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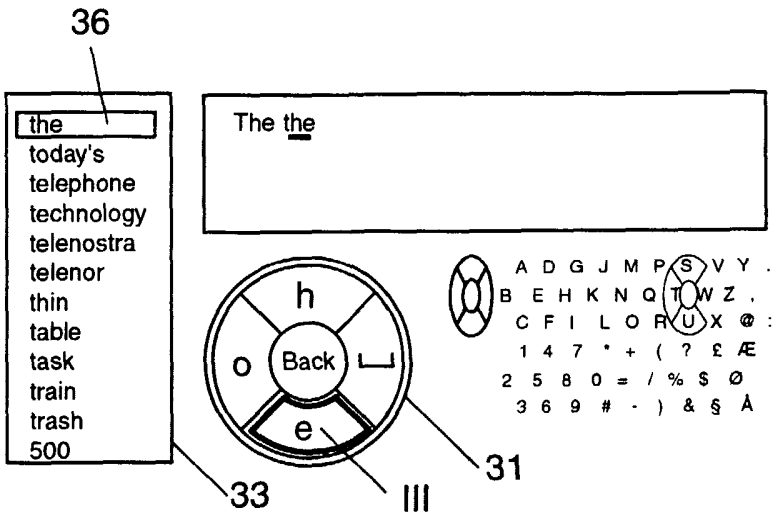
(54) Title: SYSTEM FOR PREDICTING INPUT OF DATA ELEMENTS



(57) Abstract: A system for input of data elements, e.g. letters, signs, numbers and/or symbols in connection with an electronic apparatus or device which has or is connected to a display, wherein the system is so configured that on input of at least one first data element in a data phrase it offers suggestions of the data phrase. A stepwise rotatable multifunction switch having five depression points causes on rotation movement of a marker across an array of said data elements. On the screen there is shown an animation of the multifunction switch and its depression points, and also the successive data elements over which the marker is brought to lie for selection of at least the first data element on depression of the switch at the given depression point. The system is so configured that after input of said at least first data element and/or possibly further data element(s) predictively, it shows on the display, without further rotation of the switch, predictively at least three data elements on the switch animation for further construction of words, independent of the marker's position on the array of data elements, and at the same time offers suggestions of remaining data elements in a complete data phrase.

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System for predicting input of data elements

The present application relates to a system for letter, sign and/or symbol input in connection with electronic apparatus, as disclosed in the preamble of the attached patent claims.

The invention is also related to a system for the input of data elements, e.g., letters, signs, numbers and/or symbols, in connection with an electronic apparatus or device which has or is connected to a display, wherein the system is so configured that on the input of at least a first data element which is part of a data phrase it offers suggestions of the data phrase, as disclosed in the preamble of attached claims 23, 24 and 25.

When using multifunction keys on electronic apparatus such as a mobile telephone, a PDA, a pocket PC, a remote control, a calculator, vessel control units etc, the user will, with the system described in this application, find it easy to operate the various functions in the various apparatus.

The invention represents further development of the invention described in the applicant's earlier application PCT/NO00/00412.

The invention will be described in connection with the use of sliding and rotary switches. These are described in more detail in the inventor's earlier applications PCT/NO99/00373 and PCT/NO01/00057.

In order to describe the different systems, apparatus such as a mobile telephone and a PDA/pocket PC are used as illustrations in this application, although this should not be taken as defining the limits of the invention. The system is based on the screen showing or reflecting the possible functions of the switch and showing or giving feedback in response to the choices made and the functions operated. Thus, all screen-assisted and screen-based devices can be used according to the system described herein.

Today, input of text, in particular in small apparatus without a complete keyboard (like a PC/typewriter) is somewhat cumbersome. This is because one and the same key may be a means of input for several letters/symbols/signs. This means that the user has to press the same key many times in order to obtain his desired choice, and with the many functions apparatus such as PDAs and mobile telephones have today it is easy to "become bogged down in" menus or to become entangled in functions.

There are various solutions on the market which make a guess at words on the input of text. One example of such a solution is T9 from Tegic, cf. PCT/US98/20200, WO99/15952. This system guesses words/letter combinations of the same number of letters as the word the user requires or enters.

Another system guesses words in response to the letters that have been entered and places the alternatives on a line for the user to choose from. (This is found, e.g., with Linux).

The inventor's patent application PCT/NO00/00412 describes a system which guesses words as the user writes. This means to say that the user can continue to write if the system guesses wrong. The system guesses on the basis of a list of words from which words are chosen on the basis of priority, i.e., according to how frequently they are used. There are a number of documents which describe similar subjects, such as US5952942, US6002390 and WO 00/34880, although these documents cannot regarded as anticipating the novelty of the present invention.

The characteristic features of the first aspect of the invention are set forth in attached patent claim 1 and its associated subclaims 2-22, and are described with reference to the attached drawings, Figs. 1-7 in the following description.

In what follows a predictive system for use in connection with apparatus operated with just one switch will be described. The system can also be adapted to today's standard pushbutton keyboards and touch screens.

It is also intended to show how the system mentioned above is meant to be implemented in practice in connection with a rotatable, multifunctional switch having five pressure points. Referring to Fig. 5, a predictive system is shown where a such a switch type is used. In this case a predictive selection of letters takes place by highlighting or marking relevant letters which are arranged in a "keyboard".

It is also an object of the present invention to take the form of predictiveness shown and described in Figs. 1-7 a step further, primarily in connection with the use of the said rotating, multifunctional switch.

Thus, it is an object of the invention to simplify a system for input of data elements, as for example letters, signs, numbers and/or symbols, thereby enabling words or sentences to be entered considerably faster when using a multifunctional switch of this kind than has been possible before.

Another object of the present invention is to be able to adapt the system to a conventional keyboard per se, although the same advantages are not obtained as when using a rotatable, multifunctional switch.

The primary characteristic features of the second aspect of the invention are set forth in attached claims 23, 24 and 35 and subclaims 25-34 and 36-39 associated therewith.

This part of the invention will be described in more detail with reference to the attached drawings, Figs. 8-12 which serve as non-limiting embodiments of the present invention.

In addition, reference is made to PCT NO99/00373, which relates to multifunction keys, PCT/NO01/00057, which describes multifunction keys and the use of multifunction keys in handheld apparatus such as a mobile telephone, a PDA, a mini PC, or a remote control related to PCT/NO00/00412 and in connection with a car as described in PCT/NO01/00056.

Fig. 1 shows a first aspect of the system according to the invention.
Fig. 2 shows a second aspect of the system according to the invention.
Fig. 3 shows a third aspect of the system according to the invention.
Fig. 4 shows a fourth aspect of the system according to the invention.
Fig. 5 shows the use of a first version of a keyboard for operating the system.
Fig. 6 shows the use of a second version of a keyboard for operating the system.
Fig. 7 is a schematic illustration of the structure of the system according to the invention.
Fig. 8 shows by way of example a rotatable multifunctional switch with five pressure points.
Figs. 9a-9m show in steps an interactive display presentation with an animation of the actual switch with its five depression points, and also related screen images.
Figs. 10a-10h show a variant of the system disclosed in Figs. 9a-9m.
Figs. 11a-11u illustrate the entry of data using a rotatable switch as shown in Fig. 1 interactively with a display and a predictive letter and word system.

Figs. 12a-12d shows the use of a traditional pushbutton keyboard in connection with the system shown in Figs. 9-11.

In the following description it will be understood that a screen image on a display will reflect the input and navigation options which, for example, the use of a multifunction switch will have. The screen image can be adapted to a smaller display screen which is usual for a mobile telephone, but is of course adaptable to larger display screens which are not only used on mobile telephones but also for other apparatus. Therefore the system is not limited to mobile telephone application, but could also easily be used in other apparatus and applications such as ordinary telephones, PDAs, PCs, remote control units, other input devices etc.

The system shown will also be capable of being used (with modifications) on switches which vary as regards the number of pressure positions, sliding or rotational positions. This will also apply to rotary switches which operate in different planes (horizontal or vertical).

As will be apparent from some of the earlier applications, it is possible when using a multifunction switch to distinguish between a long and a short key press. The user also distinguishes between different functions and commands with a toggle or sliding function (a toggle function is a short sliding movement of a switch, where the switch will automatically move back to its previous position once actuation ceases, cf. PCT/NO01/00057). In a text mode it will be possible, for example, to enter new letters/symbols/numbers by means of a short key press. By means of a long key press, it will be possible, for example, to choose other symbols or submenus.

One alternative may be to use short and long key presses so that the user has two options for each position on the screen, but distinguishes between these by means of long or short key presses.

It should be mentioned that all the system solutions shown and described per se will be capable of being utilised in connection with the use of conventional pushbutton keyboards, but will then not be as effective in practice.

In today's pushbutton keyboards arrow keys are often used to cause a cursor to move across a screen. However, the systems discussed in this description can also be utilised directly when a touch screen is used. In this case, touching the screen at the different

positions and functions will replace the positions to which the various switches in the illustrated systems would have to be moved. However, the user will be dependent upon all information being shown on the screen.

A method for the use of a sliding switch across five steps and with four possible depression points, without toggle, will now be described.

For input or writing to take place the user must be in a write mode, i.e., for example, he must write SMS if the apparatus is, for example, a mobile telephone, as assumed in this example. The apparatus will preferably have a memory in which is stored a reference book/dictionary for the language that it is to be used. However, it is conceivable that information from a reference book/dictionary can be fetched from an external memory, as for instance from a telecommunications operator (APS, Application Service Provider). Other aspects concerning language will be touched upon later in the description. It may well be thought that it would be difficult to have so much memory capacity in such a small apparatus as a mobile telephone, but it looks as though this will be a problem of the past in a very short time (just like battery capacity). Another aspect is systems currently in the pipeline which will have a much larger transmission capacity and rate than we have today. This will enable users to exchange much greater amounts of data and information via both fixed lines and wireless connection.

The system is intended to be programmed so that the words which the user employs most come first, that it is to say that, no matter what their length, words will come or be shown successively in the priority order they have according to previous use. If the list of words does not have any priority order, the shortest words will be shown first. If a long word has been in use more than a short word with the same beginning, the long word will be shown first according to the system with priority order. The text the user is writing will be shown in a separate field in the screen image, i.e., on the display. In addition, the words the system guesses will continue to appear in the text. At the same time, for example, six successive words in priority order will be shown in the six fields (in this case) at the bottom of the display screen. Of course, the number of fields may be slightly smaller or slightly greater. In addition, a number could be shown which indicates the total number of words than can be chosen from. Here, regardless of the position of the switch, the user can either confirm if the system has guessed correctly, continue to enter letters, thereby reducing the number of word options, or choose another word from the list shown.

In connection with Fig. 1, especially Figs. 1e-1j, it should be noted that the splitting of letter groups is an important principle which, in combination with a predictive system, can make letter input extremely efficient. On the input of text, the user will, by means of the system, split letter groups for the selection of the right letter or sign. If the system has selected a word on the basis of a letter from a particular group of letters, but the user requires another word, the user will eliminate the suggested word based on the letter which was rejected by entering a letter from another group of letters. If the letter is correct, but the word is wrong, the letter is approved and all the predictive options which then follow include this letter of group of letters. The system thus guesses words on the basis of entered letter(s). If a letter is rejected, the possible options the system has for guessing the right word are reduced. The whole list of words is narrowed down to the words which contain the selected letters.

As indicated in Fig. 1a, field 1 will essentially show the main options which are chosen by a short key press in relation to the individual fields. Field 2 shows other functions and is chosen by a long key press of the multifunction key 3. Fig. 1a thus shows a "start" image where the main options are shown in field 1 and the subsidiary options are shown in field 2. The whole menu is shown when the user presses the function key 3 at II. As shown in Fig. 1b, the menu will spread out in the main field 4. Pushing the button 3 through Y5-Y1 will result in the selection of the desired submenu or function. If the position Y5 is chosen and the user presses the button 4 at position III, he will thus choose SMS from the menu, and thereby go straight into a write mode as shown in Fig. 1c. If the user does not choose MENU, he may go straight to SMS which is provided as a fast select field 2, X2 in Fig. 1a.

Position Y2-Y5 will contain the normal alphabet, and is shown in field 1 for each switch position. Field 2 shows commands which are activated by a long key press (or a double key press, depending upon the programming). The set-up in this case is such that the menu or main functions are in position Y1 and are thus shown in field 1. It may also be the case that the menu line can be assigned to Y5, or installed as an option in the setting of the menu for the apparatus in question.

A predictive system of a first type will now be described.

We want to write "TELENOSTRA". After choosing SMS (Short Message Service) or another write mode, the letters will be split into groups of three in field 1, cf. Fig. 1c. As shown in Fig. 1e, the switch 3 is then moved to Y3 and STU is selected by pressing

the switch or button 3 at position I thereof, whereby the letters are split up as shown in Fig. 1f. The letter T is then selected by pressing on II, cf. Fig. 1f. After input, field 1 will revert to showing the groups of letters present in the switch position in question, see Fig. 1g. In Fig. 1h the switch 3 is pushed to Y5 and the group DEF is selected and splitting takes place, see Fig. 1e. Then the next letter E is entered and the predictive system will guess one word, see Fig. 1j, in this case "TELEFON". This word is selected as the memory in the system finds that this word has been used the most. If the system had not built up a memory of "used" words and had no priority of use, the system would select words alphabetically.

The system can also be so configured that words are guessed upon the first selection of a letter group. Thus, it is possible to pass directly from, e.g., Fig. 1e to Fig. 1j.

As regards word use, this can be preprogrammed in order to adapt to the language of individual countries. There are standards (publicly available) for the most used words in different languages. Such words can be priority listed in a memory in the apparatus. There are many possibilities here, and alternatives are conceivable in which the user may choose to program the priority system and select words in an area of style or jargon, e.g., slang, academic, child-friendly, militant, old-fashioned ... etc. The possibilities are virtually endless.

Fig. 1j shows in field 1 further alternative words which have the same two first letters, in this case selected according to priority. In field 4, see Fig. 1k, six alternative words are shown, which indicates the number of words that have been used earlier and that are in a priority list, in this case six, with the remaining 56 words in the whole list in alphabetical or standard order as indicated by the reference numeral 5 at the bottom right-hand corner in field 4 in the example.

The number of words shown, or the position on the screen thereof should not be limiting for the system. An alternative embodiment is shown in Fig. 1k where a first field 6 shows the most used words and field 7 is for the words (or as many as there is room for) from the standard list. Field 1, indicated by the reference numeral 8 in this figure, is thus placed in the main screen area 4. Here, the user can choose three words at a time by pushing the switch in the Y area. Field 2 has also been brought up on the main screen area 4 and is indicated by the reference numeral 9 in this figure and represents sub-options which can be selected by a long key press. It is possible to choose to continue to browse in the list by means of a long key press III MORE.

Fig. 1l shows an example where one of the words shown in field 1 is required. The switch 3 is depressed at II , thereby selecting the word TELENOSTRA. Fig. 1m shows that a long press I on the switch 3 will allow the user to confirm OK in field 2 that the input is complete, and the system goes straight on to the input of a telephone number, see Fig. 1n. Here, the user also has the option of going straight into a telephone list by means of a long press in position II on the switch 3, see position PHB in field 2. Alternatively, the user may push the switch 3 into a position which allows him to enter the main menu, see Fig. 1o. If the user wishes to continue input, the word is confirmed by means of a long press at II on the switch 3, i.e., SPACE, see Fig. 1m. The user can then write in new letters or words.

We can also make a variation of this in that the words guessed are not shown in field 1, but only written out on the screen in the text. If the user accepts the word guessed, he presses, e.g., SPACE. If he does not accept the word, he continues to enter letters.

Alternatively, as shown in Figs. 1s and 1t, the user may keep letters in field 2 for direct further input of letters. This may be appropriate if the user doe not want any of the listed words, or if the user would like to reduce the list, he can enter new letters directly. By means of a long click, the user may choose between the words in field 2. To choose from the words listed on the screen, the switch 3 is moved in the Y direction. To bring up more words in the list, the user must go via Y1 where field 2, position X3 will provide a link to more words, see also Fig. 1j.

In the above explanation, it has been assumed that words are guessed after the second letter entered. This is not limiting as it is possible to install as an option in a set-up program of the apparatus when (i.e., after how many letters) the user would like the predictive system of the apparatus to be activated.

With regard to priority lists of words as shown in Figs. 1j-1l, these may be grouped in several categories. Here, the list is split into previously used words and unused words. In addition, it is possible, as mentioned, to have a group of standard words (i.e., words which are statistically most used). The system should allow the user to preprogram the alternative(s) he would like. At the same time, all the alternatives or lists can be available if desired. The different alternatives may, for example, be alternatively coded by using colour. E.g., green = most used; yellow = standard; red = never used before. As already mentioned, this may apply both to letter groups and to word groups/lists.

The system should also contain a predictive function for signs in connection with writing. We envisage that when a word is written and accepted a sign will be suggested as well as options for direct access to other signs. See Fig. 1p – Fig. 1r. A full stop is shown after the word on the screen. Field 2 shows groups with additional signs for direct access by means of a long key press. The user confirms the guess by pressing to select letters for a new word. This also happens if the user moves the switch in the Y direction to select another group of letters, see Fig. 1r. In this case, the signs in field 2 will also be changed to allow other sign options. If the user would like a sign other than those suggested, he makes a long click for the sign group he wants so that the desired sign can be selected. When sign selection has been made, the system will automatically make a space and "normal" set-up for input is shown, see Fig. 1q. If the user does not want a sign, he pushes "CLEAR", and an automatic space will appear. The user may then key in for the desired groups of letters for further input of text.

An alternative for predictive punctuation can be limited to the most used signs such as full stop, exclamation mark and question mark. These may then be shown as a direct option is field 2 (X1, full stop, X2. exclamation mark, X3, question mark).

Predictive systems as described here must be adapted to each individual language in order to function. In this description of the language part we have used Norwegian words, but could just as easily have found English words or words from other languages.

As regard typical designations in Norwegian as prefixes, this will be described on the basis of Fig. 2. We have, for example, the prefix FOR-. Many words start with the letters FOR. By pressing II on the switch 3 as a long key press, see Fig. 1b, the user confirms the word FOR. In Fig. 1c I is selected on the switch 3, i.e., FOR-, and the system guesses at words beginning with FOR, but shows only the endings. Many of these words are combinations of FOR plus another letter or another word, as for instance –BEIN, -D, -AN, -DEL, -KVINNE, -MANN, -SIKRING.

A predictive system of another type will now be described.

We are going to write the word "TELENOSTRA" using a system which guesses the most likely letter on the basis of the preceding letter. The basis of this system is that the group of letters will select the most used letter on the basis of the preceding letter

without first making a split. Thus, if the system guesses correctly, only one key press on the letter group is required to enter the desired letter. If an obvious candidate is not found in the desired group of letters, the system will split the group and the user must select the desired letter manually, which means that the user continues to write in the normal way.

The starting point in Fig. 3a – Fig. 3b is that the user is in a mode for input of text, i.e., a variant of the starting point shown in Fig. 1a – Fig. 1e. Fig- 3b shows the splitting of the desired groups of letters and the user selects T. The user then wants the letter E and finds the group DEF as shown in Fig. 3d and presses II on the switch button 3 and obtains E straightaway. Here the system guesses the letter E because a list in the memory has registered that E is the most used of the three letters in the group in question and thus most likely after the previously entered letter T. If the system does not have any priority among the letters in the group in question, the system will split the group and a manual selection must be made, here shown in Fig. 3e and Fig. 3f. If the system automatically selects a letter the user does not want, for example E in Fig. 3d, the user presses IV (CLEAR) on the switch button 3, as shown in Fig. 3g and the system splits the group of letters in question, cf. Fig. 3h.

A variant in this system is to automatically show a selection of vowels after the input of consonants as shown in Fig. 3i. This may be appropriate at the beginning of a word. Further on in the word a selection of both vowels and consonants that are natural on the basis of previously used combinations can be shown.

Fig. 3j – Fig. 3n show a system where a predictive system guesses the most probable groups of letters and shows them in field 1 regardless of which row the switch is in. Fig. 1o shows an alternative where the system is so configured that after a number of letters have been written and the word ends temporarily with a vowel, the system will try to find the letters, in this case consonants, which are the most likely to be used.

It should be specified that the system at any given time selects the letters and/or words which are likely to be required by the user. These choices on shown on the screen. When it comes to showing choice of letters, nine different letters can be shown in field 1 and/or field 2 in connection with Fig. 3i and Fig. 3o which will naturally follow a previously entered or input letter. In a system of this kind the letters do not need to belong to the same group originally. In this system we have divided the alphabet into groups of three. Nine letters can be presented in three groups spread across the field in

order to then be split and selected. The probability of the right letter being among those presented is very high. After all, there is a limit to which letters naturally follow one another in an alphabet.

As already mentioned, the different options can be colour-coded. In this alternative the different letters can be coloured according to how probable it is that the letter combination will be suggested for use. For example, the group AEI in Fig. 3i can be coloured green (most used), OUY yellow (less used), ÆØÅ red (never used). The same will apply to Fig. 3o. Here it should also be mentioned that the whole group does not need to be colour-coded, but that each individual letter can be coded. It should also be pointed out that the system includes the possibility of vowels and consonants being mixed in the groups.

Referring to Fig. 3j – Fig. 3o, it pointed out that after, e.g., the consonant T has been entered, the system will look for element groups containing vowels, or the most probable vowels in connection with the consonant. Thus, when T has been entered, field 1 will change the letter groups from STY VWX YZ@ to ABC DEF GHI as shown in Fig. 3k. A depression of the key 3 in position II will cause the automatic selection of the vowel E. Then a shift is made to the most probable groups shown in field 1 in Fig. 3l and L is chosen, whereupon the field 1 changes to that shown in Fig. 3m and the system predictively selects E. In Fig. 3n the system suggests the groups STU DEF PQR and if this is not suitable, a next array of groups is suggested as shown in Fig. 3o, i.e., DFG HJK LMN. We see that, regardless of the position the switch is in, the system will show the relevant predictive options in field 1, even though they do not "match" the position the switch is in. However, this will not be a problem for a rotary switch which can also be pressed.

In this connection, an example of how the system will work in conjunction with a standard pushbutton keypad is shown in Fig. 3p – Fig. 3u. When one, or possibly two letters have been entered, the system will guess likely letters which are suitable as the following letters, and on the basis of this also suggest a word. The letter alternatives are shown in field 21, and the group with the relevant letter is selected by pressing the OK key. If, for example, TELENOSTRA is to be entered, the following is done. The group STU is selected, the letters are split up and T is chosen by pressing the OK key 22. In the illustrated case, the system proposes the word TAKK. If this had been correct, the user could have pressed the 0_ key and continued for the next word. However, the word desired is TELENOSTRA and E is selected by pressing the OK key 22. The

system then guesses TELECOM and at the same time the likely letters for other words are put in the fields. Here, after splitting (see Fig. 3s) when OK key 23 is activated, the letter L is selected, wherein OK key 23 is activated again, see Fig. 3t. Although both TELENOSTRA and TELECOM contain the letter L, the entry of L will inform the system that another word with the letter L as the third letter is desired. This results in the screen image shown in Fig. 3u.

From that explained above in connection with the two predictive systems, it will of course be seen that a combination of the systems could form a further, third system which by means of advanced programming could provide an efficient input of text without having to key in all the letters.

As mentioned earlier with regard to the user forming his own menu, he may also program requests that the telephone should guess words and/or letters from first to – letter etc., or not guess at all. (Similar settings are found today in telephones equipped with the T9 system, where the user may choose to have the system on or not.) In a third predictive system of this kind with several ways of guessing the right text, the user should be able to freely set the apparatus concerned so that a level of predictiveness is obtained. That is to say, e.g., to choose between word and/or letter guessing.

A further possibility with an extended predictive system of this kind is the option of obtaining input of letters without having to go via a selection process, i.e., as described in Fig. 3d, where the system guesses at one of the three letters on the switch on the basis of the letter arrays which give the most common or most used words.

As the system can guess words, it is possible to extend this so that the system guesses sentences or phrases. This requires a memory and processing power which can "go through" text to see the probability of the same sentence or phrases being used again by first analysing the first letters and words.

Example:

Enter:	Kommer, guesses:	*du hjem snart?*
	Jeg	*elsker deg*
	Jeg	*kommer hjem snart*

As shown in previous figures, the user can quickly confirm the suggestion or move on to the input of another text.

A predictive solution in connection with the input of numbers will now be described.

Related to Fig. 4, the system of the invention will be predictive in connection with the input of a telephone number. In a first alternative, the system takes into account the numbers stored in the apparatus. It presents a list of the most used numbers on the basis of the first digits, for example, the first three digits.

As shown in Fig. 4a - Fig. 4c, the first three digits of the telephone number are entered. The telephone suggests and lists the numbers that begin with these three digits. Field 1 shows the other numbers. Indication 5 shows all the available numbers starting with the digit combination in the same way as has been explained earlier in connection with words. If the user wants to see more numbers, he presses on MORE (long key press). Then numbers will appear three at a time in field 1. Alternatively, as shown in Fig. 4e, many more numbers can be shown. Of course, as another alternative, names could be shown instead of or in addition to the numbers, see Fig. 4f.

If none of the numbers are correct, the user continues by pressing CLEAR (short), or toggle /move glider. This will allow the input to continue and the telephone will guess again etc. If the user is in a mode where the screen image shows all the number alternatives, the user can exit the whole list by means of a long key press and the system will not guess other numbers. It is an advantage if the user knows that the number is not already to be found in the list.

In connection with telephone lists, the system can sort these so that, for example, foreign numbers are stored separately. The user can retrieve these by, for example, entering + or 00. Different dialling codes or names of countries will appear first. When countries are chosen, the different dialling codes will be shown on the screen according to a priority list.

It is also conceivable that mobile telephones will in time be equipped with an extended memory which will make it possible to store all incoming and outgoing calls/numbers. These could also be stored with the net operator, but linked up to each individual apparatus. This will allow the system, in another alternative, to guess from numbers that have not been pre-stored. In a system of this kind, any pictures the users exchange may also be stored.

One advantage of this is that the user can call up a number that has been through the telephone without having specifically stored it. This means to say that the user can remember the first digits, but when presented with a list of relevant numbers he may be reminded of the whole number when seeing it on the display.

It is conceivable that telephone operators will store "traces", i.e. numbers (and other data) which the apparatus can retrieve when there is a need to do so.

A more detailed description of a predictive keypad will be given in what follows.

On the input of text in apparatus which have a standard keypad or keyboard (such as a telephone, calculator, PC (Qwerty) or the like), it may be particularly advantageous to make use of a touchscreen keyboard, i.e., a keyboard which is shown on the screen and touched directly for input of the desired functions. It will then be possible to install a function which marks the letters or numbers guessed by the system in different ways, perhaps by using colour or highlighting on the keyboards themselves. For example, the user wishes to write TELENOSTRA: T is entered; all the vowels light up on the keyboard; E is chosen; a selection of the most used consonants light up, including L which is entered. In addition, word and sentence guessing may be programmed to appear as suggestions on the screen.

As taught in the applicant's document PCT/NO00/00412, the user can easily control various screen-assisted apparatus by using various switch solutions (such as sliding switches, pushbutton switches and rotary switches). In this connection, reference will be made to Fig. 5 in the present description where the writing of a text can be executed by using a rotary switch. Different arrangements on the apparatus screen are controlled by using the rotary switch. If the apparatus is controlled via a touch screen, the system can still be used.

Fig. 5a shows an electronic apparatus (e.g., a mini-computer/PDA/mobile telephone) which is controlled by a multifunction key, in this case a rotary switch with four clicks (as shown before) and with an alternative centre click. Fig. 5b shows how the alphabet is arranged on the screen 10 for the selection of the individual letters/signs and functions by using switch 11. On the left-hand side of the field is an overview of what the different depression positions represent, here, represented as A's which show the positions for input of letters and characters. As shown in Fig. 5d, the switch will change character by positioning the right-hand III pressure position on the switch 11 on an

arrow in the function field. Unlike the earlier positioning of so-called global functions (described in PCT/NO00/00412), this is assigned to the III position.

We see that the major advantage of multifunction switches of this kind is that functions can be placed where they are at all times practical in relation to the apparatus and the functions it is to control.

Figs. 5b - 5d show how the function field can change character. This is done by going via a SHIFT function by a click in position III on the switch 11 after having rotated the switch 11 to the right (shifted from "CLEAR" to "SHIFT").

The cursor fields will move across the functions which are in the field. Fig. 5d shows active navigation selected (by arrows). Alternative navigation can be obtained if a cursor control switch 11' is mounted in the centre of the switch 11 (stepless joystick-like system).

On the basis of the above explanation, Fig. 5f – Fig. 5i will now be explained. As has been stated earlier in this description, on the input of text, the user will have systems for guessing likely words and/or letters according to priority of use /probability calculus.

Fig. 5f shows the started word TELE (we want to write Telecom). The system guesses the letters PHC (that is, e.g., Telepati, Telehuset, Telecom). If we had wanted Telenostra, i.e., N, we would have had to turn the marker to N (i.e., the option YHN). No matter where the marker is, we do not need to turn the switch 17 now, but can press II and obtain C straightaway. The system will then "pick" the letters O, A (e.g., Telecom/Telecamera). We press the key 11 (without rotating it) at IV and get O. The system then goes on to pick the letter M. We can confirm this at II.

By combining a selection of probable letters with a guess of completed words, we can save many key presses and rotational or sliding movements.

A typical keyboard as shown in Fig. 6 can be arranged on a screen 12 and can be used for text input either by marker control (mouse control), multifunction keys as shown in this application, or a touch screen. The system will also function under these conditions and predictively make selections by marking likely letters.

As shown in Fig. 6b, Te has been entered and the system guesses the word Telenostra. Here, the user can either choose to confirm this (by using "Enter") or to continue to key in letters. The system will mark on the "keyboard" 12 the letters (in this case d, l or m) which it is most likely that the user will use. This is done on the basis of a list of words found in the memory. If the user does not want the selected word he enters more letters. In Fig. 6c the letter c has been marked, as have the letters n and p. These letters have been selected so that the system can guess a new word. This can be confirmed by "Enter". Further writing will take place following the same system as described above with the possible alternatives as described earlier.

The invention also affords the possibility of the use of sound, i.e., voice feedback. This will depend upon how well voice recognition technology develops in the coming years.

Fig. 7 is a schematic illustration of how the system can be constructed with a microprocessor 14, a memory 15, an optional further memory 16 (e.g., an external memory), a reference work 17 (which also may be external), a dictionary 18 (which also may be external), an input unit 19 for input of data elements, acceptance of suggested data phrases or selection of alternative phrases and selection of other functions for controlling the system, and a display 20. The unit 19 may be adapted for, e.g., voice recognition, use of a multifunction switch (e.g., of the sliding or rotary type), standard keypad or keyboard, touchscreen keyboard and the like.

Fig. 8 shows a rotatable, multifunctional switch 31' which has five pressure points indicated by I', II', III', IV' and V'. Fig. 9 shows an animation 31 of the switch 31'. In addition, during the input of text numbers and/or symbols, an input field or result field 32 will be shown together with a field 33 which indicates appropriate words or options that are possible from a "dictionary" or "list of words" which shows the most likely words that begin with the entered letter or letters, preferably in an order determined by how many points the word or letter combination has been given, such points being related to the frequency of use of such combinations. Word or letter combinations which have not been given any "points" will be in alphabetical order in this dictionary.

The screen image which appears on the display includes said animation 31 as an interactive figure of the actual switch 31' with an indication of the pressure positions of the switches, indicated here by I-V which are related to the said depression points I'-V' in Fig. 8. A keyboard 34 is shown next to this animation in the same display area. This keyboard will preferably show all relevant letters, numbers and signs, in this case

arranged as a Qwerty keyboard, but it is also possible to arrange a keyboard of this kind in a Qwerty lay-out, but with the letters in alphabetical order. On rotation of the switch 31', a marker 35 will move across a field which covers three characters at a time. Characters can be selected by key presses in animation positions I, II and III. A key press as shown in animation position IV will confirm selection, i.e., "Space". A key press on animation point V will result in a return to the preceding menu, optionally with a HOME function. This will be variable depending on where the user is in the menu. If the cursor 35 is placed over the "keyboard" 34, V will be used as an "undo" or "clear" button in the system as indicated in Fig. 9c. In Fig. 9 it is assumed that there will be room for all letters. numbers, signs and/or symbols on the screen image in connection with the keyboard 34. Turning the switch 31' as shown in Fig. 8 will result in the marker 35 moving across the keyboard 34 step by step. The system is preferably designed so that the data elements, e.g., letters, from the keyboard marked by the marker 35 are shown in the animation 31 in fields I, II and III. The data elements that are guessed, e.g., letters, will also appear here no matter where cursor 35 is over the keyboard 34. This will mean that it is unnecessary to rotate the switch 31' to all the data elements required, as the most appropriate data elements will most probably be present as direct options shown in animation fields I-III.

Figs. 9a-9m thus show an example of how the predictive system according to the invention will be able to assist a user with the input of, e.g., text. Fig. 9b shows what a start position in the animation 31 might look like. Here, it will be seen that the marker 35 field is "parked" in position 35'.

The intention is to write "the telephone number". In this connection reference is made to Figs. 9c-9e. The switch 31' is rotated and the marker 35 is placed over the appropriate letters, in this case the letters STU. In the animation 31, the field II for the letter is T is selected, see Fig. 9d. The system now guesses the word "The", which is thus written out in full in the text field 32, see Fig. 9e. Field 33 shows the candidate words which are picked from the available list of word in the order made according to how often these words have been used statistically. On the basis thereof, the system will choose letters which follow the previously entered letter. In this case, HOE are chosen as the letters which will provide letter number two in the first words that are chosen from the displayed list. These letters appear in the animation 31. However, here the system will guess right and acceptance is made by selecting the "Space" function represented by function field IV in the animation 31. By using this function, a space will automatically be generated and the entry of a new word can then be made.

As shown in Fig. 9f, the letter T is entered by activating function field II, and the word "the" is selected again by the system, see Fig. 9g, as this word comes at the top of the list shown in field 33. The letters "HOE" are presented as an option in the animation field 31, and the letter e is selected by activating the function field III. This means that the list of words 33 will shift to words beginning with "te" in the prioritised order, see Fig. 9h. The word "telephone" is then suggested in the field 32, see Figs. 9h and 9i. The word is confirmed by activating the function field IV (see Fig. 9h), i.e., the "Space" field, and the screen image will then return to the earlier image, i.e., as it was in Fig. 9f where the predictive system started to function.

With reference to Fig. 9j, it will be appreciated that the switch 31' is now rotated and the marker 35 is moved to the letter combination MNO, where the letter "n" is chosen. As a consequence thereof, as shown in Fig. 9k, the system will then suggest the word "name" which lies as a priority. The letters AOU which are thus predictively selected will appear in the switch animation fields I, II, III. However, "name" is not the desired word and the letter "u" is chosen by activating the function field III. The list of words will then shrink to four words, from which the system writes out "number" which is confirmed by a key press related to the function field IV is confirmed, see Fig. 9l.

When in the foregoing, and also in the following, reference is made to the activation of the function fields in the animation 31, it should be understood that the user will make corresponding depressions in positions I', II', III', IV' or V' for activating switches at these depression points which are respectively arranged at the depression points.

In Fig. 9e, for instance, it will be seen that a number indicated by 33' appears at the bottom of the list of words 33, in this case the number 500. This number indicates how many words in the selected category there are in the list, but it will be understood that there is not room to show the whole contents of the list and nor would this be practical. Fig. 9h shows that possible words in the list are "reduced" considerably after the entry of letter number two. If the user wants to enter a long word which is at the bottom of the list of words that appears, it will be possible by using the system to turn the switch 1' to a start position as shown in Fig. 9a and to press the switch at the point II' (function field II in animation 31) in order to activate a word list marker 36 and on rotation of the switch 31' to move this marker 36 downwards until the desired word has been selected. This selected word is confirmed by another depression related to function field II.

Fig. 10 will now be explained in more detail, wherein Figures 10a-10h show a variant of the system which has just be described in connection with Figs. 9a-9m.

A program for input of text is selected according to main menu and a screen image as shown in Fig. 10a then appears. If the user selects a function linked to field II on the animation 31, it will be possible to move down the list 33. The field 32 is also a text field in this case. By selection linked to the function field I, the animation 31 will shift to the "Edit" mode, see Fig. 10b, whereby it is possible to edit a written text. A marker 37 can thus be moved by first depressing that represented by function field I, i.e., depression of the switch 31' at depression point I, and then rotating the switch 31', i.e., its control element 31". By selection linked to the function field V, the user will move back to the preceding menu. If the function field IV is selected as shown in Fig. 10a, the fields 38 and 39 will appear, see Fig. 10c. The animation 31 will show the alternative numbers and letters over which a marker 40 will move when the switch 31' control element 31" is rotated, or alternatively the letters 41 which the predictive system selects. Fig. 10d shows that the field 41, here indicated by means of 41', can contain a plurality of fields for showing additional letters. However, for simplicity, in this case emphasis has been given to showing the principle and therefore the further explanation includes only a field 41 which provides the possibility of showing three data elements.

Fig. 10e shows that the field 38 frames a part of the keyboard 42. Obviously, it will be understood here that the architecture and design of such a keyboard 42 will by no means be limiting for the inventive idea, but merely serves as an exemplary embodiment to aid understanding of the principle of the system according to the invention. The keyboard may, for example, be in alphabetical form or in Qwerty form as shown in Figs. 10 and 11, or in another form. Figs. 10e and 10f show a switching of the field 38 between the main body 42 of the keyboard and its subsidiary part 42'. Switching can take place by placing the marker40 over the keyboard symbol 43, as shown in Fig. 10f. In this position, the marker 40 will also cover a function such as "Back" 44 and "Enter" 45, as known from "standard keyboards". Fig. 10g and Fig. 10h show that it is possible to allow only one of the keyboard parts 42 or 42' to be visible at a time, so that visually they are on top of each other, as also indicated by the fields 38 and 38'.

The system according to the invention will now be described further in connection with that shown in Figs. 11a-11u. Here, the input of data elements by using a rotatable multifunction switch which has five depression points, as shown in Fig. 8, will be described, and where there is an interactive interplay between the display and the

predictive letter and word system that the invention has provided. In the illustrated example, the user wishes to write "The telephone number is 22 35 70 18". When the user shifts to the numeric keypad, like the subsidiary part 42' of the keyboard, the predictive system will naturally switch to guessing numbers, as explained in the following.

In Fig. 11a, the user has gone from a main menu, such as that shown in Fig. 10a and is now in a mode for writing, e.g., selection of function field IV in Fig. 10a ("Keyboard").The switch 31 control element 31' is rotated to move the cursor 40 to a region on the keyboard where the desired character is found. The letter T is entered by pressing at position I', see Fig. 8, on the switch 31', which effects function selection I as shown in Fig. 11a where this function selection field is thus highlighted. The character that is thus entered or keyed in will appear in field 32. This causes the predictive system according to the invention to be activated. All the words in the list of words that begin with the letter "t" will be listed in prioritised order and shown in the field 33 insofar as there is room for these words. A number 33' will be given at the bottom of the field which indicates the total number of words found in this category, optionally how many words are found in addition to those shown. The predictive system picks the word "The" on the basis that this is the most used word, statistically speaking, in the list, and it is placed in the field 41. As shown in Fig. 33d, the field 41 may optionally consist of several fields 41', whereby it will be possible to pick out several candidates for the second letter.

However, in the example chosen here, the user wants the selected word and function field IV, i.e., "Space" is chosen and the suggested word is thus written inside the text field 32. As shown in Fig. 11d, the letter "t" is then entered and the system will again choose "the". However, in this case another word is required and the user continues to enter the letter "e", see Fig. 11e, which in this case is easily accessible, as the predictive system has presented it as a direct option in the field 41. Here, it will be seen that the same letters also appear more clearly in the animation 31. In this case, the letter "e" appears in the function field III in the animation 31. Again, it can be seen here that rotation of the switch 31' control element 31" will not be necessary to fetch the right letter.

Referring now to Fig. 11f, it will be seen that the first word that is prioritised in the list 33, in this case "telephone" is now written out. The list has now been "shrunk" as there are no longer so many alternatives linked to the two-letter combination "te" that has

been entered. The function field IV in the animation 31, related to depression point IV' on the switch 31' is chosen to confirm the word "telephone" and this word is then written out on the screen image, see the field 32 in Fig. 11g. The switch 31 control element 31' is then rotated until the marker covers the letter group "YHN", these letters also being shown simultaneously in function fields I, II and II in the animation. The letter "N" is selected, as indicated in Fig. 11h and as shown in Fig. 11i all the words with the first letter "N" are listed in the list 33, whilst the word "name" is written in the field 39. This word is at the top of the list and is also marked by the list marker 36. The letters "aou" are spread in respective fields I, II and III in the animation 31 and are the different options for the letter after the first letter "n" as is evident from the list of words in field 33. It will be seen from the list of words that the first word has as its second letter "a", the next three words have the second letter "o" and the next word has the second letter "u". Referring now to Fig. 11j, the letter "u" is selected by activating function field III and the system will then present the word "number". This word can be confirmed by using the space depression point represented by the function field IV, see Fig. 11j.

Referring now to Figs. 11k-11m, the word "is" is to be written following the same principles as already discussed. As will be understood, the control element 31" of the multifunction switch will be rotated until the marker 40 lies over the letters "ikx" as shown in Fig. 11k, and on depression of the control element 31" at position 1', i.e., function field I, as shown in Fig. 11k, the letter "i" will be written inside field 32. As indicated by the field 41, the system now chooses predictively the three most likely letters as the second letter in the word which has now been started, and these letters are "stn", which also appear on the animation 31 in the respective fields I, II, III. Here, it will be correct to choose the letter "s" linked to field I by another depression of the switch control element 31" at position I'. The word "is" thus appears in the field 39. At the same time the phrase "The telephone number is" is now found in the field 32.

Numbers are now to be entered, and this means that the user must have access to numbers in the keyboard. This means that the user must bring up the subsidiary part 42' of the keyboard, as shown and described in connection with Figs. 10e-10h. In Fig. 11n it can be seen that the marker has been moved to the position 43, and respectively "back", "enter" and "switch keyboard part" appear in the respective function fields I, II and III on the animation 31. Here, depression of the switch control element 31" linked to the function field III is chosen as the user thus switches to a keyboard part which primarily consists of numbers and symbols, indicated by the reference numeral 42'. As

indicated in Fig. 11o and Fig. 11q, a switch between keyboard parts could also be executed by rotating the switch control element 31" so as to thus scroll the marker 40 past "p!", whereby the subsidiary keyboard part 42' appears as shown in Fig. 11p. Entry of numbers can be done in the same way as shown and explained in detail in connection with the entry of letters. Figs. 11n, 11p and Figs. 11r-11u show this. Here, previously used numbers will be stored, so that the system according to the invention can guess which number the user will probably enter based on statistic frequency of use. This can easily be transferred directly to a number directory and in apparatus where the system is used in a connection situation, as for instance in a telephone.

Lastly, the invention will now be described in connection with an embodiment which does not make use of a stepwise rotatable multifunction switch as shown in Fig. 8, but employs a conventional pushbutton keypad per se.

In this case the user does not need to employ the key showing the letter group in a writing process where the system guesses letters independent of which group they belong to. On the input of letters, the system according to the invention will save the guessed letters which form words that the system finds to be "correct", and by using arrow /ok keys 44, 45, 46 the user can select one of the new groups, or as shown in Figs. 12a-12d one of the selected letters. If the system guesses wrong, the user can by using the "normal keypad" go directly to the letter group which has the letter the user is looking for. Another alternative, if the display screen is large enough, is to go direct to the list of words and choose from the selected words. It will be possible to scroll up and down in this list by using arrow keys 47, 48, but it will also be possible to use a roller switch such as the roller switch 49 shown in Fig. 12d. Basically, this is a roller switch with three depression points and on rotation it can be used to scroll through the list of words and in addition it can replace the OK keys 44-46 as shown in Figs. 12a-12c. As indicated in Fig. 12a, depression of the key 50 will cause the letters STU to appear in the display screen 51. Depression of the key 45 results in the selection of the letter "T". This brings up on the display screen a predictive list 52 of the words which seem to be suitable, greatest frequency statistically being taken into account. The system will predictively choose the letters "HOE" as these appear as second letters in the words which are given in part of the list of words 52. The predictive system has suggested the word "the", but this is not the desired word, as telephone is the word the user wishes to write. The predictiveness therefore suggests that key 46 should be depressed to select the letter e. If the word "the" had been correct, it could have been confirmed, for example, by depressing the key 53 as shown in Fig. 12b. On selection of the letter e the

word "telephone" appears at the top of the list 52, whilst the three letters "lca" are indicated as a third suggested letter in the desired word. However, in the illustrated example, "telephone" is the desired word, and this can then be chosen by depressing, for example, the key 53. It will also be seen that the list as shown in Fig. 12b has in the version found in Fig. 12c shrunk from 500 words to 27 as the choice of the second letter limits the content of the list.

Similarly, the use of a roller switch 49 has shown in Fig. 17, with three depression points can be made in the same way as just shown and described in connection with Figs. 12a-12c. Here, the user will also have the advantage of being able to move the cursor, as for instance the marker 54, by rotation of the switch.

It is also possible to envisage a guessing of a person/name and number on the basis of an entered combination of numbers and letters. Predictiveness can be present as regards names in a letter combination. For example, there may be a list of names with associated numbers. A user may wish to find, e.g., the name Noia Erison, plus 47 22 23 24 25. In this case the user can enter "N" and all the persons who have a name beginning with N are chosen. If an "E" is also entered, only the names beginning with these two letters will appear. There is also a possibility of predictiveness in the system with regard to number and letter combinations. In this case, this will take place essentially as described above, but here both numbers and letters are used in combination to find the right name. For example, it is possible to write "N22", and, for example, all the persons living in Oslo with a name beginning with "N" will be selected. If an "E" is added, it will be highly unlikely to find more the person or the telephone number for which the user is looking.

Thus, there is a possibility of a system which in the illustrated example can make use of combinations of a first letter in a name and the first number in, for example, a telephone number. In this case the system will be capable of being adapted to what the user wants to find in lists, as for example, in a telephone directory, an address book etc. The system will therefore be able to give innumerable possibilities for predictive searches of names, number, addresses etc through a combination of letters, numbers, symbols etc. When searching for e-mail addresses it is possible to make a system whereby the user enters a letter plus @ plus a letter for a domain (e.g., "no", "com"). For net addresses (WEB), it will be possible, e.g., to enter a letter plus the domain or perhaps more letters.

It is also possible through a further application of the present system to guess on the basis of sentence patterns and on the basis of grammar. This means that words are guessed on the basis of a preceding word, and also that the right conjugation of the verb or declension of the noun is guessed. However, this calls for substantial storage capacity and processor power, but the predictiveness will per se be the same as when selecting letters in a word. The system is thus in reality simply expanded so that it can put together sentences according to priority, possibly related to a grammatically correct word order. Correction of spelling and grammar are known per se, so that in this case this function can be used as an addition to the possibilities that the system described already has been shown to be capable of having.

Through a further application of the system according to the present invention, it is possible to envisage that it can predictively be used in connection with the completion of forms, as for instance filling in personal details and other data. By using the system in a predictive operation mode, it will be easy per se to be able, e.g., to fill in forms, either internally or externally (net sites). The individual columns will require specific data, e.g., name, number etc based of what the form relates to, and the system will in this case have a database which contains the options and data that should be available.

In connection with names that are exchanged between, for example, a mobile telephone apparatus, options may be found which enable the exchange of data. In this connection, e.g., meeting reminders, agendas etc may be envisaged. However, this will require that software is tailored to this use. In this way it will also be possible to exchange predictive list of words whether they are personal or standard lists.

Patent claims

1.

A system for input of data elements, e.g., letters, signs, numbers and/or symbols, in connection an electronic apparatus or device which has or is connected to a display, wherein the system comprises a means in the form of a plurality of discrete fields shown on the display screen to assist in the input, and the system includes an input device, actuatable with a finger, which has a control element that is stepwise slidable or rotatable, and also depressible and two- to four-way tiltable, or which consists of parts of a conventional keypad, and wherein data elements shown on the display screen represent available input alternatives for the input device,
characterised in

- that the input device is designed to effect selection of at least one data element from one of said plurality of fields which have a data element or elements displayed on the screen in order to activate the system to offer suggestions for a subsequent data element or elements in each available field and with contents which come from a list of prioritised data phrases.

2.

A system as disclosed in claim 1, characterised in

- that the system is configured to predictively show suggestions of a subsequent data element or elements in the available fields independent of which group the data elements normally belong to.

3.

A system as disclosed in claim 2, wherein the control element of the input device is stepwise slidable,
characterised in

- that the system is configured to show the suggestion of the subsequent data element or elements independent of the control element's stepwise position.

4.

A system as disclosed in claim 1, characterised in

- that the system is so configured that before the selection of a data element in a field containing several data elements it splits the data elements in the field in question thereby spreading them out in the available fields on the screen, whereupon the desired data element can be selected.

5.

A system as disclosed in claim 1, characterised in

- that on the input of at least two data elements the system is configured to first suggest a data phrase retrieved from a memory where said data phrase is the most frequently occurring, and where said data phrase contains said data elements as a beginning or an ending, or constitutes the suffix or the prefix of said at least two data elements.

6.

A system as disclosed in one of claims 1-5, characterised in

- that the system is so configured that on the input of at least a first data element it predictively suggests the next data element in a series of data elements; and
- that the system is so configured that when the next data element selected is wrong it will receive a system user selected data element as replacement for the wrongly selected element.

7.

A system as disclosed in one or more of claims 1- 6, characterised in

- that the system is so configured that on input of at least a first data element it predictively suggests selectable groups of data elements, where each group contains at least one selectable data element harmonised with the preceding, selected data element; and
- that the system is configured for user selection of a desired group where a selectable, correct or probably correct data element is found.

8.

A system as disclosed in one or more of claims 1-7, characterised in

- that the data phrase is selected from the group consisting of: a telephone number, a data code, an internet, extranet or intranet address, an e-mail addresses, a name, a designations, a list of words, a reference book.

9.

A system as disclosed in one or more of the preceding claims, characterised in that the system is configured to sort said selectable data phrases based on:

a) the frequency of previous use of the phrases, or
b) standard frequency of the occurrence of the phrases, or
c) alphabetical order, or

d) most probable phrases in conjunction with other used phrases, or
e) style, terminology, dialect or language.

10.
A system as disclosed in one or more of the preceding claims, characterised in
- that the system is configured to sort the selectable phrases as a function of their length.

11.
A system as disclosed in one or more of the preceding claims, characterised in
- that the system is configured to show on the display the selectable phrases in a primary field and a secondary field.

12.
A system as disclosed in claim 11, characterised in
- that the secondary field contains part of a phrase catalogue, and that the rest of the contents of the phrase catalogue is retrievable in sections.

13.
A system as disclosed in one or more of the preceding claims, characterised in
- that the system is configured to indicate on a keyboard or the screen the said at least one data element which will be enterable in the series of data elements, e.g., based on consonant and vowel analysis, permitted adjacent data elements, and phrases that are retrievable.

14.
A system as disclosed in one or more of the preceding claims, characterised in
- that the system is configured to predictively suggest selectable data phrases once a pre-determined number of data elements have been entered in the system.

15.
A system as disclosed in one or more of preceding claims 2-14, characterised in
- that the system is configured to suggest a first data phrase on the basis of a data element from a particular group; and
- that the system is configured so that on user selection of a second data phrase it receives a data element from another selected group, whereby the first data phrase suggestion is eliminated.

16.

A system as disclosed in one or more of preceding claims 2-15, characterised in

- that the system is configured to suggest a first data phrase on the basis of a data element from a particular group; and
- that the system is configured so that on user selection of a second data phrase it registers that the selected data element is correct, whereupon all data phrase suggestions subsequently presented by the system include this data element and/or other data elements in the selected group.

17.

A system as disclosed in one or more of the preceding claims, characterised in

- that the data phrase consists of one or more selectable data elements or a plurality of sets of data elements, e.g., so as to form word or phrase formulations.

18.

A system as disclosed in one or more of the preceding claims, characterised in

- that a correctly selected data phrase is selectively or automatically converted by the system to one or more items of displayable information which are directly related to the selected data phrase.

19.

A system as disclosed in claim 18, characterised in

- that the correctly selected data phrase is one fetched from the group:
  - a) a telephone number or part thereof;
  - b) a name;
  - c) an electronic related address, e.g., an e-mail address;
  - d) an entry word or formulation.

20.

A system as disclosed in claim 19, characterised in

- that said items of information are fetched from the group:
  - a) a name, address etc. of a telephone subscriber;
  - b) an electronic related address, e.g., a telephone number, e-mail address, network address etc.;
  - c) a name and any other data related to the owner of the address;
  - d) a more detailed definition or explanation of an entry word or word formulation.

21.

A system as disclosed in one or more of the preceding claims, characterised in

- that the selection or suggested selection a data element and/or data phrase is based on retrieval from one of several selectable memories, e.g., categorised by respectively a) most used data, b) standard available data, c) little used data, and d) data never used before, and
- that these options appear with different markings, e.g., colour codes.

22.

A system as disclosed in one or more of the preceding claims, characterised in

- that the system is configured to convert data from a first working language to a second working language, and at the same time bring up predictiveness rules related to the second language.

23.

A system for input of data elements, e.g., letters, signs, numbers and/or symbols in connection with an electronic apparatus or device which has or is connected to a display, wherein the system is so configured that on the input of at least a first data element in a data phrase it offers suggestions of the data phrase,
characterised in

- that the system includes a stepwise rotatable multifunction switch having five depression points and where rotation of the switch causes movement of a marker across an array of data elements;
- that on the screen there is shown an animation of the multifunction switch and its depression points, and also the successive data elements over which the marker is brought to lie in order to select at least the first data element on depression of the switch at the given depression point; and
- that after input of said at least first data element and any additional data element(s) predictively, the system is configured to indicate in the depression points on said animation at least one of the next most probable data elements in the data phrase independent of the marker's position on the array of data elements.

24.

A system for input of data elements, e.g., letters, signs, numbers and/or symbols in connection with an electronic apparatus or device which has or is connected to a screen, where the system is so configured that on the input of at least one first data element in a data phrase it offers suggestions of the data phrase,

characterised in

- a) that the system includes a stepwise rotatable multifunction switch having five depression points;
- b) that rotation of the switch causes movement of a marker across an array of said data elements;
- c) that the display is designed to show an animation of the multifunction switch and its depression points, and the successive data elements over which the marker is brought to lie for selection of at least the first data element on depression of the switch on the given depression point; and
- d) that the system is so configured that after input of said at least first data element and/or any additional data element(s) predictively, it shows on the display, without further rotation of the switch, predictively at least three data elements on the switch animation for further construction of words, independent of the marker's position on the array of data elements, and at the same time suggestions of remaining data elements in a finished data phrase, the suggested data phrase
  - either e) being selectable as acceptable so that it becomes the final data phrase or so that it can be followed by at least one additional data phrase;
  - or f) being rejected in that one of said three predictive data elements is chosen instead;
  - or g) being rejected in that the marker is moved to lie over at least three data elements in the array, and one of these is selected on depression of the switch at the indicated pressure point.

25.

A system as indicated in claim 23 or 24, characterised in

- that the predictive suggestion is designed to be activated once rotation of the switch has caused movement of the marker, marking of least three data elements in the array and on the switch animation, and selecting one of these on depression of the switch at the desired depression point.

26.

A system as disclosed in claim 23 or 24, characterised in

- that the predictive suggestion of the next data element is related to a pre-stored reference list of data phrases, preferably data phrases in prioritised order.

27.

A system as disclosed in claim 26, characterised in

- that the reference list is designed to be shown in a separate field on the display.

28.

A system as disclosed in claim 23 or 24, characterised in

- that on the suggestion of a data phrase as a part of several data phrases in a context, the system is configured to
  - either predictively suggest at least one first possible data element in a subsequent data phrase;
  - or predictively suggest the most probable subsequent data phrase;
  - or scroll through the list of pre-stored data phrases on rotation of the switch.

29.

A system as disclosed in one or more of preceding claims 23-28, characterised in

- that one of said depression points is designed to represent a space between entered data elements or entered data phrases, and/or accept a predictive data phrase which is to be followed by a further data phrase.

30.

A system as disclosed in one or more of preceding claims 23-29, characterised in

- that a centrally positioned one of the depression points is designed to represent a a "BACK" function or "back to main menu" ("HOME") function.

31.

A system as disclosed in one or more of preceding claims 23-30, characterised in

- that on the screen there is also shown a predictive data element field consisting of at least one set of at least three data elements.

32.

A system as disclosed in claim 30, characterised in

- that the set represents the at least three next, unique data elements in a next data phrase in a list of selected data phrases.

33.

A system as disclosed in one or more of preceding claims 23-32,
characterised in

- that on the screen there is shown a function field over which the marker can be moved,

where a first function is related to a "Back" function, a second function is related to an "Enter" function, and a third function is related to a switching of data element type.

34.

A system as disclosed in claim 32, characterised in

- that the switching of data elements is between a) letters and b) numbers/special characters.

35.

A system for input of data elements, e.g., letters, signs, numbers and/or symbols in connection with an electronic apparatus or device which has or is connected to a display, wherein the system is so configured that on the input of at least a first data element in a data phrase it offers suggestions of the data phrase,
characterised in

- that the system comprises a standard keyboard or keypad having
  - either three confirming pushbutton keys and three keys which in addition to another function have a marker control function;
  - or a roller switch having three depression points and an optionally axially directed push switch function, and three keys which in addition have a marker control function, where rotation of the switch causes movement of a marker across an array of said data elements;
- that on the display there is shown a field indicating said depression points, and the successive data elements which pressure on the keyboard's letter or number/sign keys produces for selection of at least the first data element on depression on one of the confirming depression points; and
- that the system is so configured that after input of said at least first data element and optionally additional data element(s) predictively, it shows in said field the

depression points at least one of the next most likely data elements in the data phrase.

36.

A system as disclosed in claim 35, characterised in

- that the predictive suggestion of the next data element is related to a reference list of data phrases, preferably data phrases in prioritised order.

37.

A system as disclosed in claim 36, characterised in

- that the reference list is designed to be shown in a separate field on the display.

38.

A system as disclosed in claim 35, 36 or 37, characterised in

- that on the suggestion of a data phrase as a part of several data phrases the system is configured to predictively:
- suggest at least one first possible data element in the subsequent data phrase and/or
- indicate the selectable data elements which predictably follow the already existing, entered data element, said selectable data elements being selected in prioritised order from at least three subsequent data phrases in the reference list.

39.

A system as indicated in one or more of preceding claims 35-38,
characterised in

- that one of the keys is designed to provide on depression either confirmation of a predictively suggested data phrase or a space between subsequent data elements.

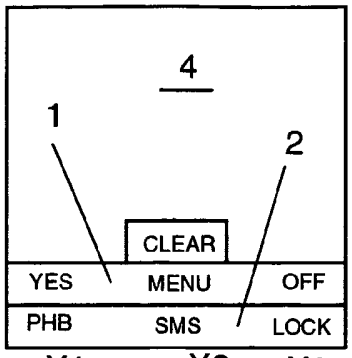


Fig. 1a

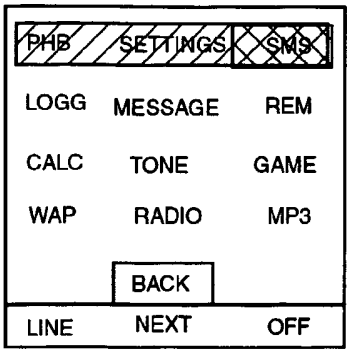


Fig. 1b

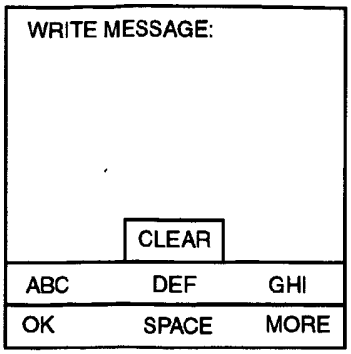


Fig. 1c

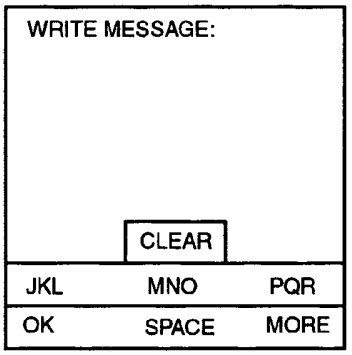


Fig. 1d

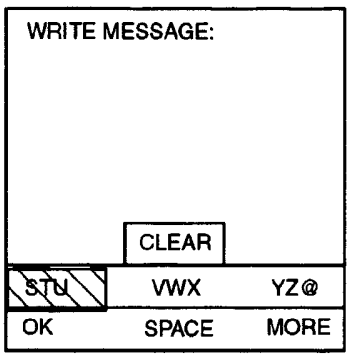


Fig. 1e

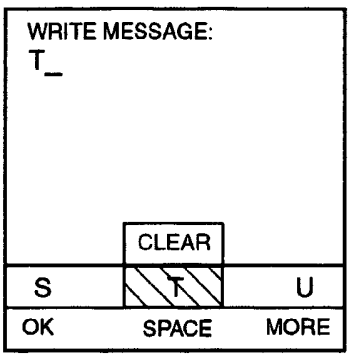


Fig. 1f

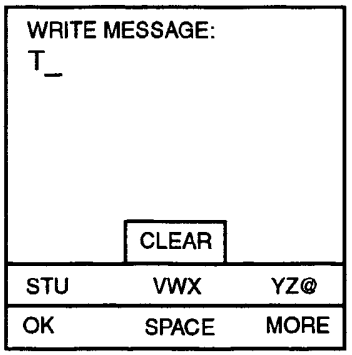


Fig. 1g

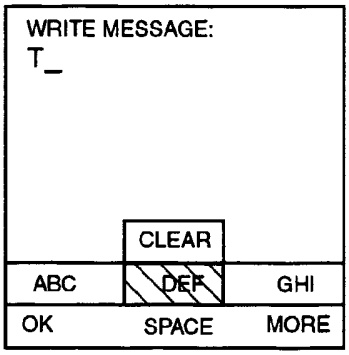


Fig. 1h

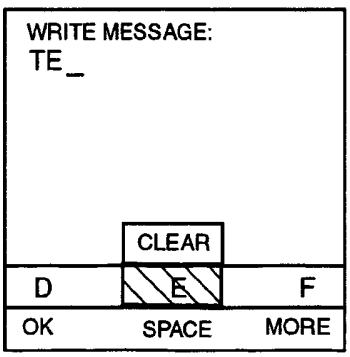


Fig. 1i

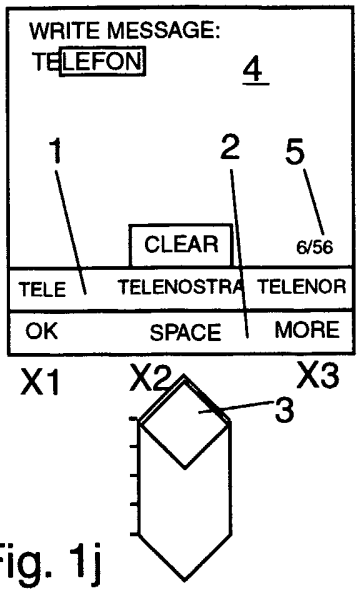


Fig. 1j

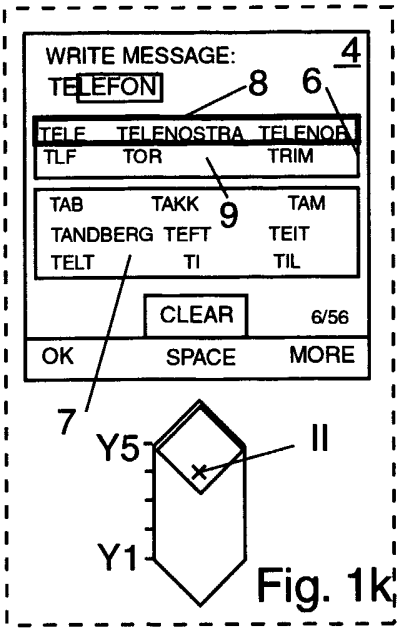


Fig. 1k

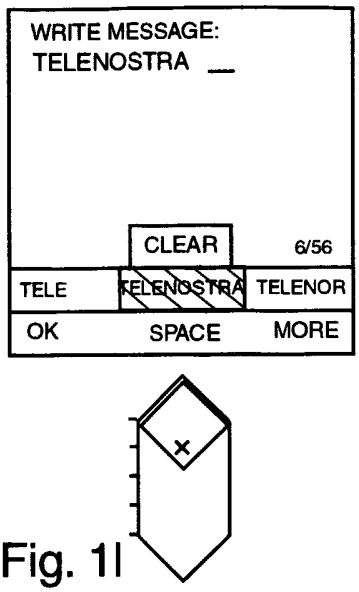


Fig. 1l

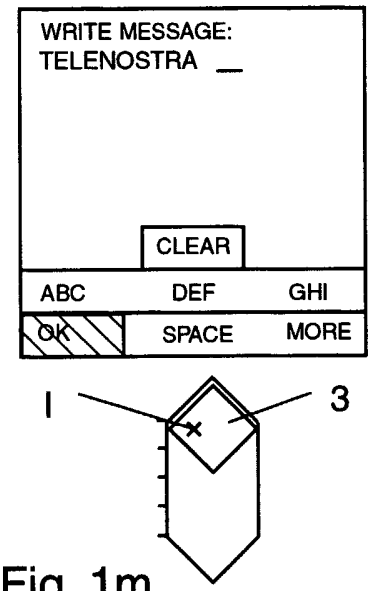


Fig. 1m

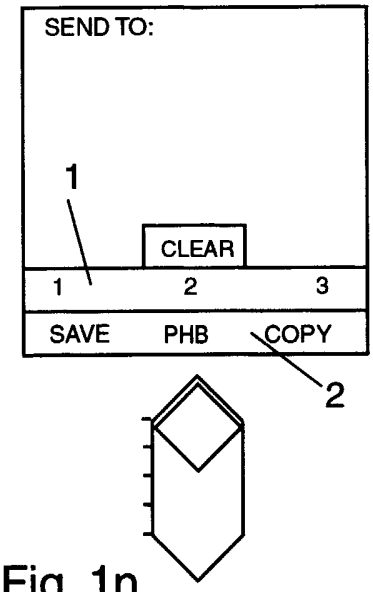


Fig. 1n

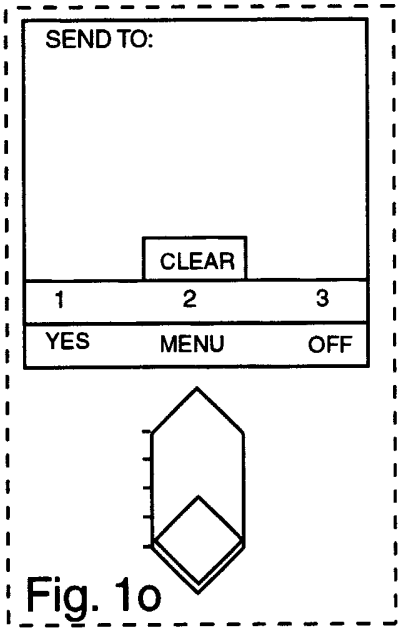


Fig. 1o

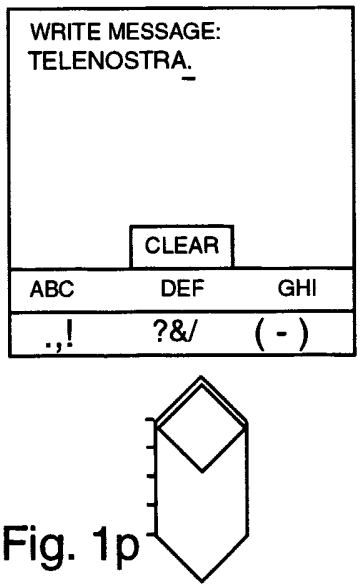


Fig. 1p

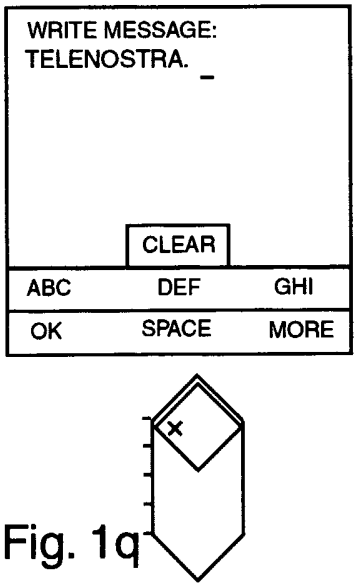


Fig. 1q

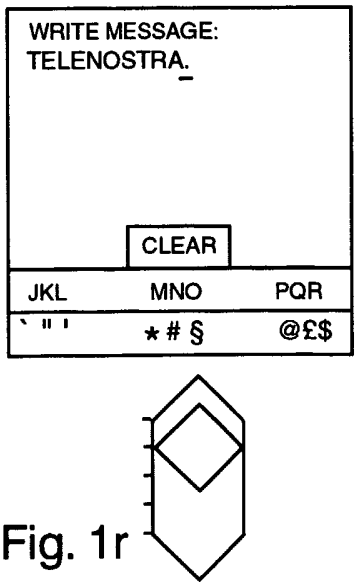
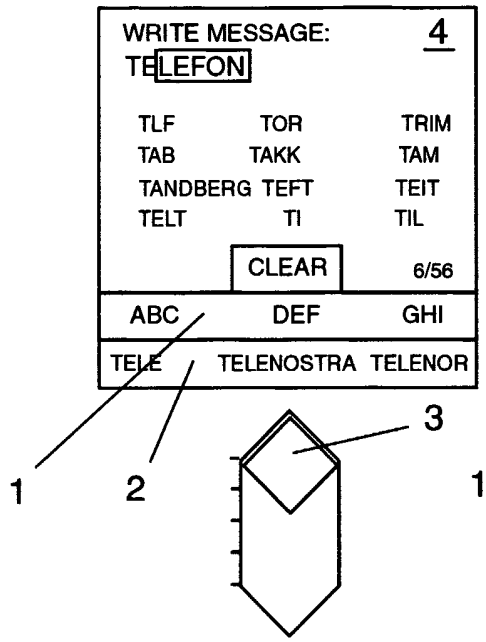


Fig. 1r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ABC DEF GHI
TELE TELENOSTRA TELENOR
1
2
3

Fig. 1s

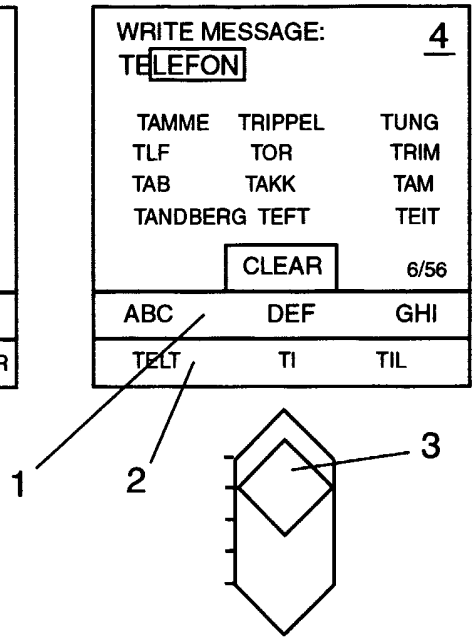
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Fig. 1t

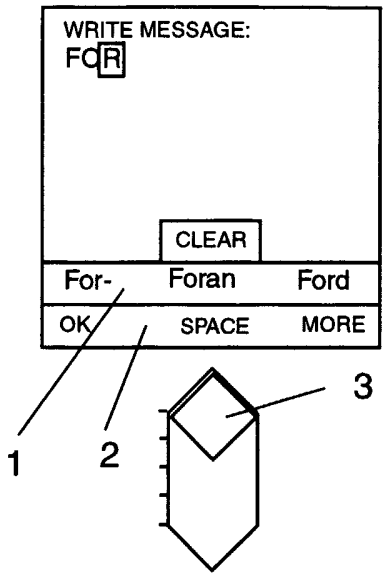

Fig. 2a

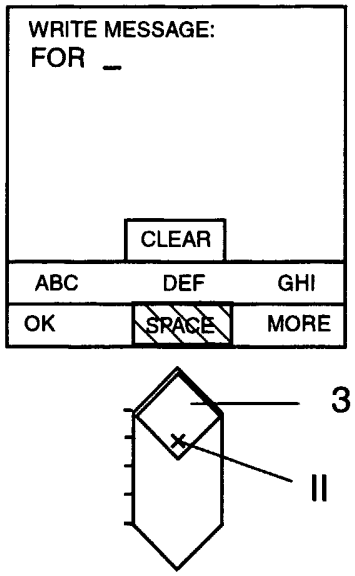

Fig. 2b

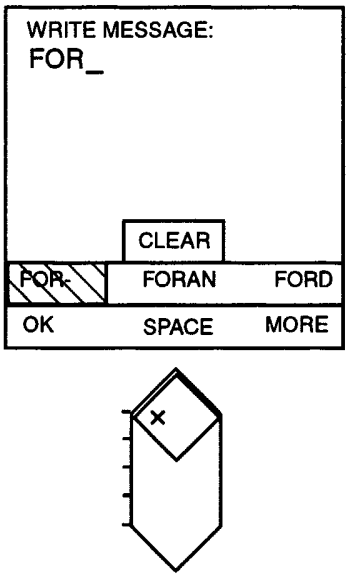

Fig. 2c

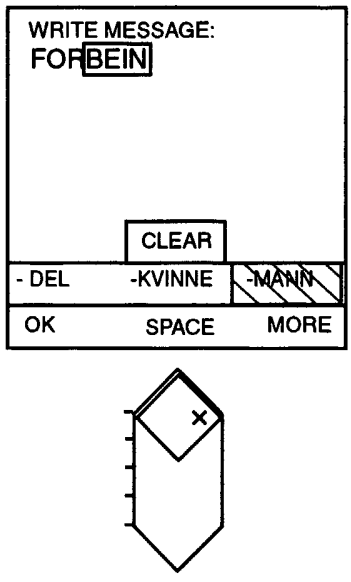

Fig. 2d

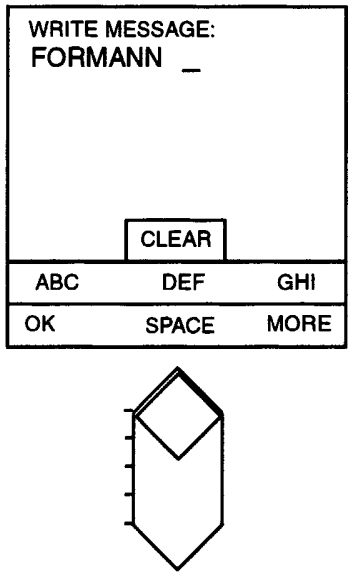

Fig. 2e

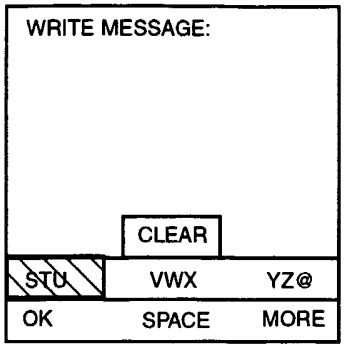

Fig. 3a

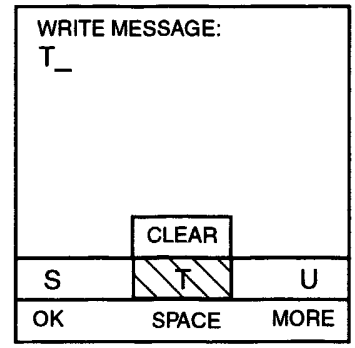

Fig. 3b

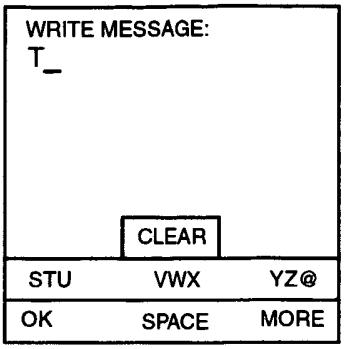

Fig. 3c

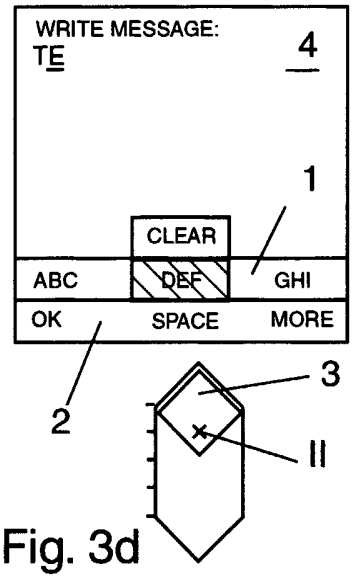

Fig. 3d

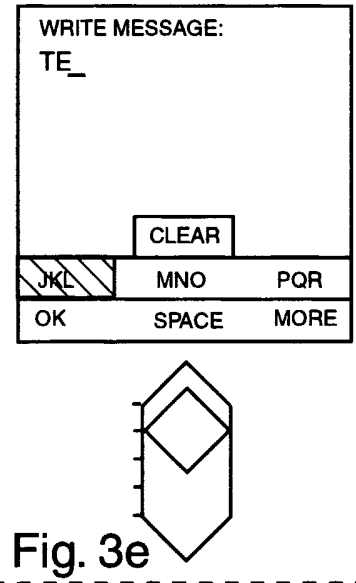

Fig. 3e

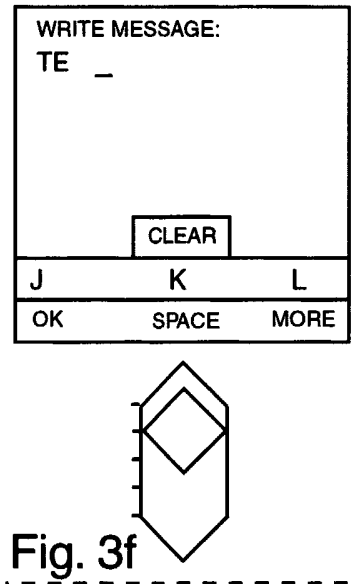

Fig. 3f

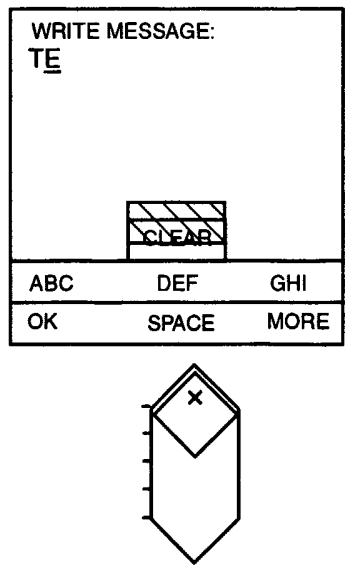

Fig. 3g

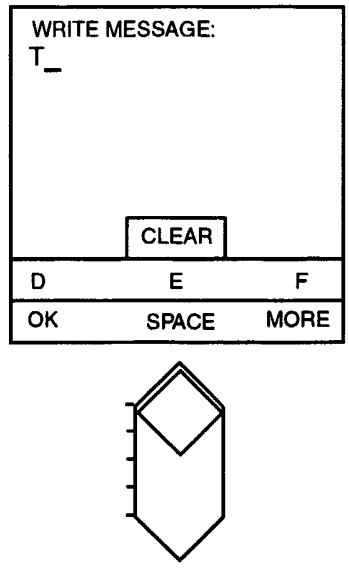

Fig. 3h

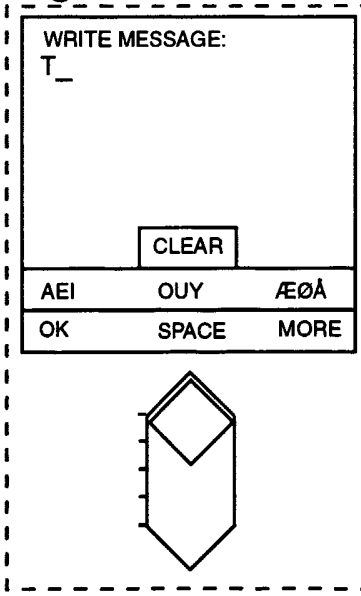

Fig. 3i

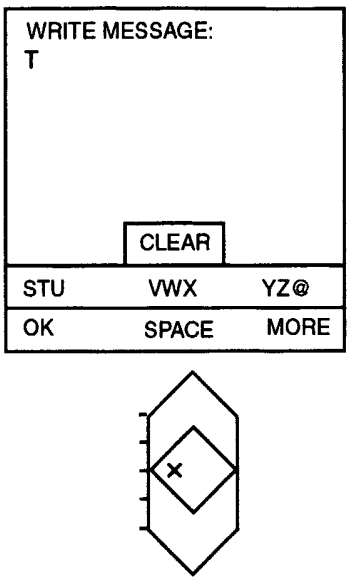

Fig. 3j

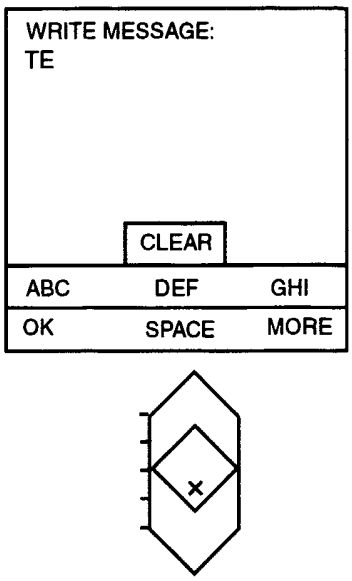

Fig. 3k

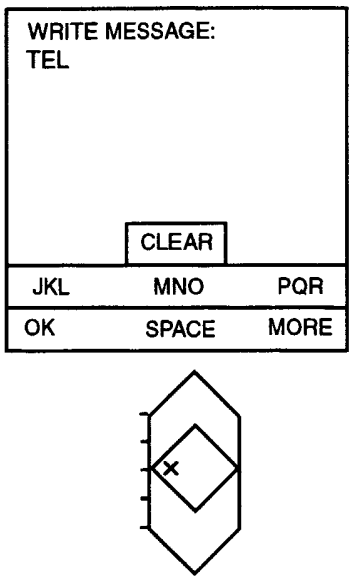

Fig. 3l

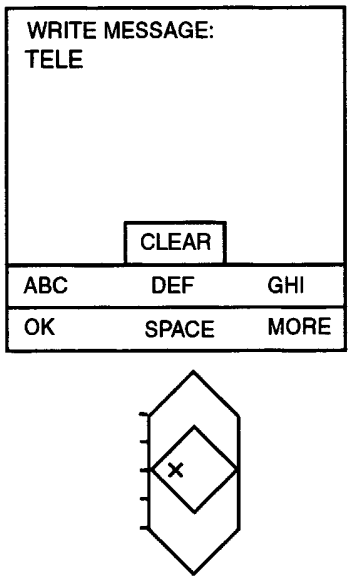

Fig. 3m

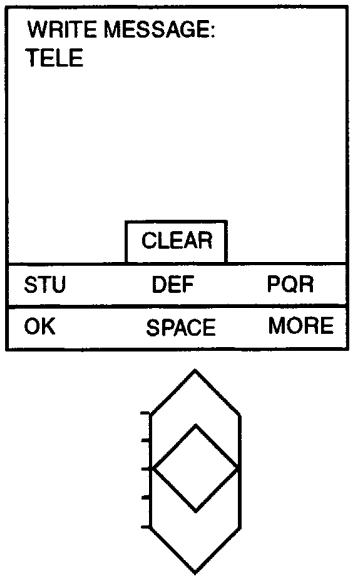

Fig. 3n

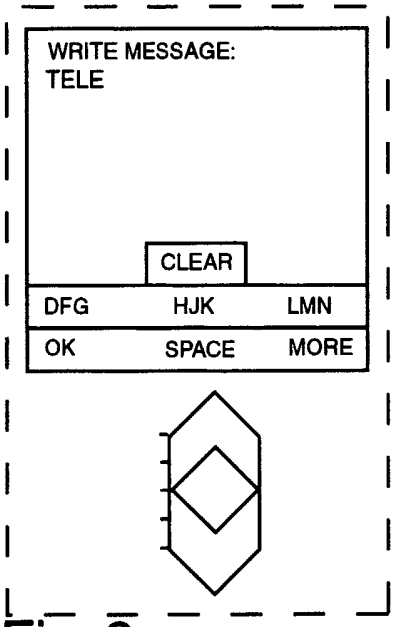

Fig. 3o

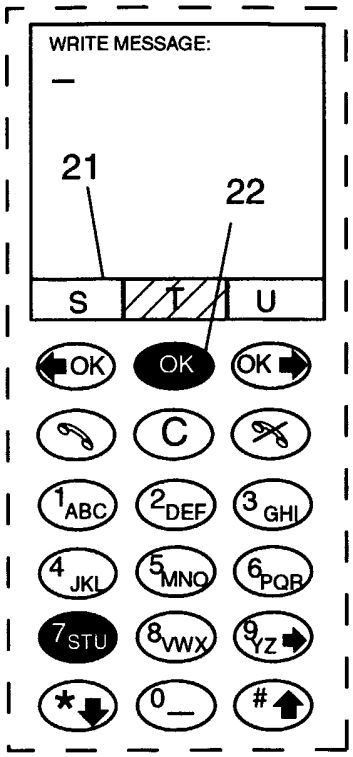

Fig. 3p

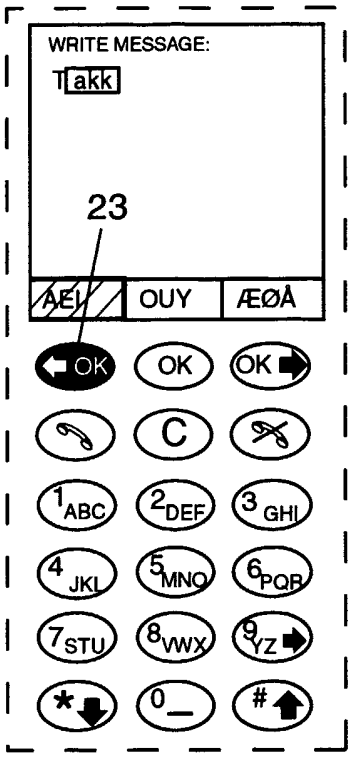

Fig. 3q

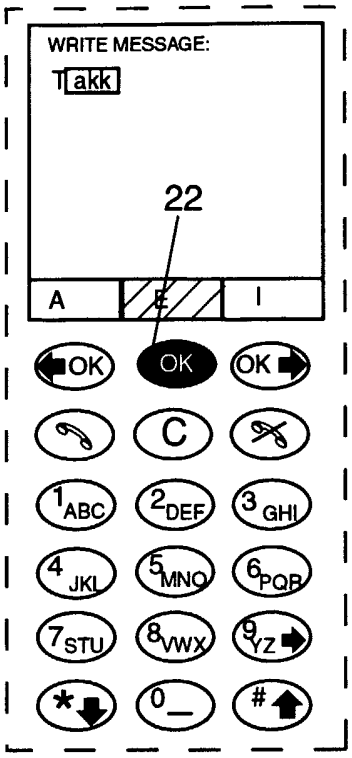

Fig. 3r

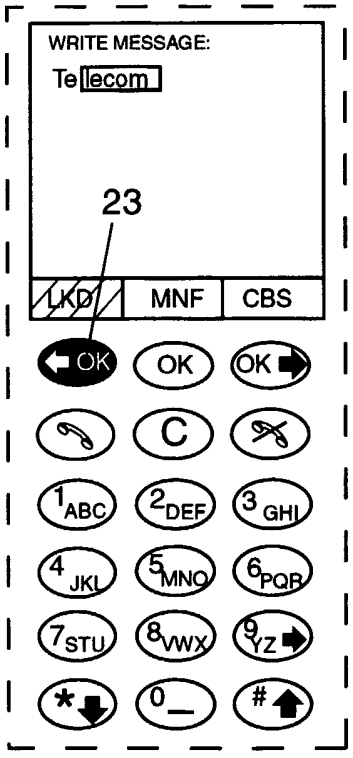

Fig. 3s

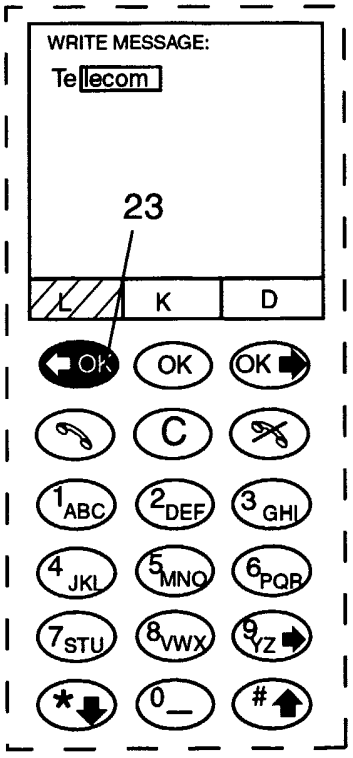

Fig. 3t

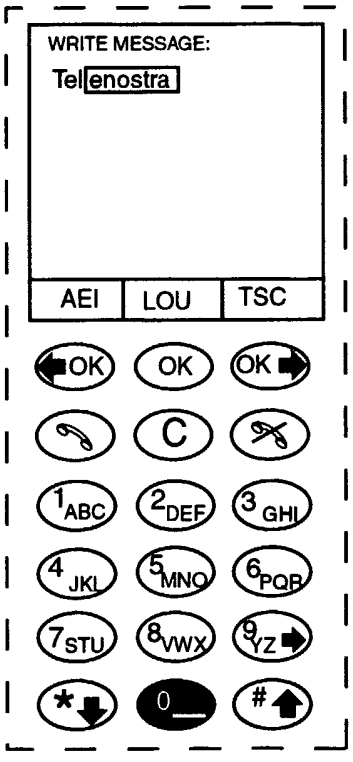

Fig. 3u

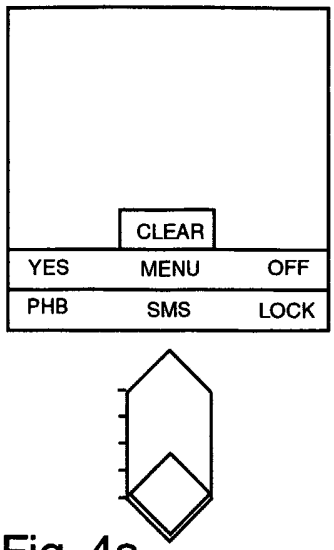

Fig. 4a

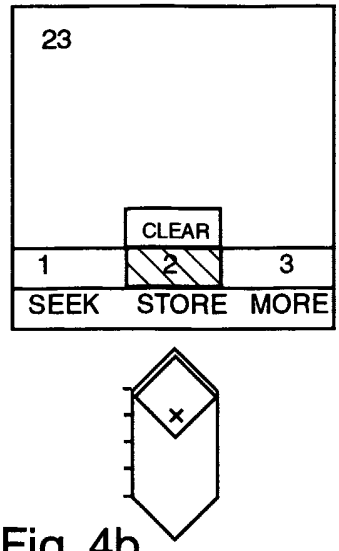

Fig. 4b

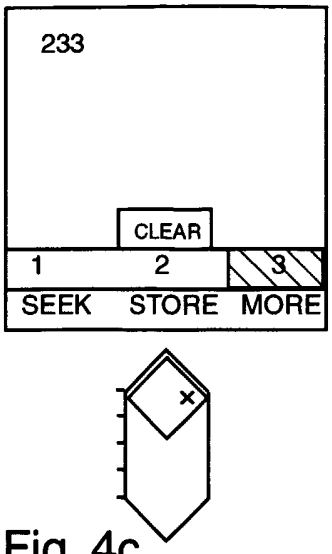

Fig. 4c

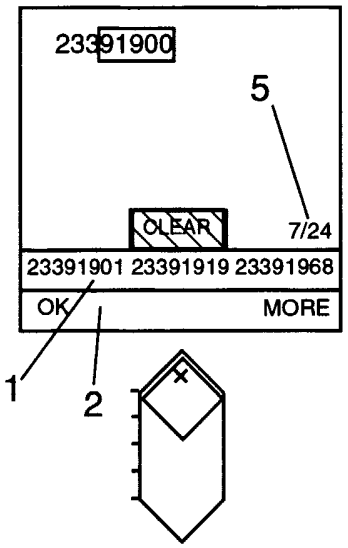

Fig. 4d

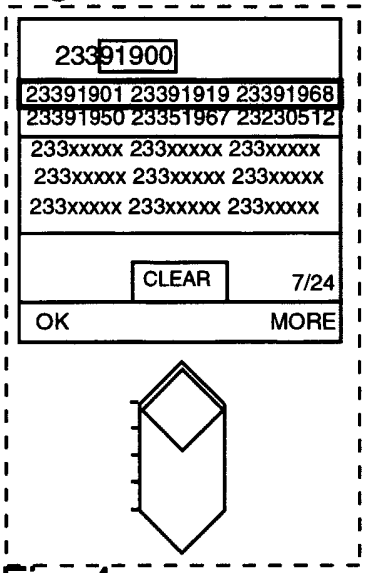

Fig. 4e

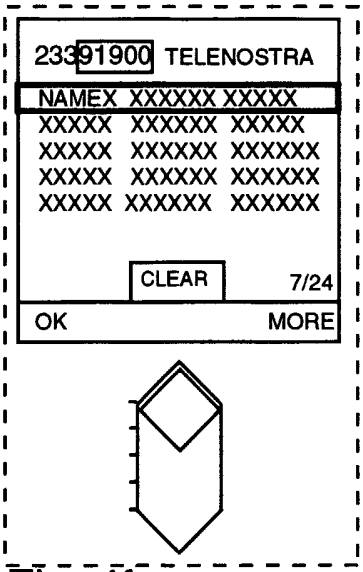

Fig. 4f

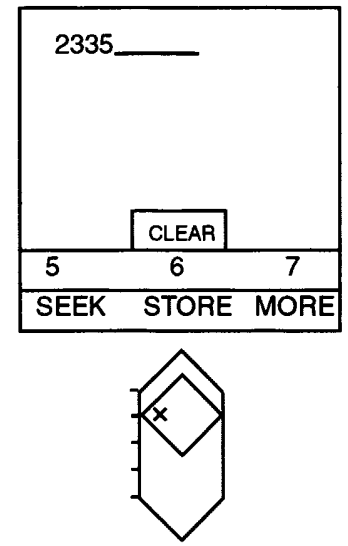

Fig. 4g

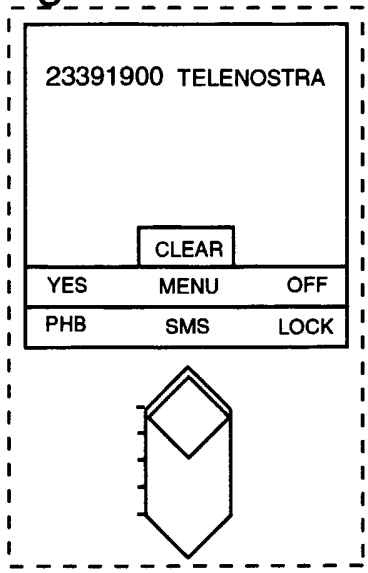

Fig. 4h

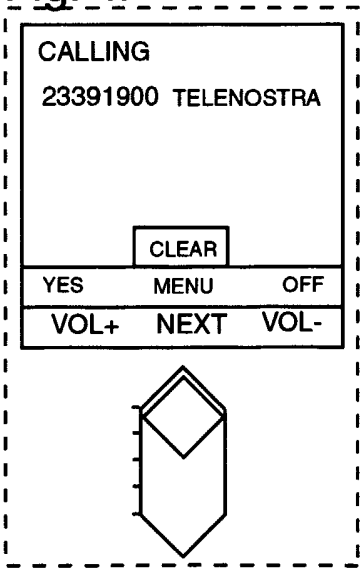

Fig. 4i

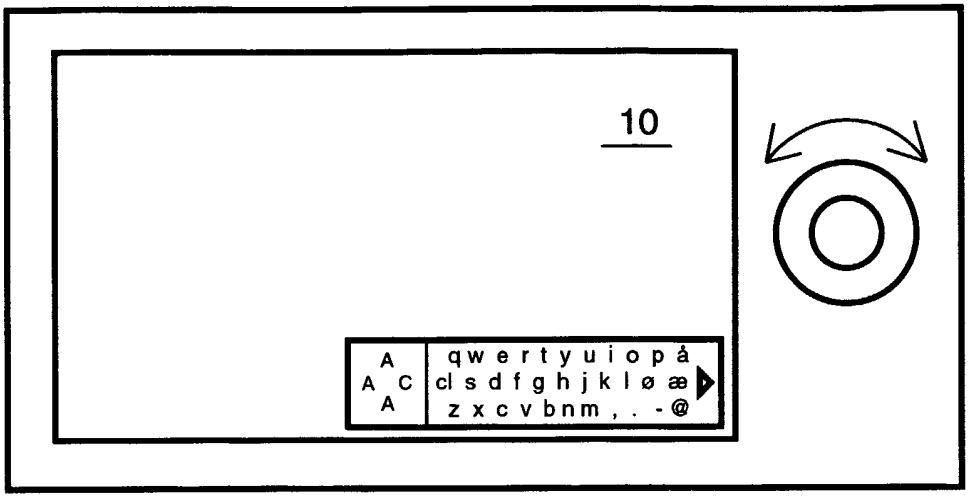

Fig. 5a

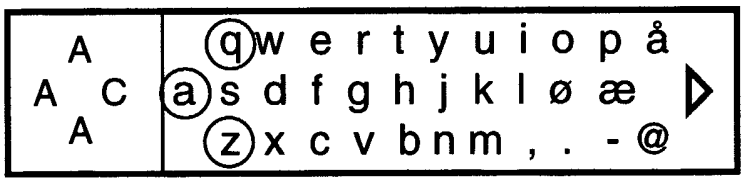

Fig. 5b

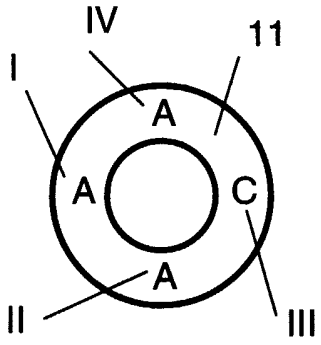

Fig. 5c

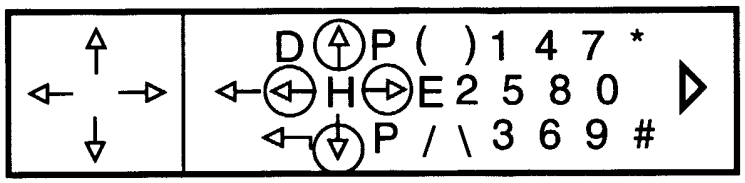

Fig. 5d

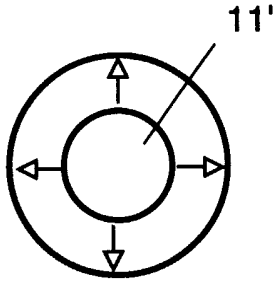

Fig. 5e

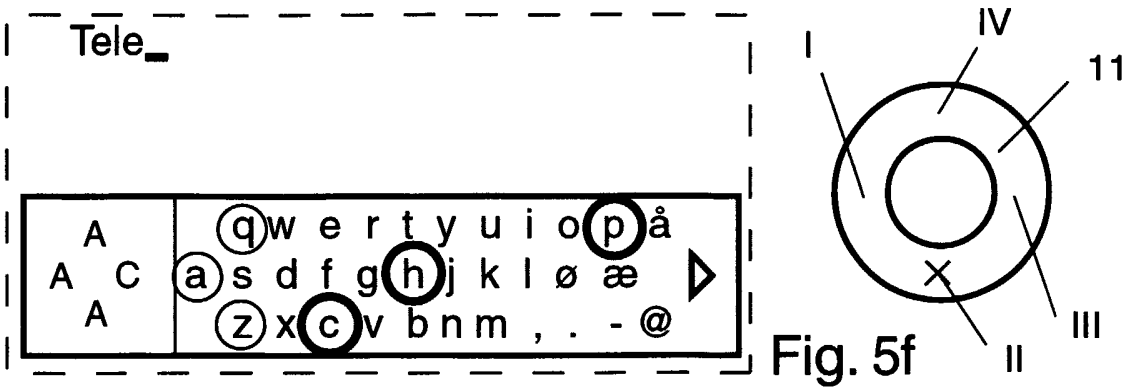

Fig. 5f

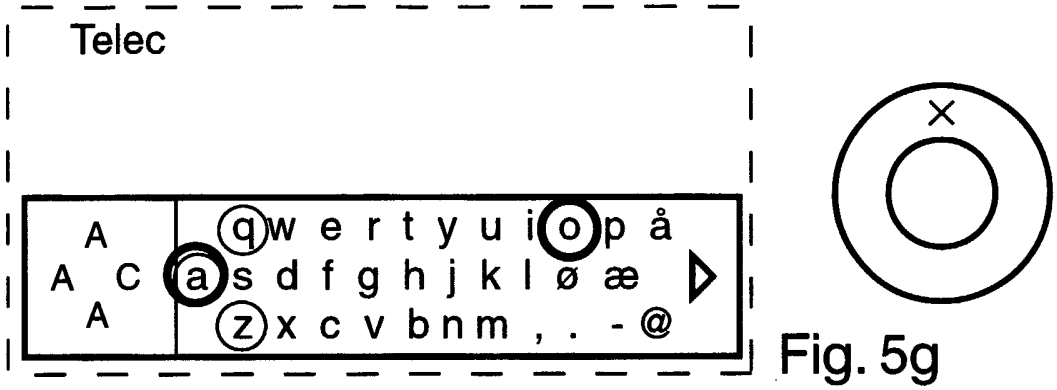

Fig. 5g

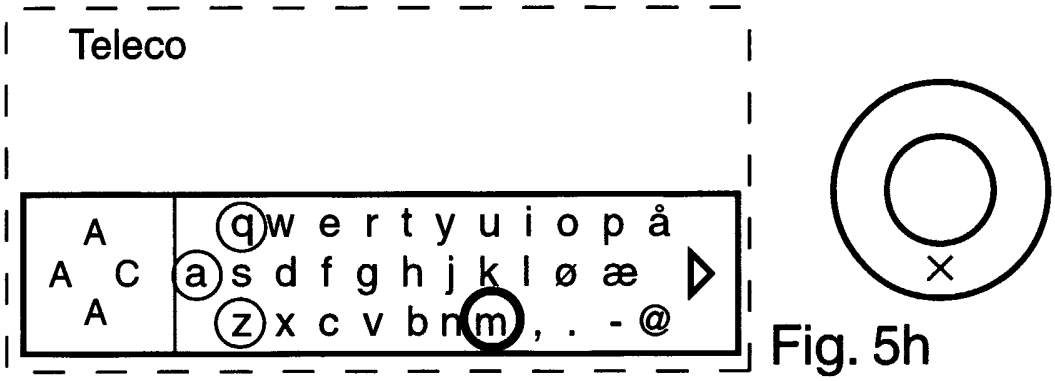

Fig. 5h

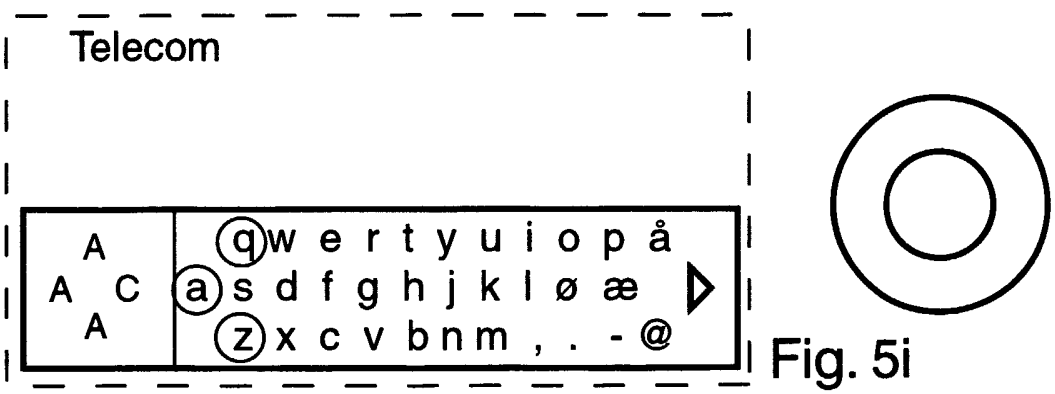

Fig. 5i

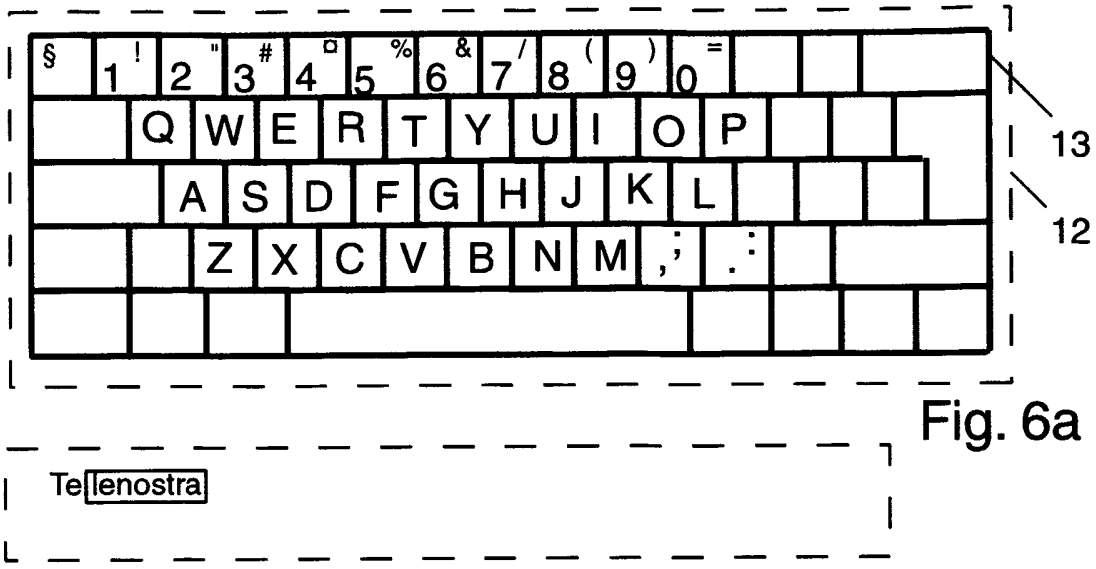

Fig. 6a

Te lenostra

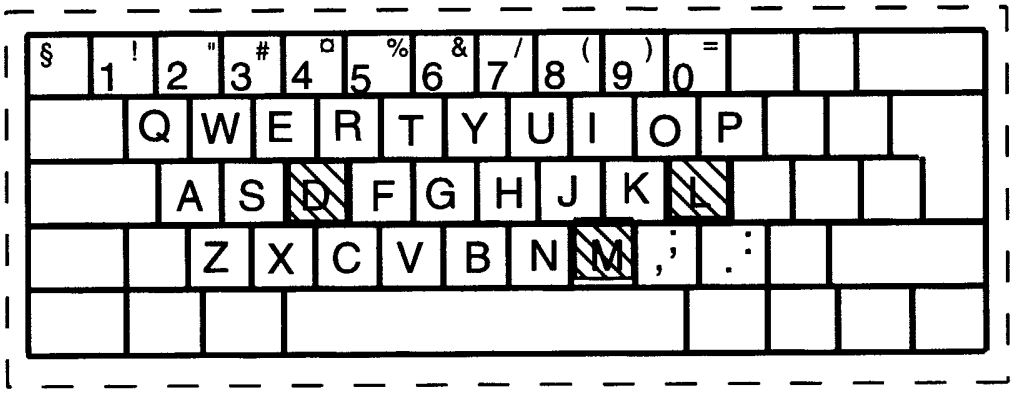

Fig. 6b

Tele nostra

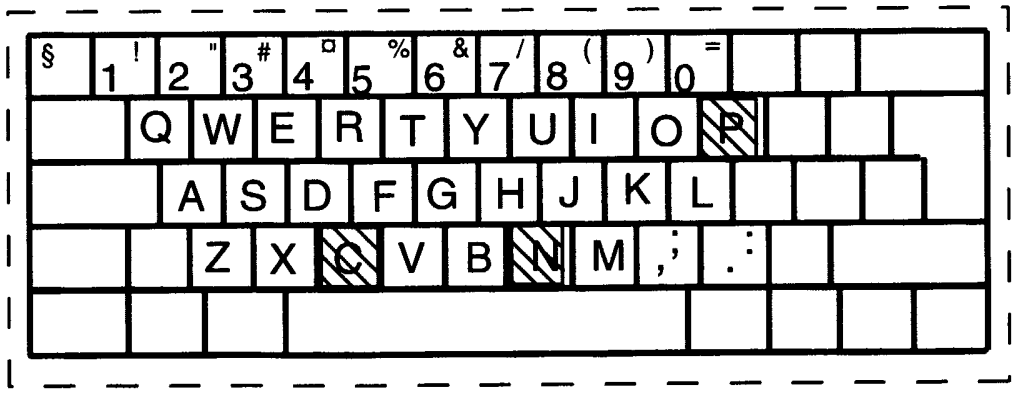

Fig. 6c

Telec om

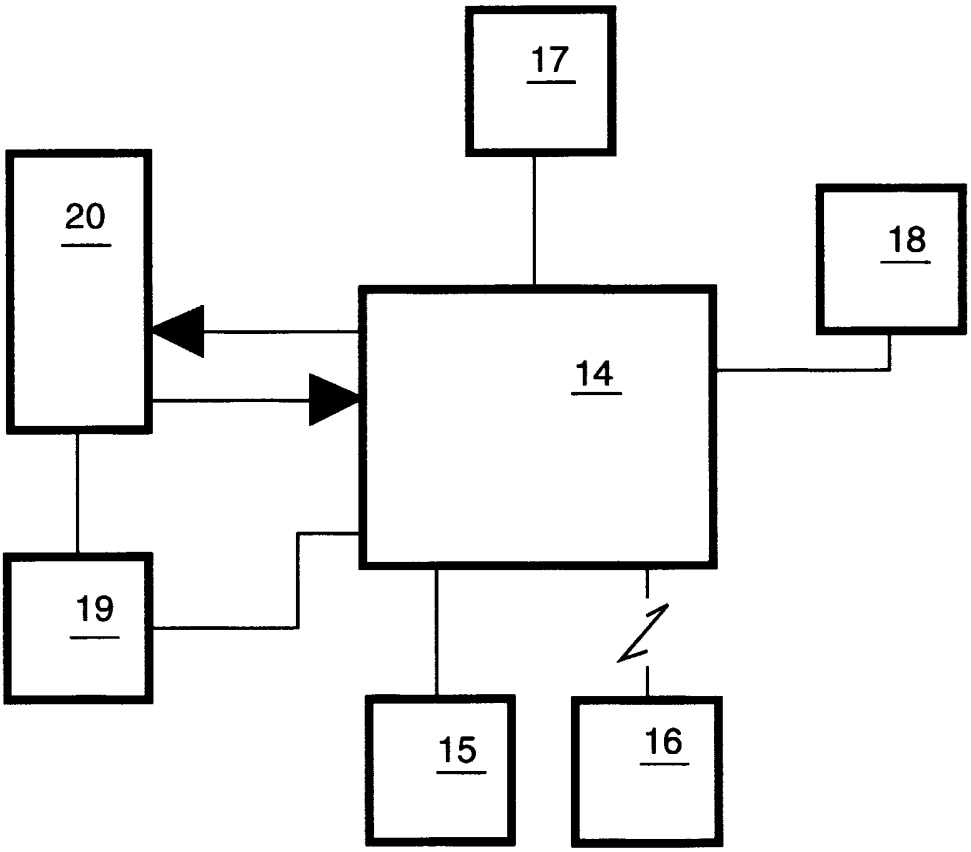

Fig. 7

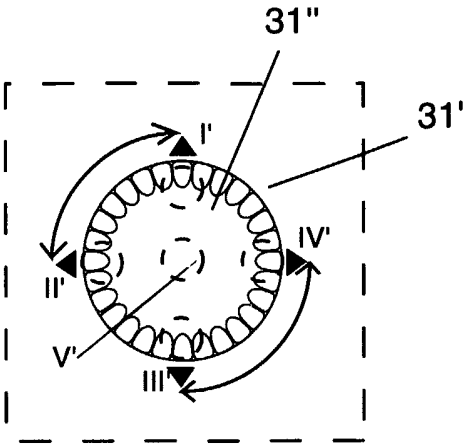

Fig. 8

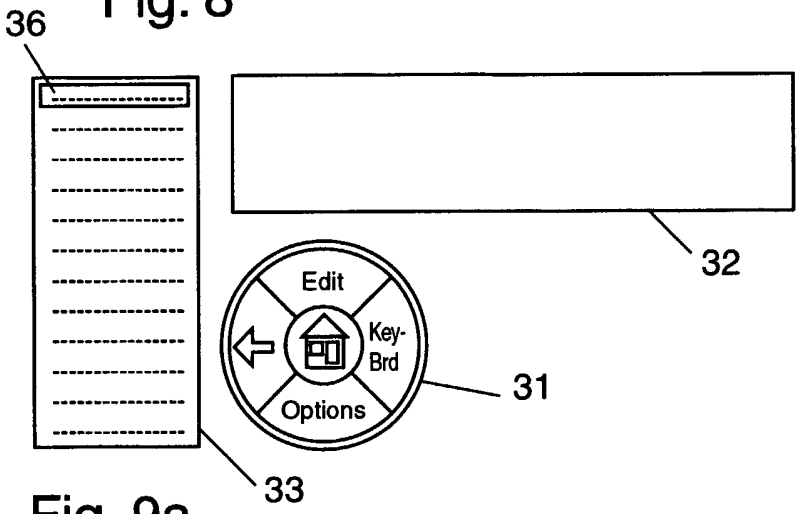

Fig. 9a

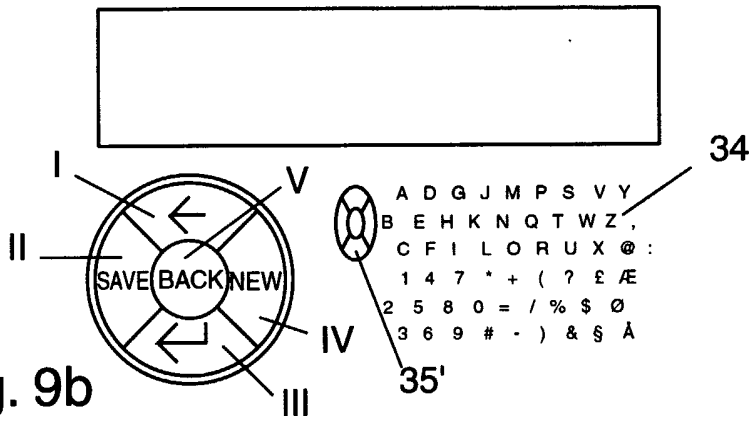

Fig. 9b

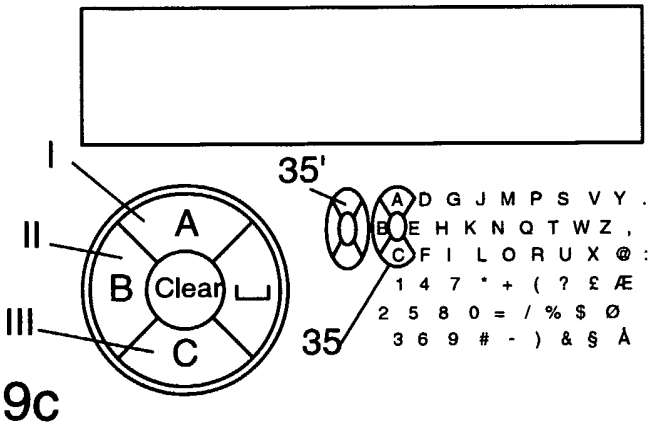

Fig. 9c

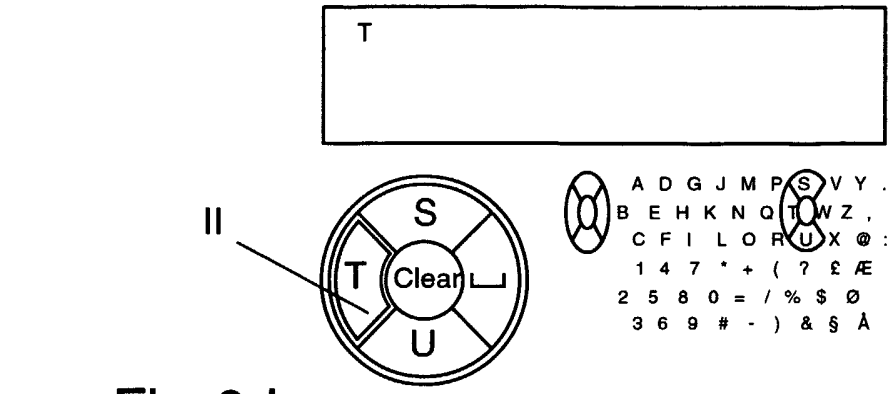

Fig. 9d

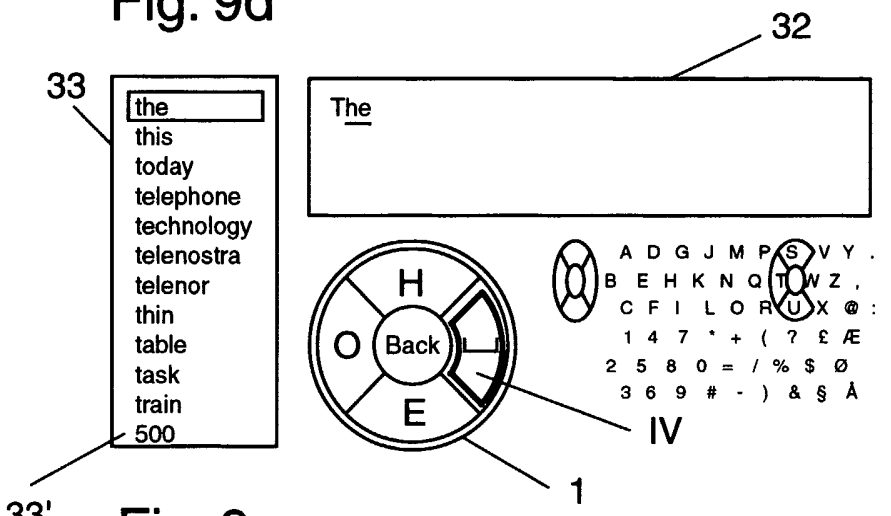

Fig. 9e

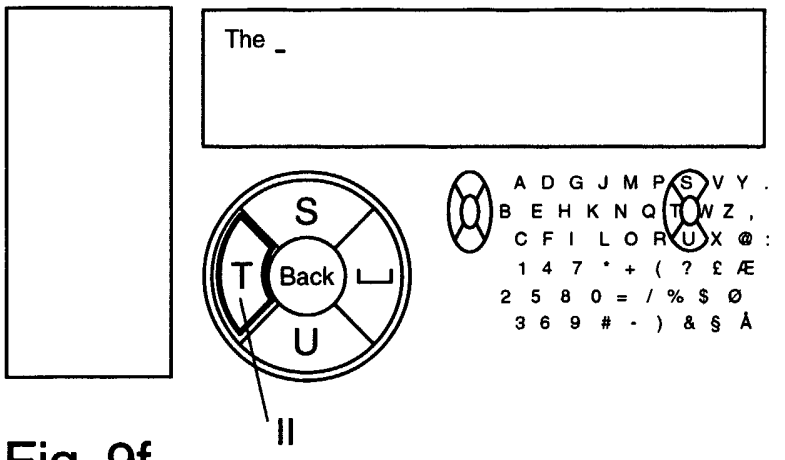

Fig. 9f

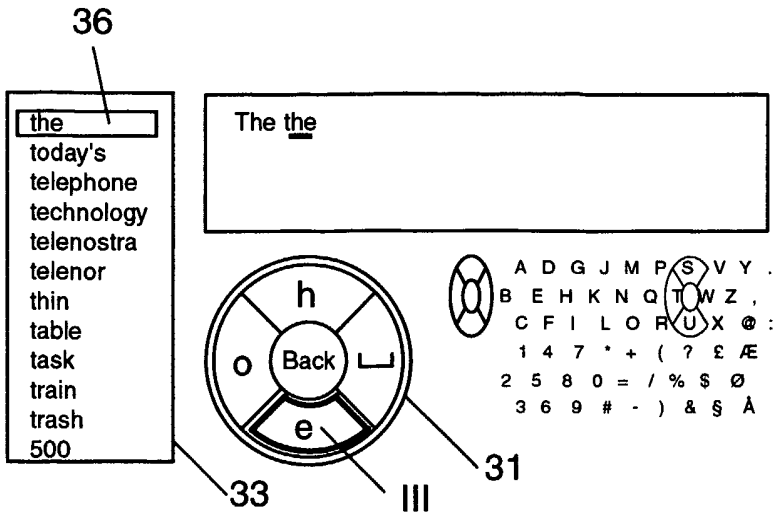

Fig. 9g

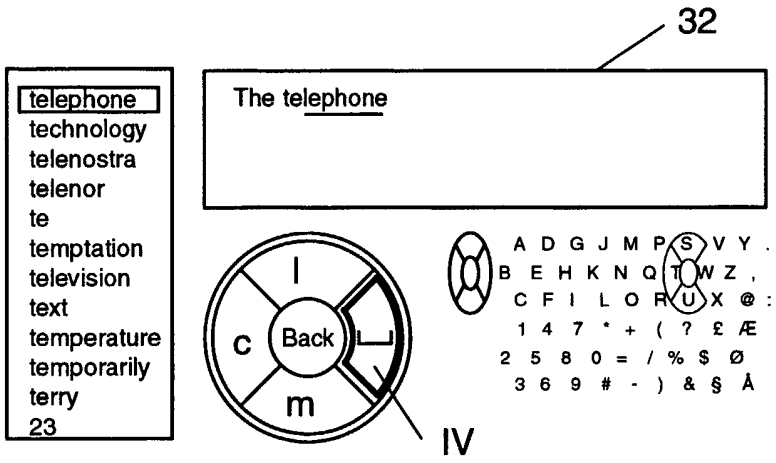

Fig. 9h

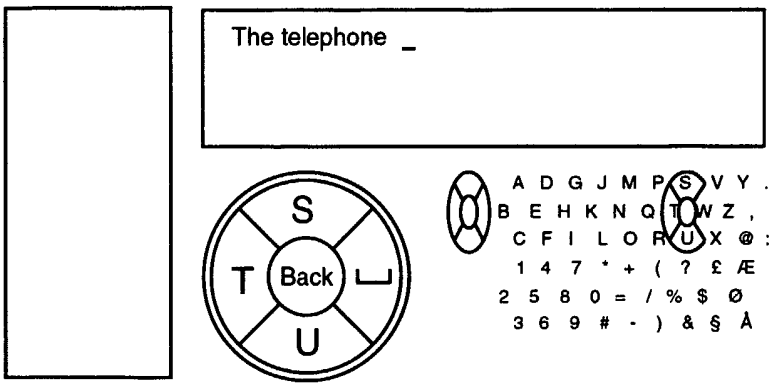

Fig. 9i

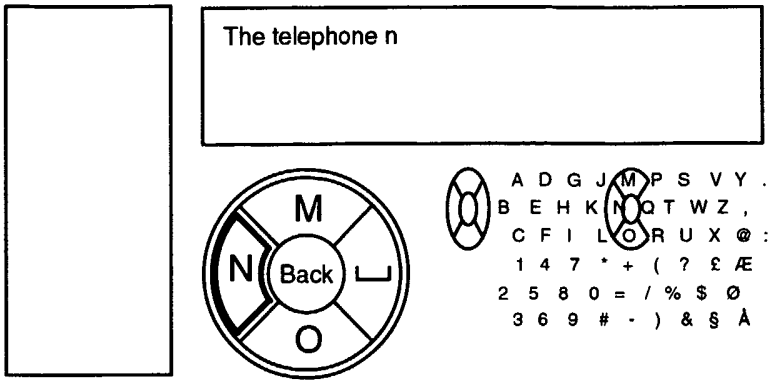

Fig. 9j

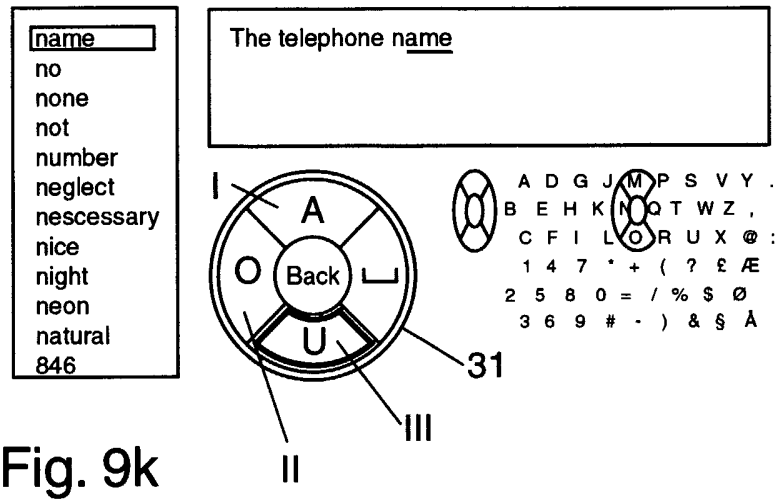

Fig. 9k

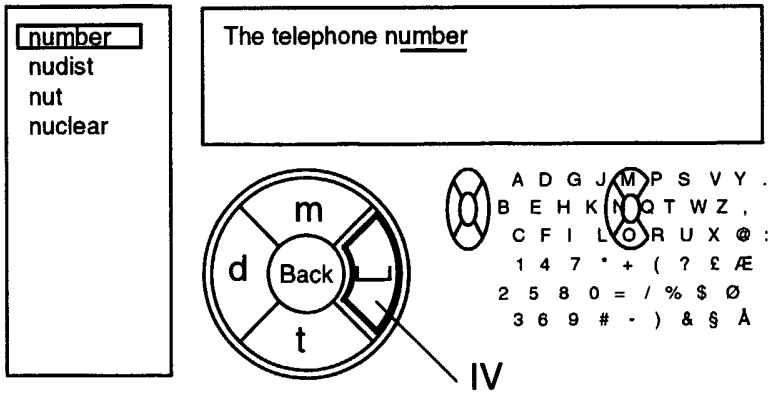

Fig. 9l

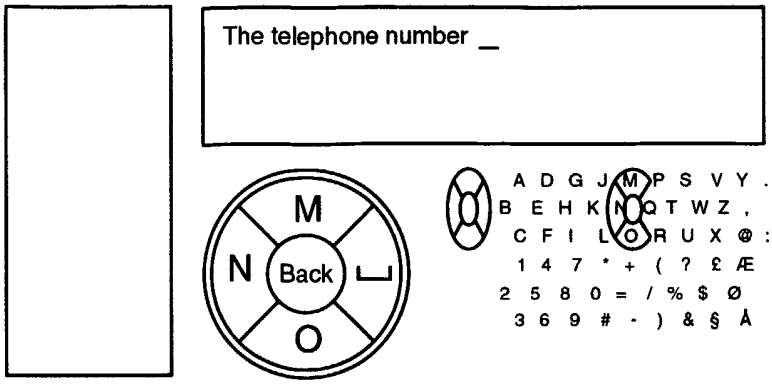

Fig. 9m

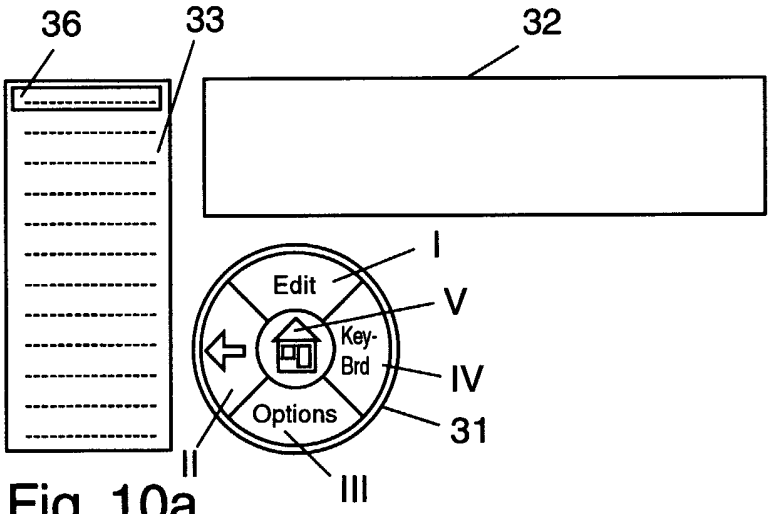

Fig. 10a

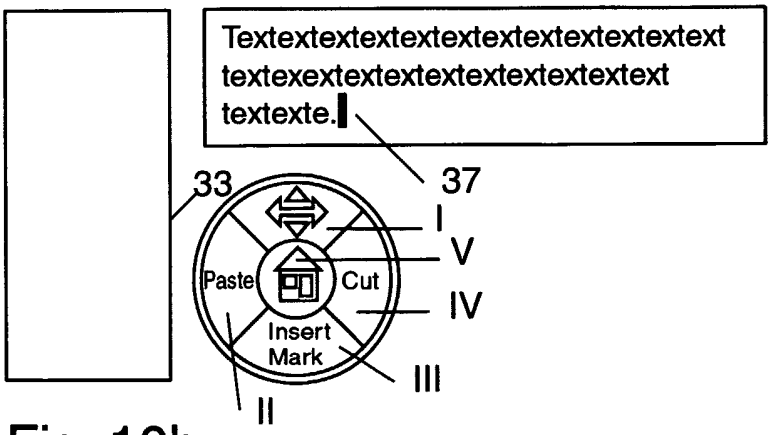

Fig. 10b

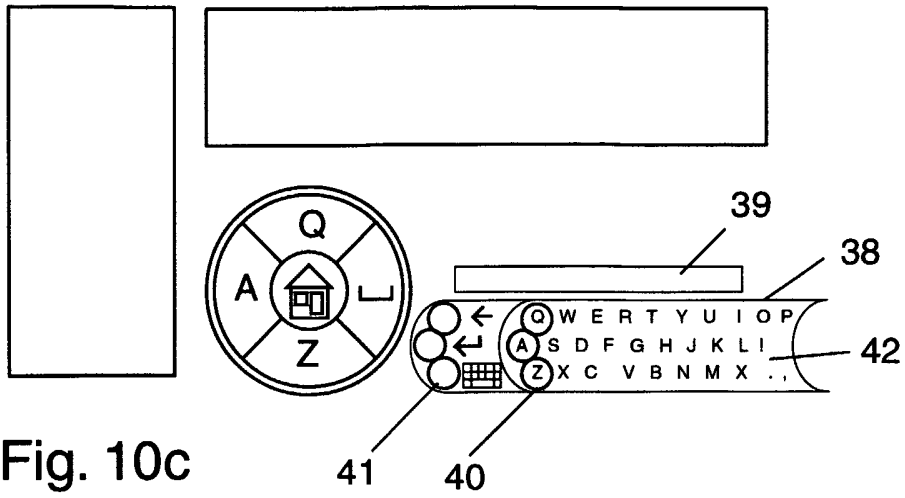

Fig. 10c

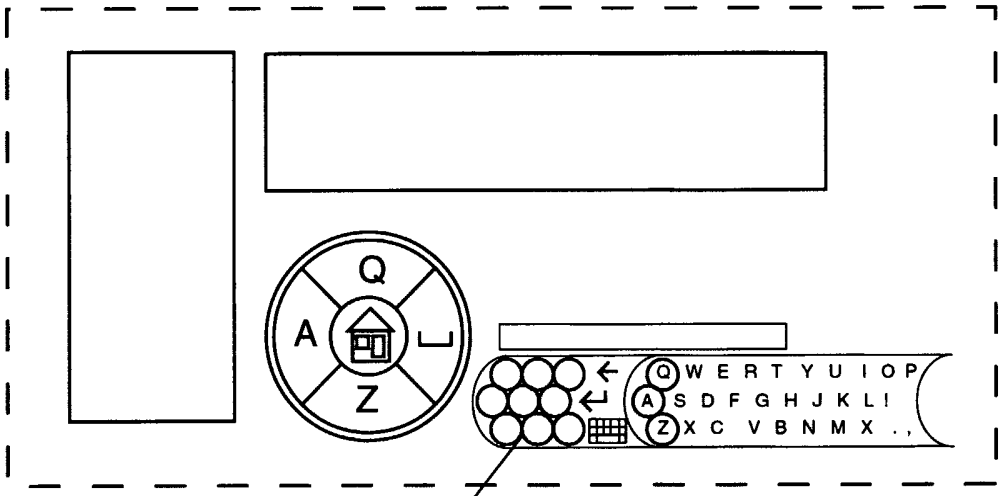

Fig. 10d

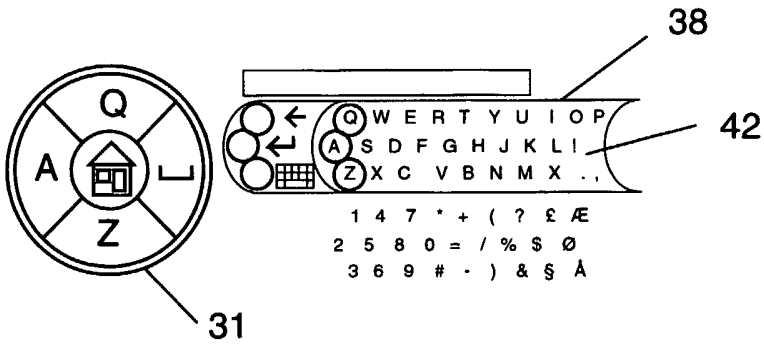

Fig. 10e

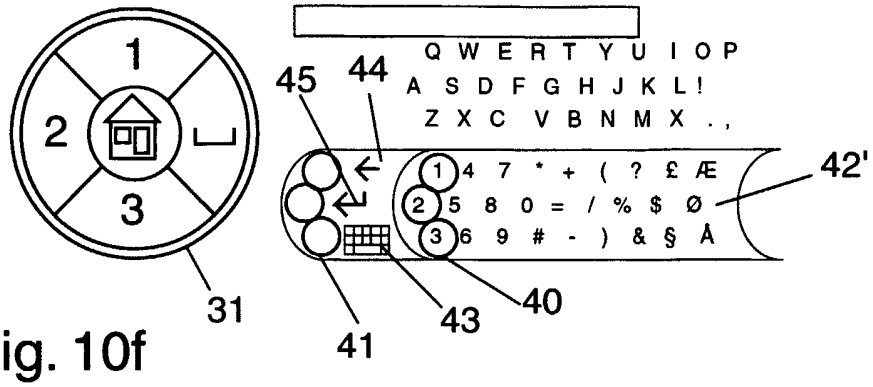

Fig. 10f

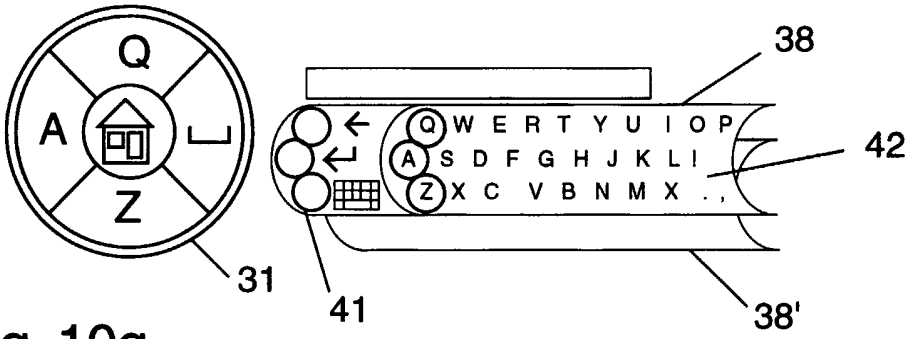

Fig. 10g

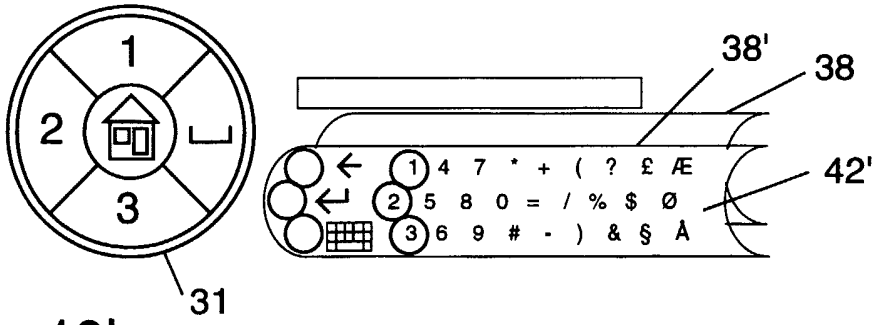

Fig. 10h

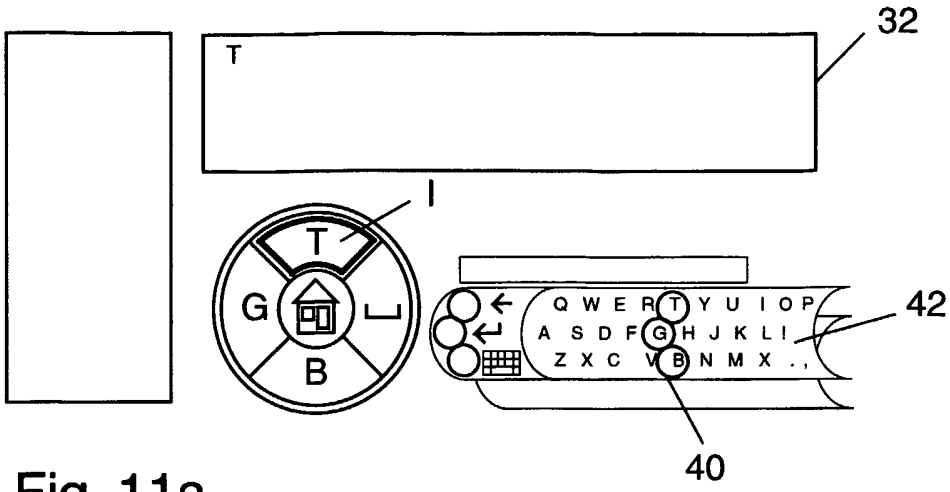

Fig. 11a

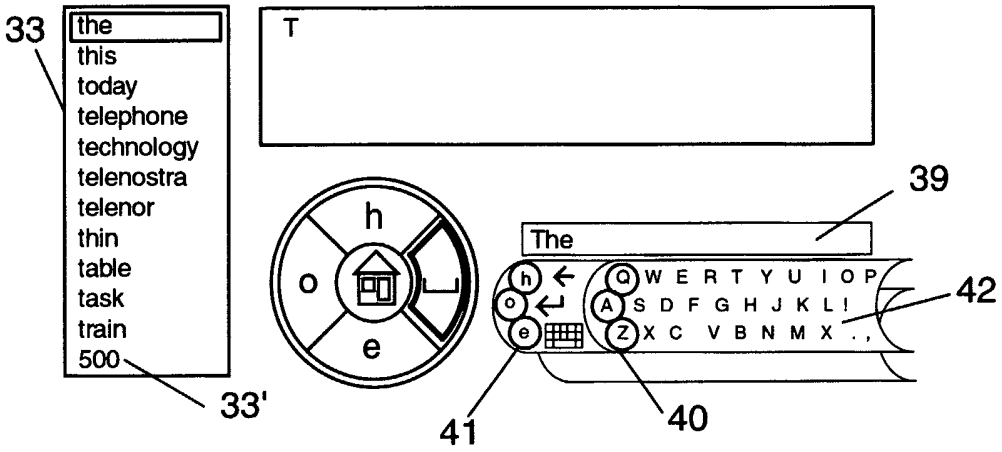

Fig. 11b

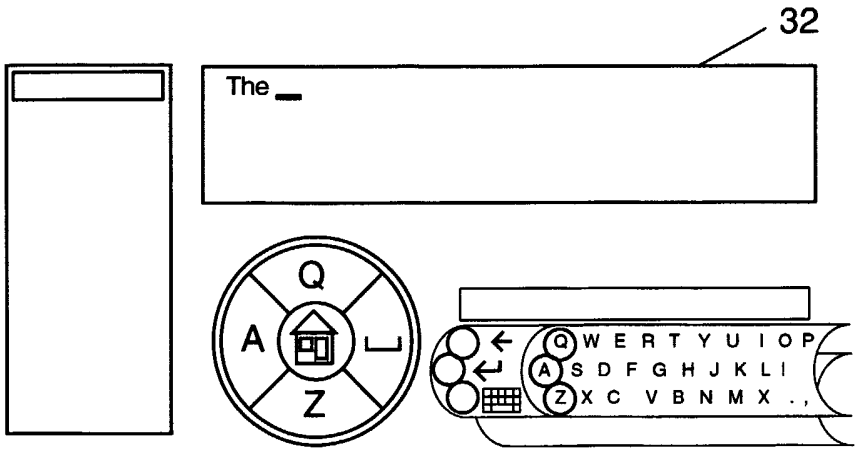

Fig. 11c

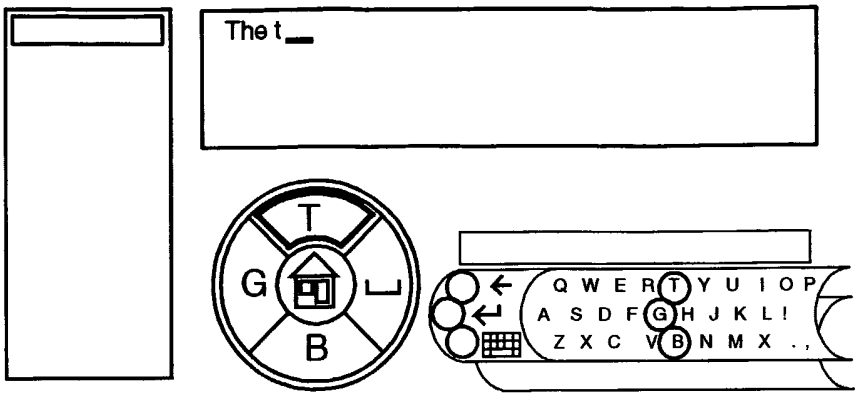

Fig. 11d

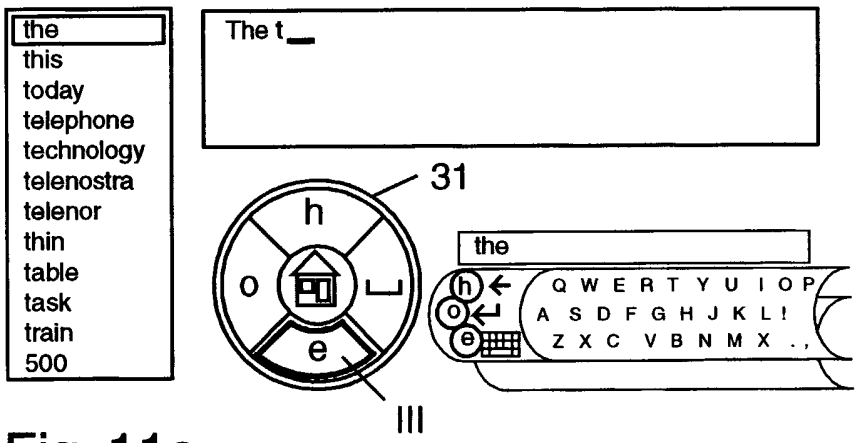

Fig. 11e

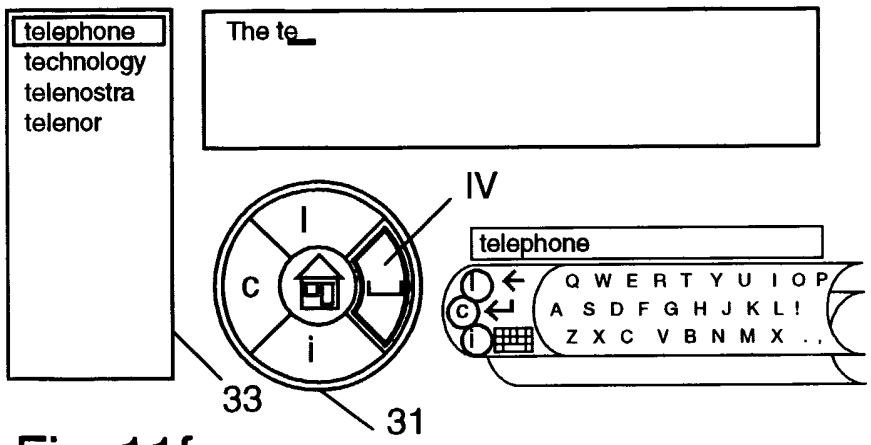

Fig. 11f

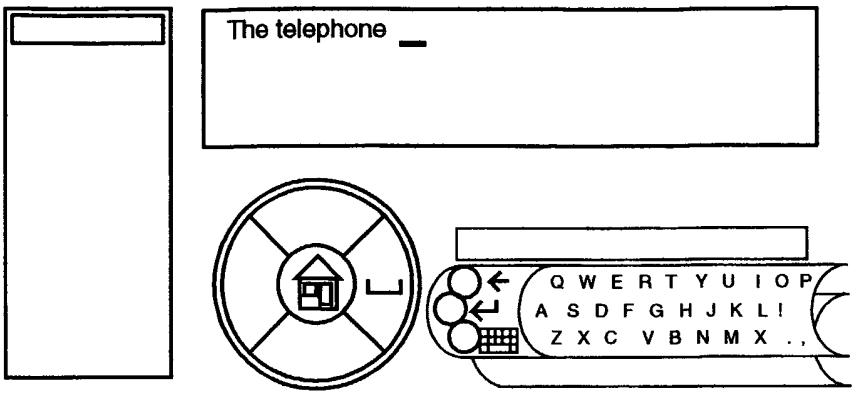

Fig. 11g

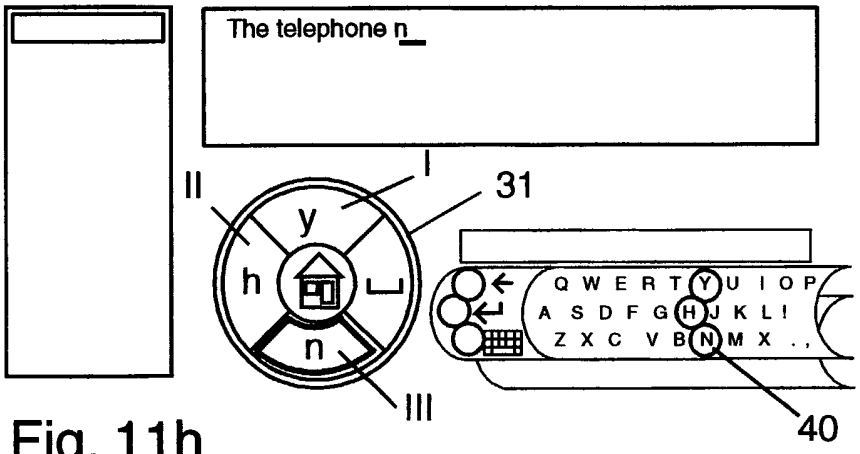

Fig. 11h

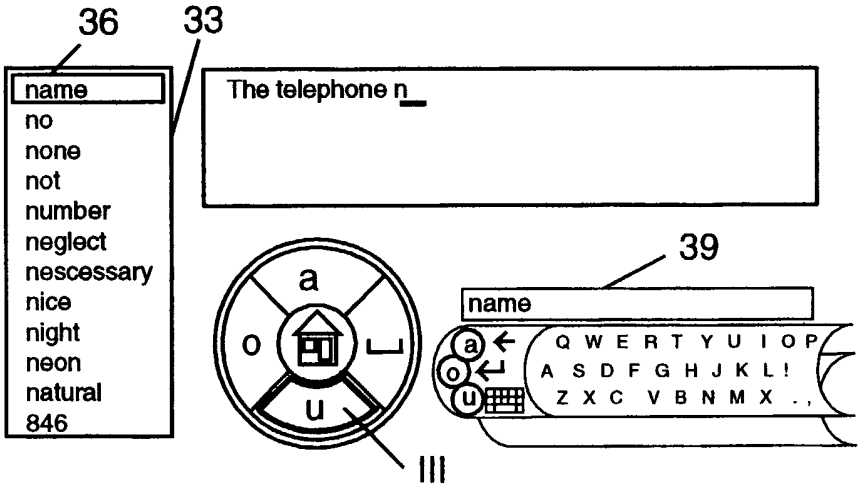

Fig. 11i

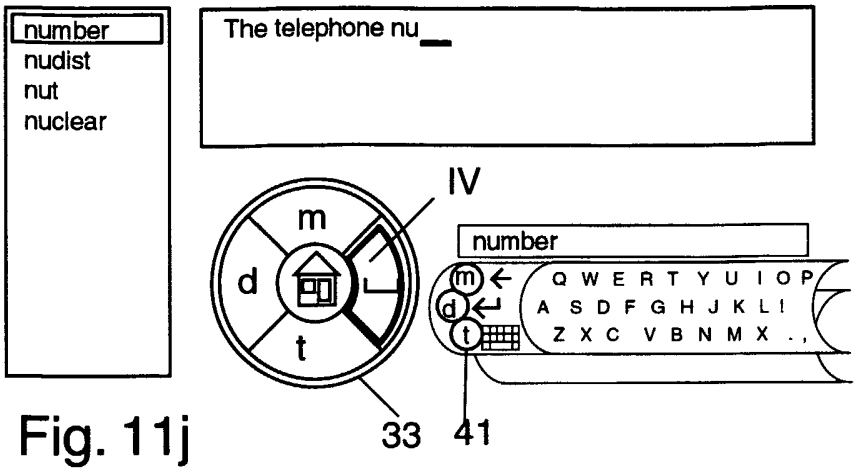

Fig. 11j

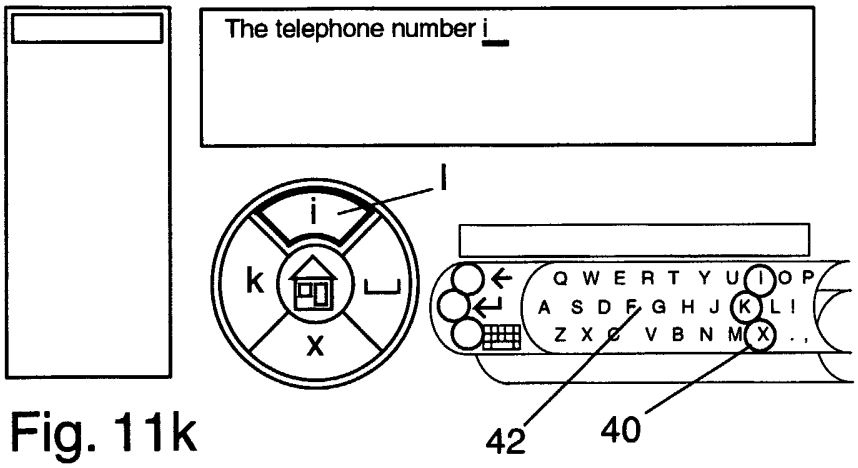

Fig. 11k

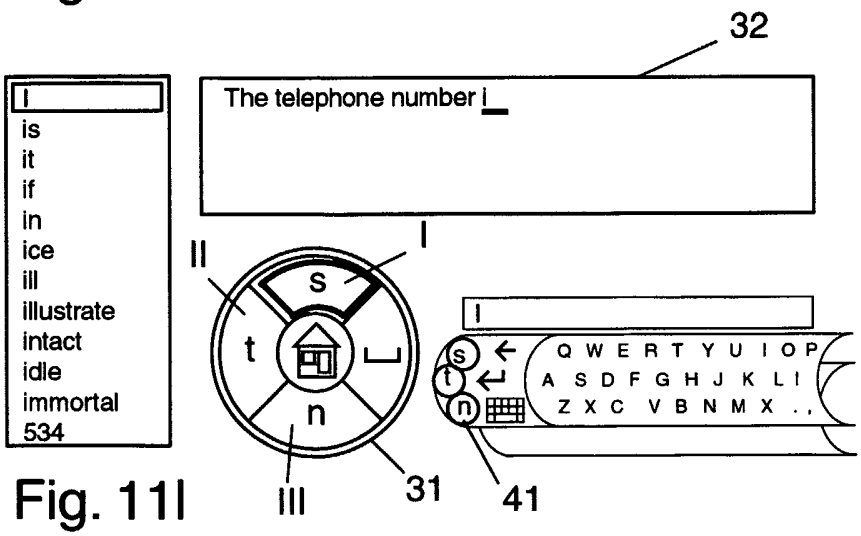

Fig. 11l

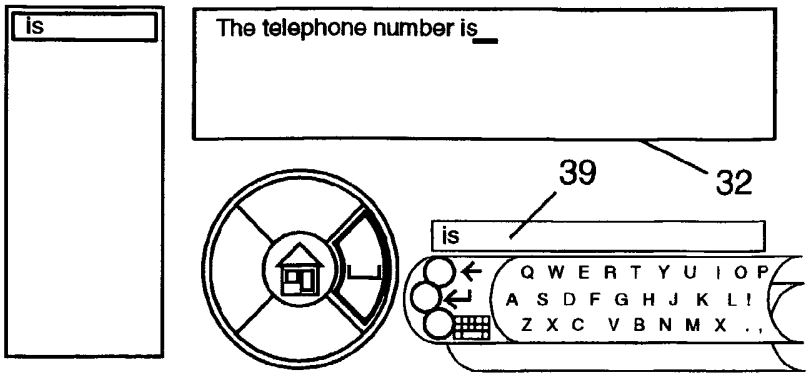

Fig. 11m

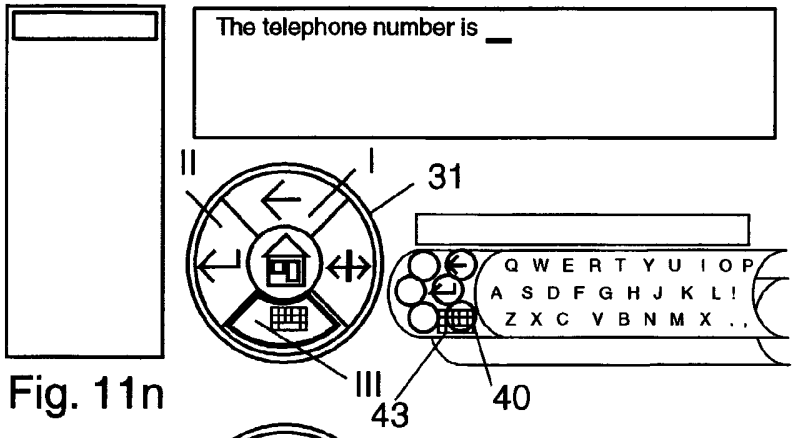

Fig. 11n

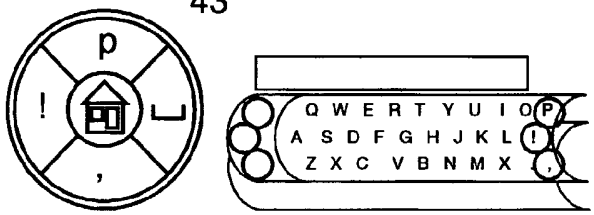

Fig. 11o

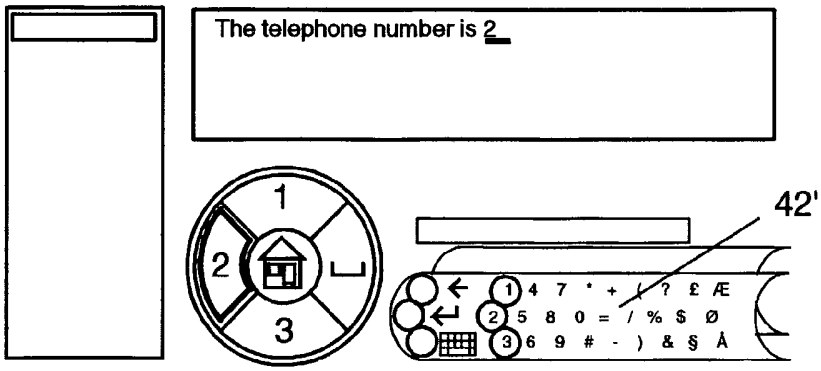

Fig. 11p

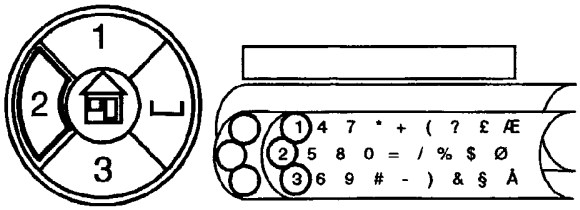

Fig. 11q

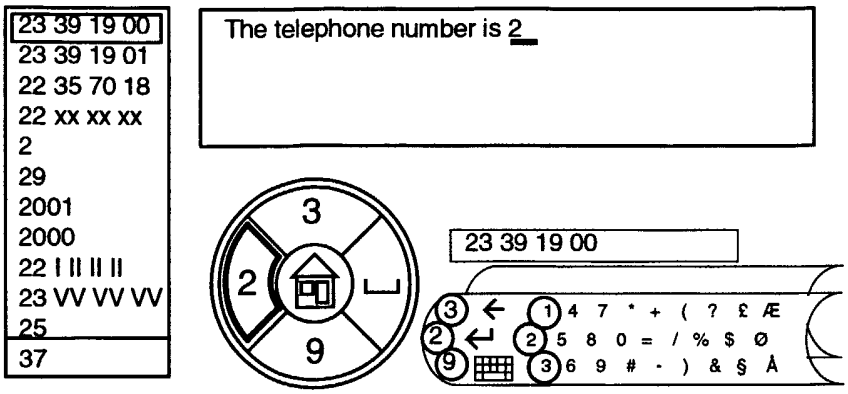

Fig. 11r

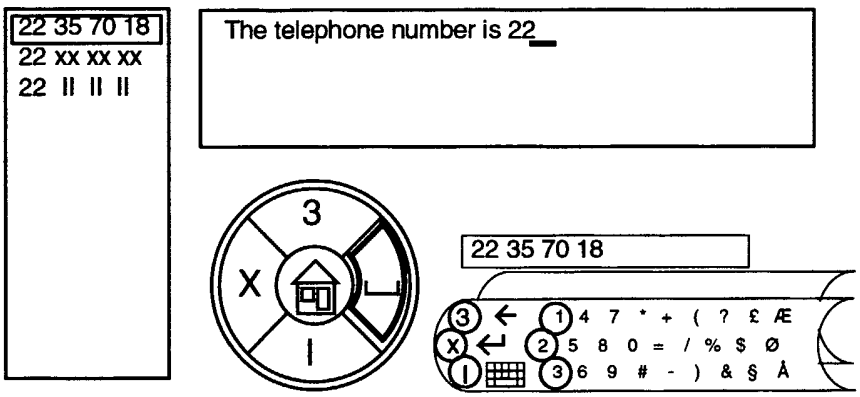

Fig. 11s

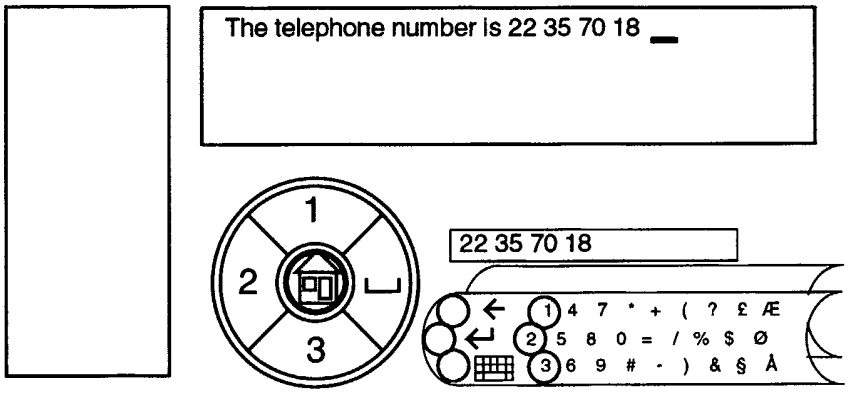

Fig. 11t

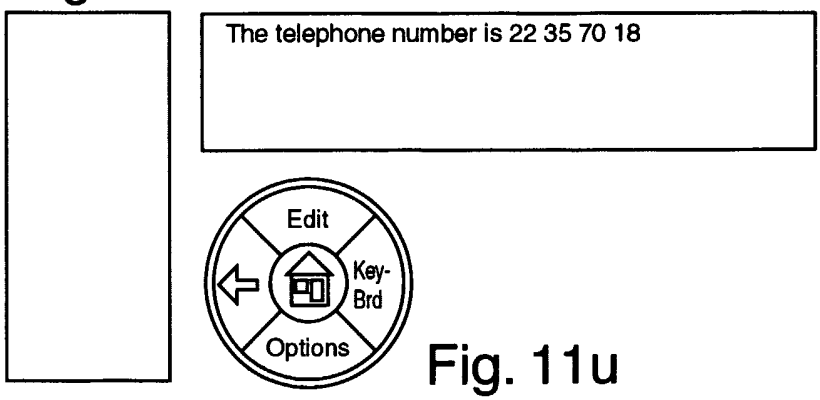

Fig. 11u

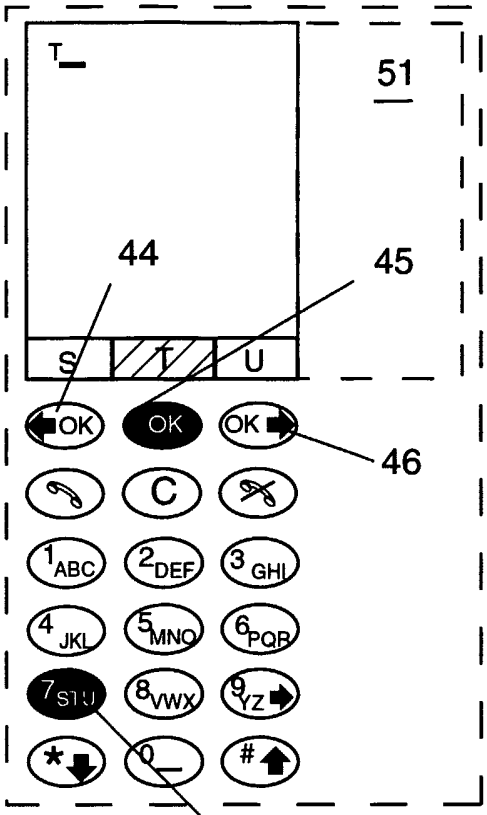

Fig. 12a

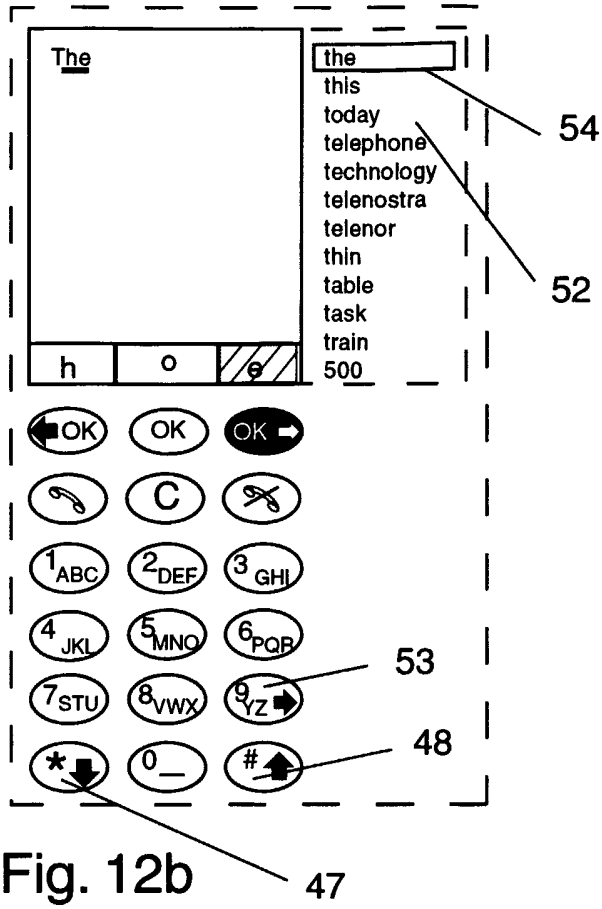

Fig. 12b

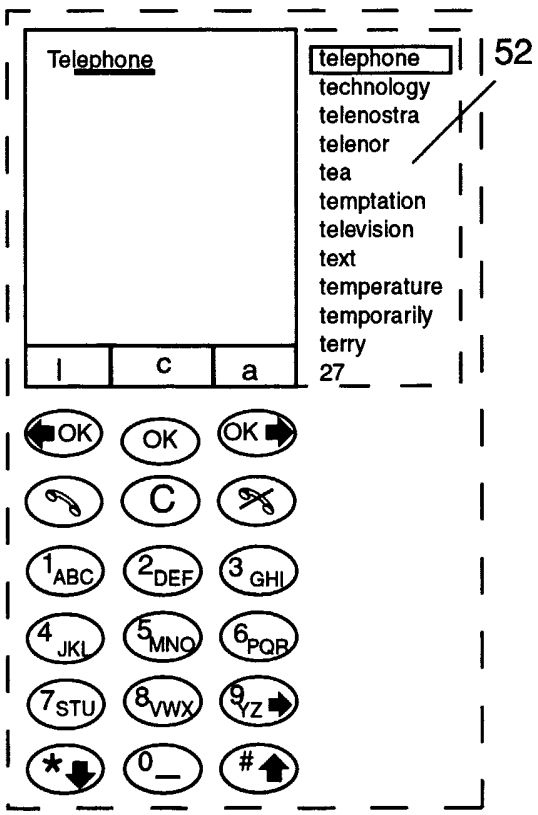

Fig. 12c

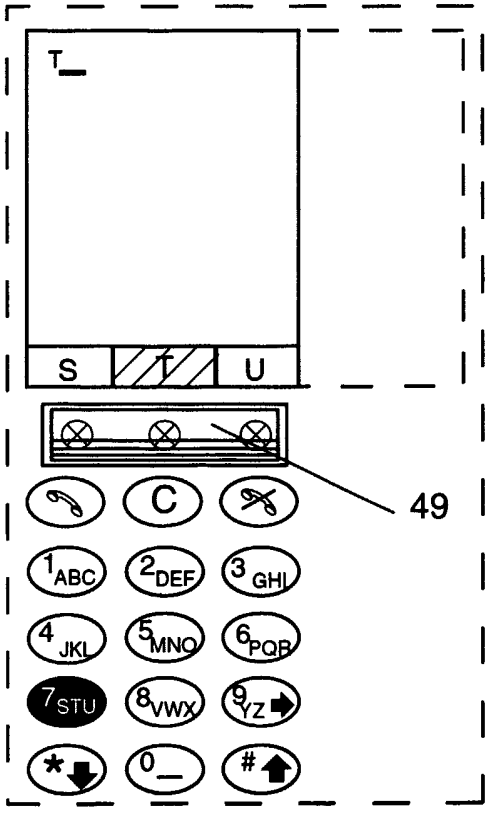

Fig. 12d

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 02/00171

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/023, G06F 3/033
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 0075765 A1 (MALVERN SCIENTIFIC SOLUTIONS LTD), 14 December 2000 (14.12.00), page 14, line 15 - page 15, line 8; page 15, line 36 - line 37; page 27, line 19 - page 28, line 25 --	1-39
X	WO 9704580 A1 (PACIFIC COMMUNICATION SCIENCES, INC), 6 February 1997 (06.02.97), figure 4, claim 1 --	1-39
X	WO 0058816 A2 (NOW SEE HEAR INTERACTIVE INC), 5 October 2000 (05.10.00), page 5, line 20 - line 32; page 7, line 4 - line 9; page 9, line 7 - line 15 --	1-39

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means
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"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 July 2002	26 -07- 2002
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Kristoffer Ogebjer/LR Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 02/00171

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 0844570 A2 (SONY CORP), 27 May 1998 (27.05.98), claims 1-28	1-39
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A	US 6011542 A (DURRANI,S. ET AL.), 4 January 2000 (04.01.00), column 1, line 24 - line 37; column 5, line 30 - line 56	1-28
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P,X	WO 0141402 A2 (BADARNEH, ZIAD), 7 June 2001 (07.06.01), page 25, line 13 - page 26, line 34	1-39
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INTERNATIONAL SEARCH REPORT

Information on patent family members

10/06/02

International application No.
PCT/NO 02/00171

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