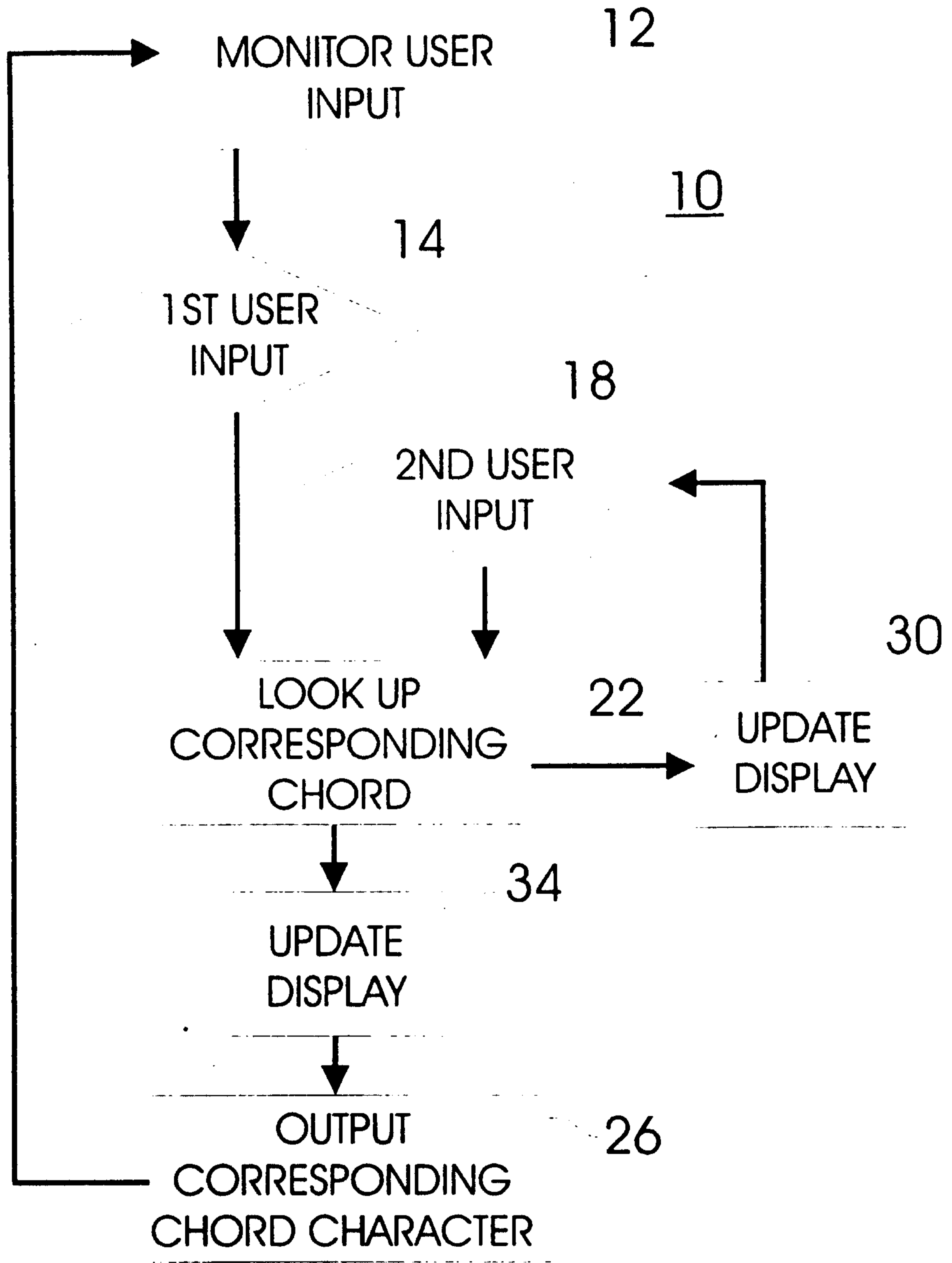
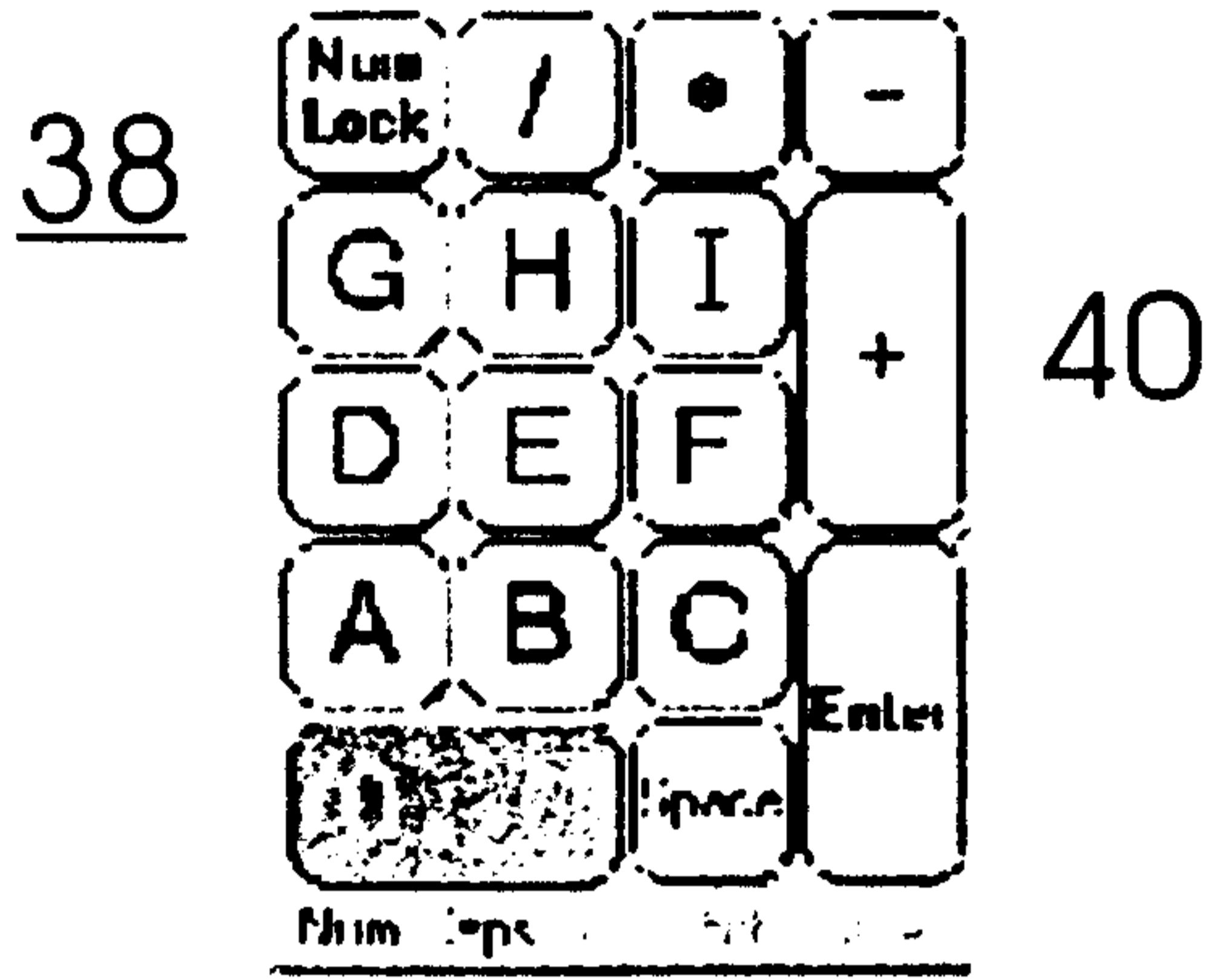
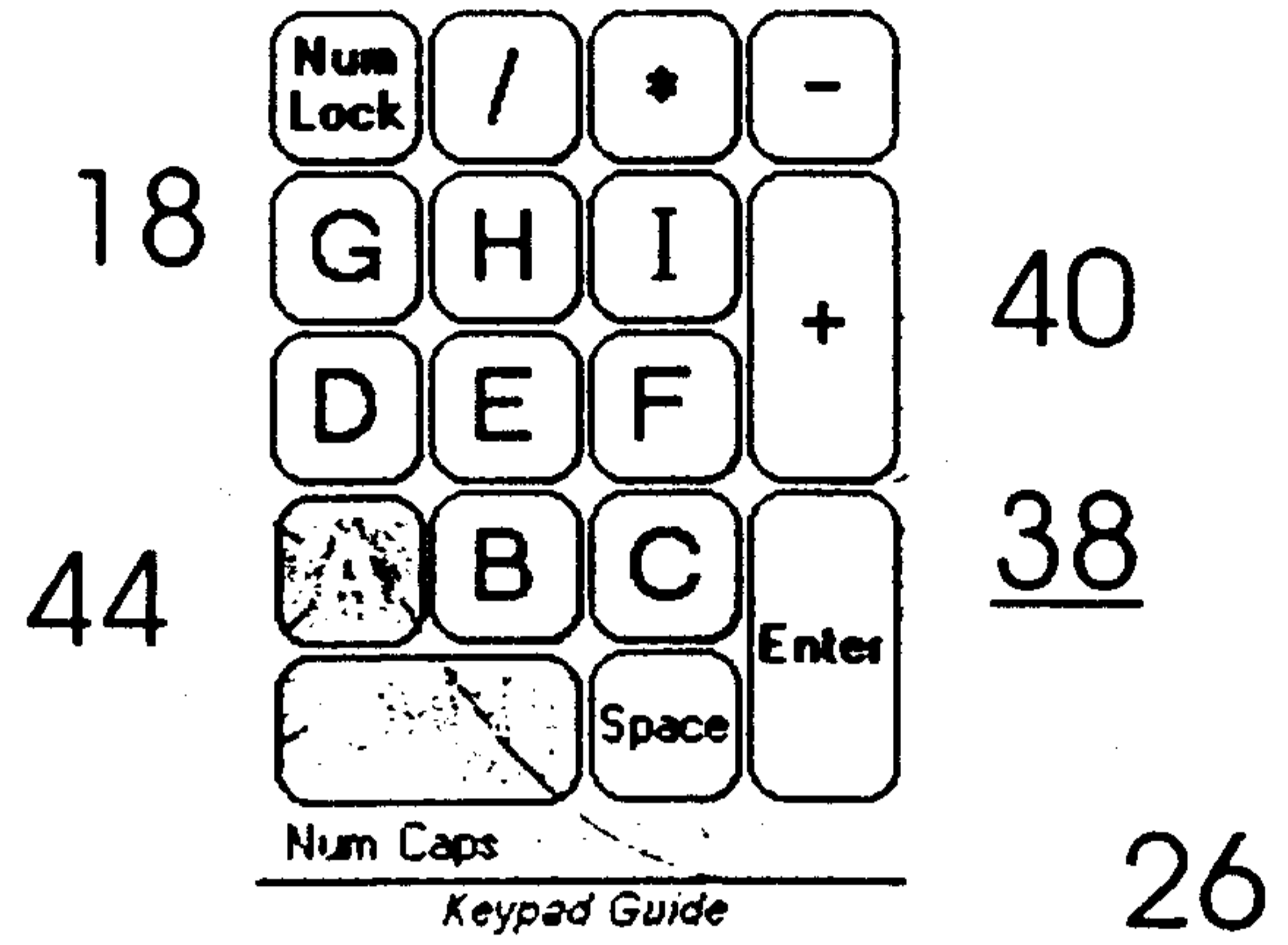


FIG. 2



14 FIG. 3A



14 FIG. 3B

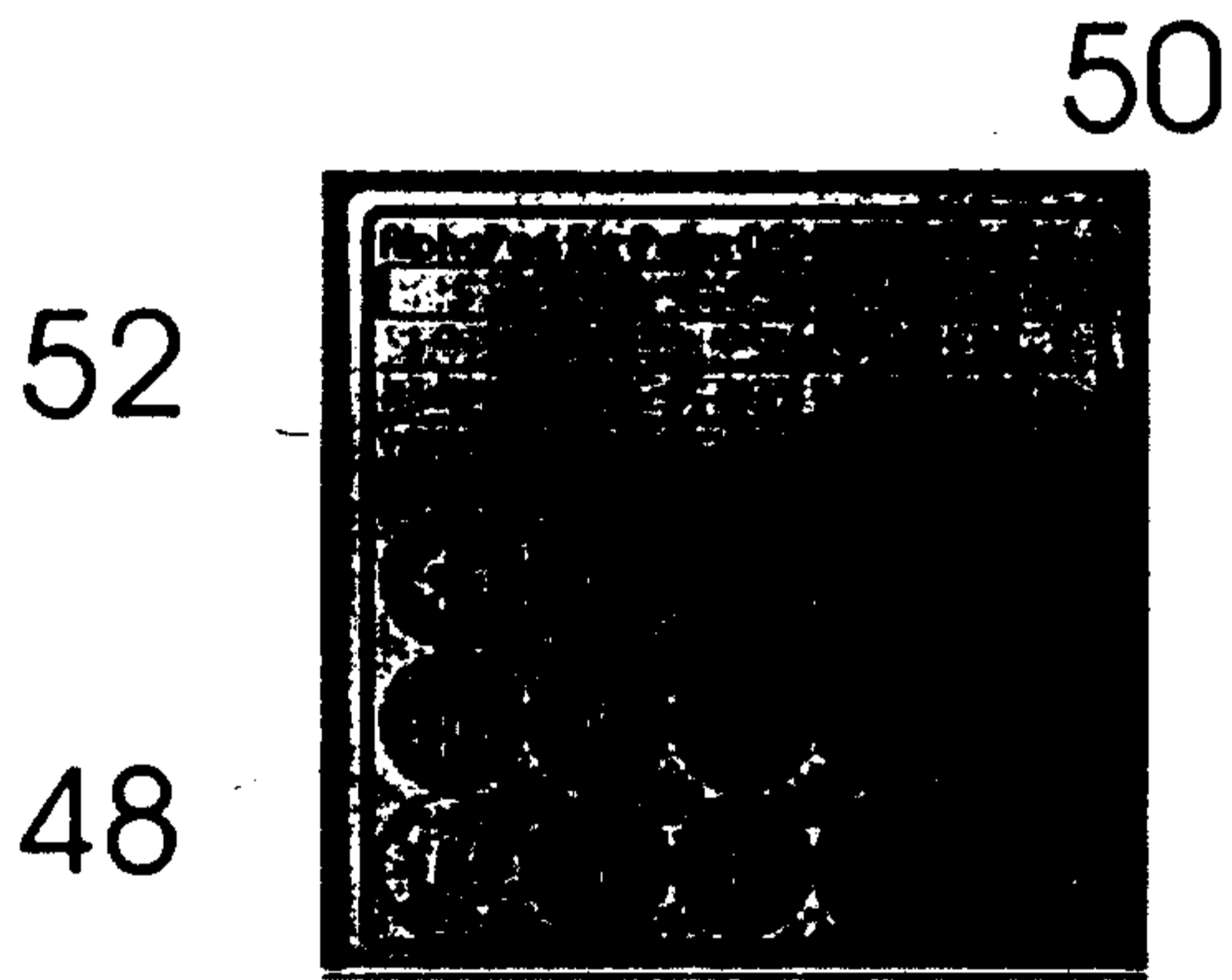


FIG. 4

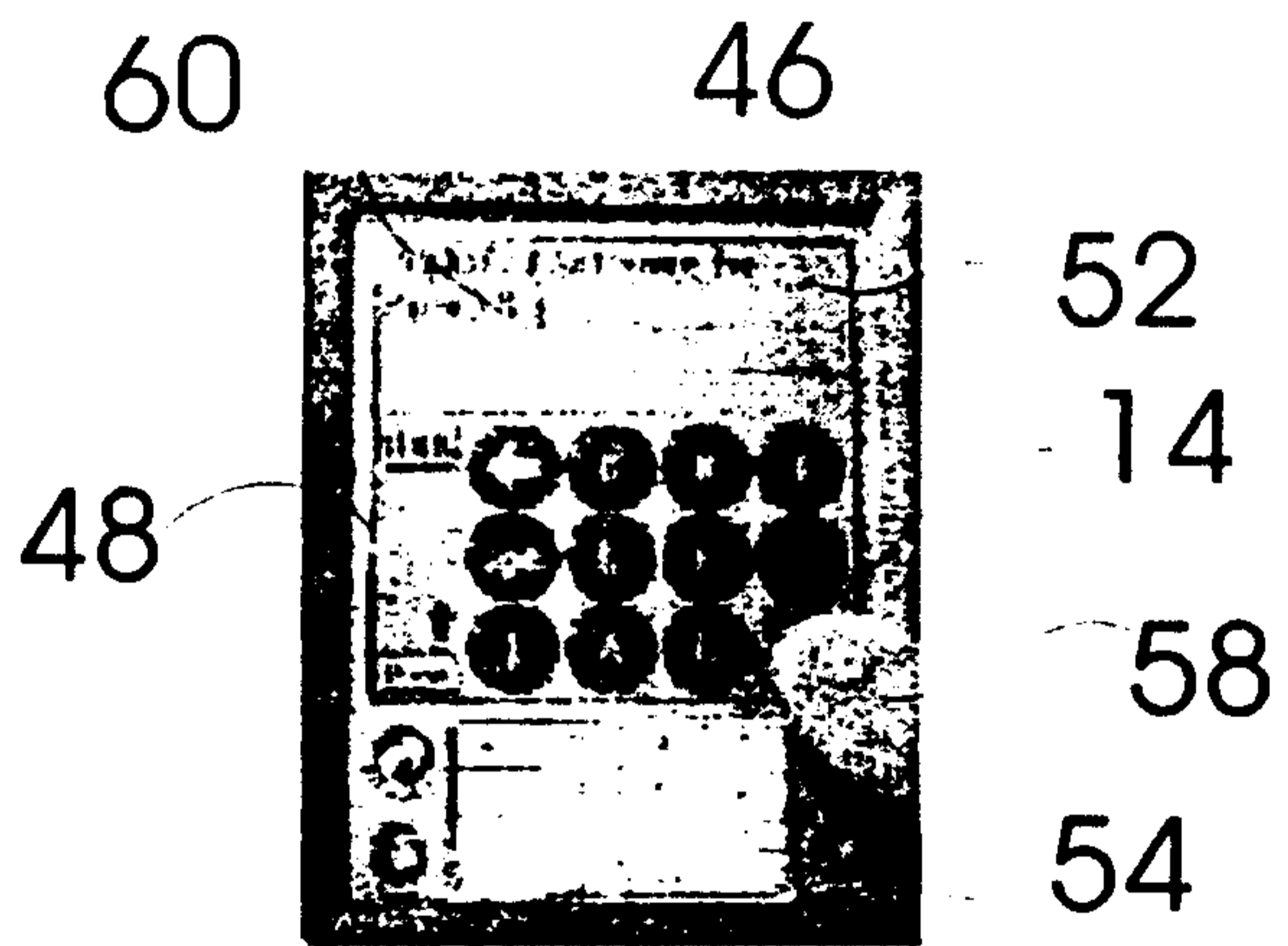


FIG. 5

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