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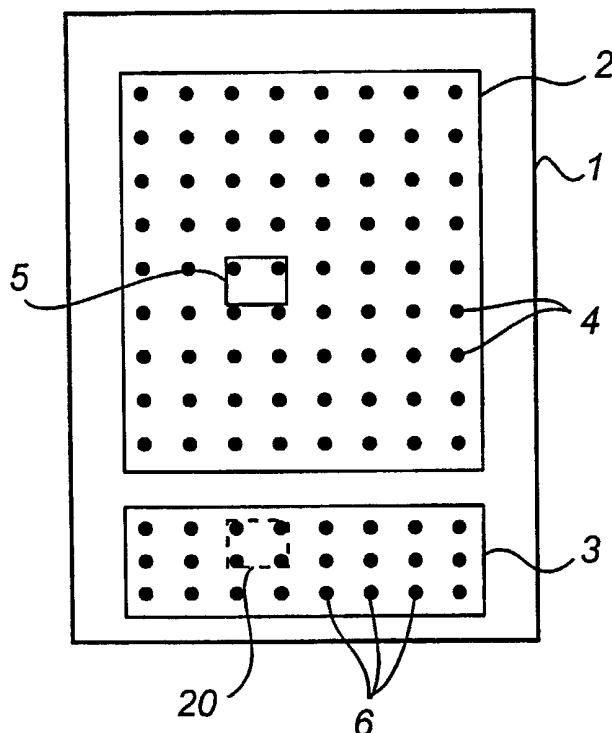
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(54) Title: DEVICE AND METHOD FOR COMMUNICATION



(57) Abstract: A product (1) intended for electronic transmission of handwritten information, a user unit (11) for recording and sending the information, and a computer program for controlling a user unit are described. The product comprises at least one writing area intended for the handwritten information and an address area (3) indicating an address to which the handwritten information is to be sent. A position-coding pattern in the form of a plurality of symbols is reproduced in the writing area, as arbitrary position area of a predetermined size of the position-coding pattern unambiguously defining a position on the product, and the address area comprises an address-coding pattern with a plurality of symbols, an arbitrary address pattern portion of a predetermined size of the address-coding pattern unambiguously defining part of the address.

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DEVICE AND METHOD FOR COMMUNICATIONField of the Invention

The present invention relates to electronic transmission of handwritten information.

Background Art

5 The amount of information transmitted electronically has increased in recent years. Most of the information transmitted electronically has been generated by means of a computer. There is, however, a great need for electronically transmitting information that has been
10 generated in some other way than by means of computers. For instance, there is a need for transmitting handwritten information in connection with the filling-in of a form. A further example when there is a need for transmitting handwritten information involves advertisements
15 in newspapers. Advertisements in newspapers sometimes have a writing area for handwritten information and a fax number to which the advertisement can be sent.

For a long time the only possibility of sending handwritten information was to use a fax machine. An
20 alternative is to use a scanner for converting the information to a digital image which can then be transmitted via a computer communication link or via the telephone network. US Patent 5,852,434 discloses a method for entering handwritten information by means of a pen and a
25 base with a coordinate pattern. When writing on the base, the pen records the movement and stores it as positions.

Independently of how the information is entered, a manual step is necessary when transmitting the information.

30 There is thus a need for an alternative method and a device adapted to the method for easier handling when transmitting handwritten information such as handwritten text.

Summary of the Invention

An object of the present invention is to provide a device for easy recording and transmission of handwritten information.

5 A further object of the present invention is to provide a user unit by means of which handwritten information can easily be transmitted to a predetermined receiver.

10 Another object of the present invention is to provide a memory medium with a computer program which can be used to control a user unit according to the invention.

15 One more object of the present invention is to provide a device for easy recording and transmission of handwritten information, which allows compact storage of an encryption key.

 These objects are achieved by a product, a user unit, and a storage medium according to the appended claims.

20 A product according to the invention for electronic transmission of handwritten text comprises at least one writing area intended for the handwritten information and an address area which indicates an address to which the handwritten information is to be transmitted. The product is characterised in that a position-coding pattern in the
25 form of a plurality of symbols is reproduced in the writing area, an arbitrary position area of a predetermined size of the position-coding pattern unambiguously defining a position on the product, and that the address area comprises an address-coding pattern with a plurality of
30 symbols, an arbitrary address portion of a predetermined size of the address-coding pattern unambiguously defining part of the address.

35 The product preferably consists of a sheet of paper in a newspaper but may also consist of e.g. an information board.

 Position-coding patterns are per se known from, for instance, US Patent 5,852,434. By the product containing

a writing area with a position-coding pattern, it is possible to enter information in the writing area by means of a user unit while at the same time a position sequence corresponding to the movement of the pen is recorded. As
5 a result, the handwritten information is recorded while being written on the sheet of paper. Since the address area contains an address-coding pattern it is possible to read the address to which the handwritten information is to be sent by recording the information by means of a
10 user unit which is adapted to enter the address-coding pattern and the position-coding pattern. The position-coding pattern thus defines a large number of positions. Each of the positions is associated with different parts of the writing area.

15 The size of the position area that is required to unambiguously determine a position from the position-coding pattern is advantageously at least the same as the size of the address area required to unambiguously determine part of the address from the address-coding
20 pattern. It is thus possible to adapt a user unit to the position-coding pattern without taking the address-coding pattern into consideration.

Said part of the address is advantageously an individual character. By said address portion of a predetermined size of the address-coding pattern unambiguously
25 defining a character, the decoding operation will be simple.

It is, of course, within the scope of the invention that certain characters correspond to a special command.
30 For instance, a character constitutes information about how the information is to be transmitted. Thus one character signifies that the information is to be sent by electronic mail and another character that the information is to be sent by fax.

35 The address area advantageously contains information which defines a communication medium which is to be used for the transmission of the handwritten information. In

the case where the address area does not contain such information, a user unit can interpret the information in the address area and thus establish which communication medium is to be used. For example, all addresses containing the character "@" are interpreted as electronic mail addresses.

Advantageously the position-coding pattern defines positions within a partial code area which is part of a larger virtual code area, the address area containing information which defines the coordinates for at least part of the writing area.

The position-coding pattern on different products codes advantageously different partial code areas. As a result, a user unit recording the address can determine which handwritten information is to be sent to the address. It is also an advantage that a user can write on a plurality of products in parallel without any risk that the written information is mixed up. Different companies can then reserve different partial code areas.

The address-coding pattern advantageously contains a plurality of sequence portions with symbols, the address portion which is required to define part of the address containing sequence portions of a predetermined number and a predetermined length. By the symbols being arranged in sequence portions, the recording and interpretation of the pattern is facilitated.

Each of the sequence portions advantageously comprises at least one subsequence of a predetermined length of a sequence, each subsequence unambiguously defining a sequence value which corresponds to the position of the subsequence in the sequence. As a result, the subsequences can easily be converted to sequence values.

The difference between the sequence value defined by a subsequence of a first sequence portion and the sequence value defined by a subsequence of a second sequence portion is constant independently of from which parts of the sequence portions the subsequences are

selected when the subsequences are fetched from corresponding parts of the sequence portions. By using differences between sequence portions, the address-coding pattern will be independent of which parts of the address-coding pattern are recorded. If the sequence portions are
5 arranged in columns in a matrix, the address-coding pattern will be insensitive to at what height in the columns the address-coding pattern is recorded.

The difference value which corresponds to the difference between sequence values from different sequence
10 portions can be represented as a binary value. A first part of the binary value represents a character and a second part of the binary value codes a sequence position for the sequence portions in the matrix.

By the difference value coding a sequence position,
15 the recording of the address is facilitated since it is then possible to record different parts of the address on different occasions and get the complete address together by means of the sequence positions. This results in robust inputting. It is thus possible to record different
20 parts of the address-coding pattern on different occasions and put together the entire address by means of the sequence positions.

The symbols in the address-coding pattern have
25 advantageously a size different from that of the symbols in the position-coding pattern. Alternatively the symbols in the address-coding pattern are arranged with an interspace which is different from that of the symbols in the position-coding pattern. A user unit can thus easily
30 distinguish the address-coding pattern and the position-coding pattern.

It goes without saying that it is possible for the two patterns to differ from each other merely by the information they code. A user unit must then interpret
35 the information represented by the patterns before it can determine whether it is a position-coding pattern or an address-coding pattern. The address-coding pattern cannot

be interpreted as positions since the positions to which they are then decoded will not be associated with each other, which is the case of the position-coding pattern.

The address area advantageously codes also a public
5 key, the receiver specified by the address being capable of decoding a message which has been coded by means of the public key. This facilitates the encryption of the message that has been written manually in the writing area.

10 By using the above-mentioned sequences for coding the address-coding pattern, it will be possible to store long encryption keys in the address.

The address-coding pattern is alternatively divided into a plurality of code fields each of which corresponds
15 to a character. An arbitrary address portion on the address-coding pattern means that the address portion is associated with one code field only. Each code field can, for example, define a specific code area on a virtual surface. The partial code areas on the virtual surface
20 are in turn associated with different characters.

According to a less preferred embodiment, the address-coding pattern is a bar code. However, it will not be possible to provide a bar code which can be recorded on several occasions. Besides, a bar code will
25 be less compact.

In the case where the address-coding pattern is divided into code fields, the code fields are preferably separated by separating fields. By the code fields being separated by separating fields, the identification of the
30 different code fields will be facilitated.

A user unit for electronic transmission of handwritten information according to the invention comprises a reading head and a memory and is adapted to optically record images from a surface by means of the reading
35 head. The user unit is characterised in that it further is adapted to convert the recorded image to at least one position and store the position in the memory in response

to the fact that the recorded image contains a position-coding pattern which codes at least one position, convert the recorded image to at least one character and store the character in the memory in response to the fact that
5 the recorded image contains an address-coding pattern which codes at least one character, and transmit at least part of positions stored in the memory to an address corresponding to characters stored in the memory. Handwritten information can thus easily be transmitted to a pre-
10 determined address by means of a user unit according to the invention.

A product according to the invention, together with a user unit according to the invention, can be used, for example, to order articles. A user then inputs which
15 articles he wants to order together with his address. When the receiver defined by the address receives the message, the receiver sends the ordered articles to the inputted address.

There are a number of alternatives to the way the
20 recording of images is to be initiated. According to an embodiment of the invention the user unit comprises a pen point. The user unit is then adapted to record images as the pen point is being pressed against a surface.

The user unit is advantageously adapted to convert
25 a first part of characters stored in the memory to an address and a second part of characters stored in the memory to writing-area information defining a writing area, and to send only positions contained in the writing area to the address. This prevents information that has
30 been recorded on other surfaces than the writing area from being sent to the address.

The user unit is advantageously adapted to attach recorded images of the address-coding pattern to a set of sequence portions, to convert the set of the sequence
35 portions to a set of sequence values, and to convert the sequence values to characters by means of information stored in the memory.

The user unit is advantageously adapted to attach an identification number when sending information to the address, said identification number being unique for each user unit. This permits identification of the user unit.

5 A memory medium according to the invention can be read by a computer. A computer program is stored on the memory medium and is adapted to be used for inputting handwritten information and electronic transmission of the information. The computer program is characterised
10 in that it contains instructions for making the computer read an input signal corresponding to a recorded image, convert the recorded image to at least one position and store the position in response to the fact that the recorded image corresponds to a position-coding pattern,
15 convert the recorded image to at least one character and store the character in response to the fact that the recorded image corresponds to an address-coding pattern, and transmit stored positions to an address corresponding to characters stored in the memory.

20 The above features can, of course, be combined in the same embodiment.

In order to further elucidate the invention, detailed embodiments of the invention will be described below without, however, the invention being considered
25 restricted thereto. The Figures are intended to illustrate the invention as distinctly as possible. The Figures are not according to scale and some dimensions are greatly exaggerated to show more clearly specific features of the invention.

30 Brief Description of the Drawings

Fig. 1 illustrates a product according to an embodiment of the present invention.

Fig. 2 shows a user unit and a communication device according to an embodiment of the present invention.

35 Fig. 3 shows symbols according to a preferred embodiment of the present invention.

Fig. 4 shows a sequence which is used to code the coding patterns according to an embodiment of the present invention.

Fig. 5 illustrates how part of the address-coding pattern is converted to an address.

Fig. 6 shows how part of the position-coding pattern is converted to positions.

Fig. 7 shows the fundamental composition of an address area.

Fig. 8 shows schematically how an ordering operation according to the invention is done.

Fig. 9 shows the conversion of part of the address-coding field at different heights in the address area according to the present invention.

Fig. 10 shows schematically an address area according to an alternative embodiment of the present invention.

Detailed Description of the Invention

Fig. 1 shows a product according to a preferred embodiment of the present invention. The product is a sheet of paper 1, which comprises a writing area 2 and an address area 3. According to a preferred embodiment of the present invention, the sheet of paper 1 is a page in a newspaper. The writing area comprises a position-coding pattern which consists of a plurality of position symbols 4 arranged in a matrix. The symbols in Fig. 1 are greatly exaggerated in respect of size. A first arbitrary position area 5 of the writing area unambiguously defines a position on the sheet. The address area comprises an address-coding pattern with a plurality of address symbols 6. The address symbols 6 are greater than the position symbols, which makes it possible to easily distinguish the different patterns. An arbitrary address portion 20 of the address area defines a character. The position-coding pattern and the address-coding pattern thus have the property that if an arbitrary part of the pattern of a certain minimum size is recorded, a position

and a character, respectively, is unambiguously defined. The coding patterns will be described in more detail below.

5 The position-coding pattern can be of the type as disclosed in the above-mentioned US 5,852,434, where each position is coded by a specific symbol.

10 However, the position-coding pattern is advantageously of the type disclosed in Applicant's Applications SE 9901954-9 and SE 9903541-2, where each position is coded by a plurality of symbols and each symbol contributes to the coding of several positions.

15 The position-coding pattern is made up of a small number of types of symbols. An example is disclosed in SE 9901954-9 where a larger dot represents a "one" and a smaller dot represents a "zero". Another example is disclosed in SE 9901954-9, where four different displacements of a dot in relation to a raster point code four different values.

20 Fig. 2 illustrates a user unit 14 which is adapted to record images from a surface. The user unit comprises a light-emitting diode 7 for illumination of the surface to be recorded, an image sensor 8 in the form of a CCD for recording of images, an image-processing means 9 and a memory 10. The user unit 14 further has a battery 12
25 for supplying power to the reading head and buttons 13 by means of which the reading head is turned on. Fig. 2 also shows a communication device 15 in the form of a computer which is disconnected from the user unit 14 and which is connected to a network via cables 18, 19. The network is
30 in this case the public telephone network but could also be an internal network. The user unit 14 is provided with a transmitter 16 for transmitting of recorded information. The user unit transmits information to the communication device which transmits the information by the public
35 telephone network. In the latter case, the user unit is a mobile unit in a mobile communication system and transmits information to the mobile communication system

by means of the transmitter 16. The user unit also comprises a pen point 21 by means of which a user can enter information. The pen point is pressure-sensitive and connected to the image-processing means. When the pen point
5 21 is pressed against a base, the recording of an image is initiated. Thus, recording of images is initiated when a user enters information in the writing area. The communication device 15 is provided with a receiver 17 for receiving information from the user unit. The transmitter
10 and the receiver communicate, for example, by using IR or radio waves.

According to an alternative embodiment, the transmitter 16 constitutes a communication device which communicates with the world around via a mobile telephone
15 system. The user unit then constitutes a mobile unit in a mobile telephone system.

Figs 3a-d show an embodiment of a symbol which can be used in the matrix in Fig. 1 according to the invention. The symbol comprises a virtual raster point 28
20 which is represented by the intersection between the raster lines, and a marking 29 which has the form of a point. The value of the symbol depends on where the marking is located. In the example in Fig. 3 there are four possible locations, one on each of the raster lines
25 extending from the raster points. The displacement from the raster point is the same for all values. The symbol has in Fig. 3a the value 0, in Fig. 3b the value 1, in Fig. 3c the value 2 and in Fig. 3d the value 3. In other words, there are four different kinds of symbols. Each
30 symbol can thus represent one of four values "0-3".

Fig. 4 illustrates a sequence 32 that is used to code the address in the address-coding pattern and positions in the position-coding pattern. The sequence 32 comprises 512 values 33 which each are either "0", "1",
35 "2" or "3". An arbitrary subsequence 34, 35 with five values unambiguously defines a sequence value which corresponds to the position of the subsequence in the

sequence 32. Each subsequence appears only once in the subsequence. Thus, the first subsequence 34 corresponds to the value "0" and the second subsequence 35 to the value "1". Sequences of this kind are described in

5 "Pseudo-Random Sequences and Arrays" by F. Jessi MacWilliams and Neil J.A. Sloane in "Proceedings of the IEEE Vol. 64 No. 12 December 1976".

Fig. 5 shows part of the address-coding pattern 2 in Fig. 1. The address-coding pattern consists of a matrix

10 20 with symbols 6. The columns 36 in the matrix consist of sequence portions of the sequences which have been described above in connection with Fig. 4, in which the values have been converted to symbols.

The recording of an address from an address-coding

15 pattern 2, 5 will now be described with reference to Figs 1, 2 and 5. When the reading pen is passed across the address-coding pattern 3, an image of a first address portion 20 is recorded, with five times five symbols 6 arranged in columns 36 which each constitute a sub-

20 quence. Each of the symbols 6 is one of the four different symbols that are shown in Fig. 4. The image-processing means converts the subsequences 36 in the matrix to subsequences 39 with values 40. Each subsequence with values corresponds to a sequence value 27 corresponding

25 to the position in a sequence with 512 values each of which is either "0", "1", "2" or "3". If an image is recorded, which is displaced one row in the matrix, sequence values corresponding to the next position in the sequence are obtained. The user unit converts the

30 subsequences 39 to sequence values 27. Subsequently the user unit calculates data values 26 as the difference modulo 1024 between the sequence values 27 for adjoining columns. By the sequence values 27 increasing to the same extent for each column if the recorded image is displaced

35 in the direction of the column, the data values which equal the difference between the sequence values are independent of at which height the image is recorded.

Then the data values are converted to binary values and the eight least significant bits in each character value are converted to characters 11 which are stored in the memory 10 while the two most significant bits from four adjoining character values are used as position for the columns. Thus a total of 256 different characters can thus be coded. The characters 11 constitute part of the address.

Fig. 6 shows part of the position-coding pattern 2 in Fig. 1. The first matrix 61 in Fig. 6 is the smallest matrix which unambiguously defines a position. The position-coding pattern in the writing area is made up of symbols 62 like those shown in Fig. 3. The difference between the symbols 62 in the writing area 2 and the symbols 6 in the address area 3 is that the symbols in the address area are larger than the symbols in the writing area. In the position-coding pattern the four different values are used to code a binary bit in each of two orthogonal directions. Thus, the four different values "0, 1, 2, 3" code the four different bit combinations (0, 0), (0, 1), (1, 0), (1, 1) where the first digit in each bit combination relates to a first direction and the second digit relates to a second direction which is orthogonal to the first direction. When a user unit records the first matrix 61 in Fig. 6, it is converted to a second matrix 63 with values 64, which defines the x coordinate, and to a third matrix 65 with values 66, which defines the y coordinate, by means of the above relationship between values and bit combinations. The second and the third matrix contain subsequences 67 with values which are each either "0" or "1". In the third matrix the subsequences constitute rows in the matrix while the subsequences constitute columns in the second matrix. Each of the subsequences 67 is part of a writing area sequence similar to the sequence shown in Fig. 4. Thus each subsequence has a unique sequence value. Each of the matrices 63, 65 with values is converted to a set

of five sequence values Sx_1-Sx_5 and Sy_1-Sy_5 , respectively, which define the position of the different subsequences in the sequence. Then the difference between adjoining sequence values is calculated, which causes two sets of
5 four difference values Dx_1-Dx_4 and Dy_1-Dy_4 , respectively, $Dx_n=Sx_{n+1}-Sx_n$ modulo R , where R is the number of unique subsequences in the writing area sequence and $Dy_n=Sy_{n+1}-Sy_n$ modulo R . Subsequently the difference values are used to generate an x coordinate and a y coordinate.

10 Fig. 7 is a schematic view of the contents in the address area. The address area contains a communication part 22 which specifies which communication medium is to be used, a character part 23 which specifies the address, a code part 24 which specifies a public code which can be
15 used to encrypt the message and a position part 25 which defines a partial code area in the writing area. The receiver defined by the address can decrypt the message which has been encrypted with the public key.

According to the preferred embodiment the product
20 constitutes a page in a newspaper. For instance the writing area and the address area are part of an advertisement offering the readers to buy a product. The writing area 2 is intended for entering the address to which the product is to be sent. When a user begins to enter information in the writing area 2, the CCD records images
25 which are transmitted to the image-processing means 9. The user unit 14 is arranged in such manner that the recorded images at least contain such a number of symbols that the position on the sheet of paper can be determined. The image-processing means 9 recognises that the pattern in the image corresponds to a position-coding pattern and converts the pattern in a submatrix to a position that is stored in a position sequence in the memory
30 10. As long as the pen point 21 records that the pen
35 point 21 is pressed down, new images are recorded. If the user interrupts his writing and then once more begins to

write in another position than the one where he stopped, the position sequence will define a discontinuous curve.

When the user scans the reading head across the address area, images are recorded, which are sent to the image-processing means 9 which recognises that the pattern in the image corresponds to the address-coding pattern in the address area. The image-processing means 9 converts the symbols in the recorded image to characters, which are stored in a string of characters in the memory 10. The conversion from symbols 4, 6, 62 to characters has been described above. When the pen point 21 does no longer record a pressure, the recording of images is terminated. The position sequences stored in the memory, which are associated with the area that is specified by the position part 25, are encrypted by means of the public key which is defined by the code part 24 and sent to the address which is defined by the character part 23. According to the preferred embodiment of the present invention, also an identification number is transmitted with the encrypted position sequence. The identification number is unique for each user unit. A receiver can identify the customer by means of the identification number.

According to the preferred embodiment, the user unit distinguishes the different parts in the address area by their being separated by separating characters. An alternative possibility is that the number of characters in each part of the address area is predetermined. The user unit can thus easily determine when part of the address area is finished.

Fig. 8 shows schematically how a user unit and a product according to the invention can be used. A user 41 inputs a message in a writing area on a product by means of a user unit 42 as described above. The user unit 42 sends encrypted position sequences together with an identification number to a receiver 44, who is a florist, via a communication link 43. The position sequence corresponds to a handwritten address with a greeting. The

receiver 44 sends flowers and the greeting to the handwritten address. The receiver then consults a database 46 via a communication link 45. In this case the database 46 is not located with the receiver 45. The receiver 44
5 obtains information from the database to allow him to send an invoice to the user 41, which is indicated by the dashed line 47, or the invoice is sent from the database to the user, which is indicated by the dashed line 48, whereupon the receiver obtains payment from the database.

10 An alternative field of application is to enter the answer to a question in a competition in the writing area 2 in the product 1. When the user 41 then scans the user unit across the address area, the answer entered is transmitted to the receiver together with the user unit's
15 14 identity. Then the receiver can in the same way as above consult the database to find out who is the owner of the user unit and send prize money, if any, to the owner.

Fig. 9 illustrates how the information from images
20 recorded at different heights in the address area is processed. The first image 50 contains five times five symbols. The symbols 51 are converted to the values as described in connection with Fig. 5. The values in the columns are then converted to sequence values corresponding to the position of the subsequence in the sequence.
25 The five subsequences with symbols corresponding to the columns in the first image 50 are thus converted to a first set of five sequence values 52. The first set of five sequence values 52 is then converted to a first set
30 of difference values 53 which in turn is converted to characters in the same way as described in connection with Fig. 5. When a third image 56 containing five times five symbols is recorded, the five subsequences consisting of five symbols are converted to a second set of five
35 sequence values 54. The second set of five sequence values 54 is then converted to a second set of difference values 55 which in turn is converted to characters in the

same way as described in connection with Fig. 5. Each of the sequence values 54 in the second set is four units greater than the sequence values 52 in the first set since they are fetched further down in the sequences of which the sequence parts constitute a part. However, each of the difference values 53 in the first set of difference values is the same as the corresponding difference value in the second set of difference values. Thus, the difference values are independent of at what height in the address area 57 the images are recorded.

Fig. 10 shows an address area according to an alternative embodiment of the present invention. The address area 31 is divided into a number of subareas 37, which each comprise a position-coding pattern. Each subarea thus defines a partial code area on a virtual surface. The subareas are separated by separating fields 38. The user unit has in its memory information about which character is associated with a certain partial code area on the virtual surface. When the user unit records a separating field, it can determine that it has reached the next character in the address area. The drawback of this embodiment is that the address will be less compact.

The above embodiments are to be considered examples only.

A person skilled in the art realises that the above embodiments can be varied in a number of ways without departing from the inventive idea. For instance, the communication device and the reading device can be an integrated unit.

It goes without saying that each symbol can define a number with a base other than four.

It is within the scope of the invention that the address area merely comprises the code field, the user unit, for example, being adapted to always use the same communication medium.

CLAIMS

1. A product (1) for electronic transmission of
5 handwritten information, comprising at least one writing area (2) intended for the handwritten information and an address area (3) indicating an address to which the handwritten information is to be sent, c h a r a c -
t e r i s e d in that a position-coding pattern in the
10 form of a plurality of symbols (4) is reproduced in the writing area (2), an arbitrary position area (5) of a predetermined size of the position-coding pattern unambiguously defining a position on the product, and that the address area (3) comprises an address-coding pat-
15 tern with a plurality of symbols (6), an arbitrary address portion (20) of a predetermined size of the address-coding pattern unambiguously defining part of the address.

2. A product as claimed in claim 1, c h a r a c -
20 t e r i s e d in that the size of the position area required to unambiguously determine a position from the position-coding pattern at least is the same as the size of the address portion required to unambiguously determine part of the address from the address-coding pattern.

25 3. A product as claimed in claim 1 or 2, c h a r -
a c t e r i s e d in that said part of the address is an individual character.

4. A product as claimed in claim 1, 2 or 3,
c h a r a c t e r i s e d in that the address area (3)
30 contains information which defines a communication medium that is to be used for transmission of the handwritten information.

5. A product as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the position-
35 coding pattern defines coordinates within a partial code area which is part of a larger virtual code area, the

address area containing information which defines the coordinates for at least part of the writing area.

6. A product as claimed in any one of the preceding claims, characterised in that the address-coding pattern comprises a plurality of sequence portions with symbols (4), the address portion which is required to define part of the address comprising sequence portions of a predetermined number and of a predetermined length.

10 7. A product as claimed in claim 6, characterised in that each of the sequence portions comprises at least one subsequence of a predetermined length of a sequence, each subsequence unambiguously defining a sequence value which corresponds to the position of the
15 subsequence in the sequence.

8. A product as claimed in claim 7, characterised in that the difference between the sequence value defined by a subsequence of a first sequence portion, and the sequence value defined by
20 a subsequence of a second sequence portion is constant independently of from which parts of the sequence portions the subsequences are selected when the subsequences are fetched from corresponding parts of the sequence portions.

25 9. A product as claimed in claim 8, characterised in that the difference value which corresponds to the difference between sequence values from different sequence portions is represented as a binary value, a first part of the binary value representing a
30 character and a second part of the binary value representing part of a position indication for the sequence portions in the matrix.

10. A product as claimed in any one of the preceding claims, characterised in that the symbols in
35 the address-coding pattern are of a size different from that of the symbols in the position-coding pattern.

11. A product as claimed in any one of the preceding claims, characterised in that the symbols in the address-coding pattern are arranged with an inter-space different from that of the symbols in the position-coding pattern.

12. A product as claimed in any one of the preceding claims, characterised in that the address area (3) also codes a public key, the receiver specified by the address being capable of decoding a message which has been coded with the public key.

13. A product as claimed in claim 1, characterised in that the address area (36) is divided into a plurality of code fields (37) each of which codes a partial code area of a virtual code area, each partial code area corresponding to a character.

14. A product as claimed in claim 13, characterised in that the code fields are separated by means of separation fields (38).

15. A user unit for electronic transmission of handwritten information, which comprises a reading head and a memory (10) and which is adapted to optically record by means of the reading head images from a surface, characterised in that it is further (11) adapted to

convert the recorded image to at least one position and store the position in the memory (10) in response to the fact that the recorded image contains a position-coding pattern which codes at least one position,

convert the recorded image to at least one character and store the character in the memory (10) in response to the fact that the recorded image contains an address-coding pattern which codes at least one character, and

transmit at least part of positions stored in the memory (10) to an address corresponding to characters stored in the memory.

16. A user unit as claimed in claim 15, characterised in that it also comprises a pen point

(21) and is adapted to record images when the pen point (21) is pressed against a surface.

17. A user unit as claimed in claim 15 or 16, characterised in that it is adapted to

5 convert a first part of characters stored in the memory to an address and a second part of characters stored in the memory to position information which defines a writing area, and

10 only transmit positions contained in the writing area to the address.

18. A user unit according to any one of claims 15, 16 or 17, characterised in that it is adapted to

15 convert recorded images of the address-coding pattern to a set of sequence portions,

convert the set of sequence portions to a set of sequence values, and

convert the sequence values to characters by means of information stored in the memory.

20 19. A user unit as claimed in any one of claims 15-18, characterised in that it is adapted to enclose an identification number when transmitting information to the address, said identification number being unique for each user unit.

25 20. A memory medium, which can be read by a computer (11) and on which a computer program is stored which is adapted to be used for entering handwritten information and for electronic transmission of the information, characterised in that the computer program
30 comprises instructions for making the computer (11)

read an input signal corresponding to a recorded image,

convert the recorded image to at least one position and store the position in response to the fact that the
35 recorded image corresponds to a position-coding pattern,

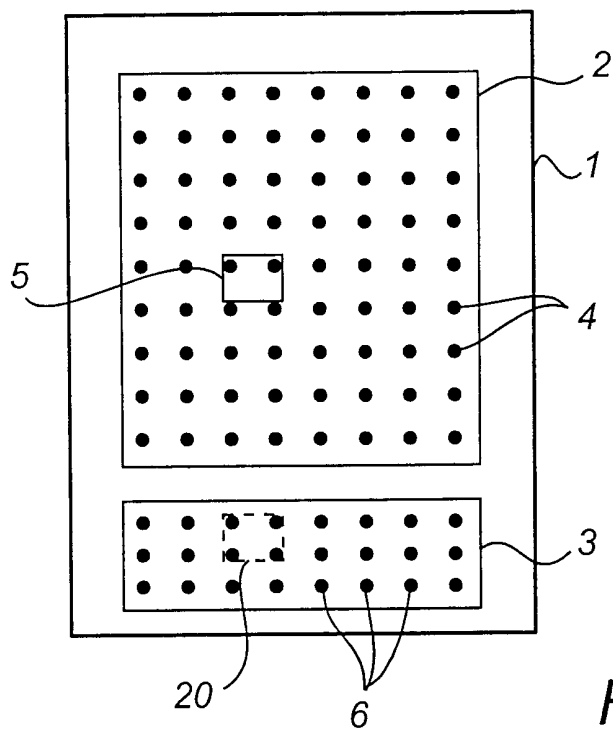
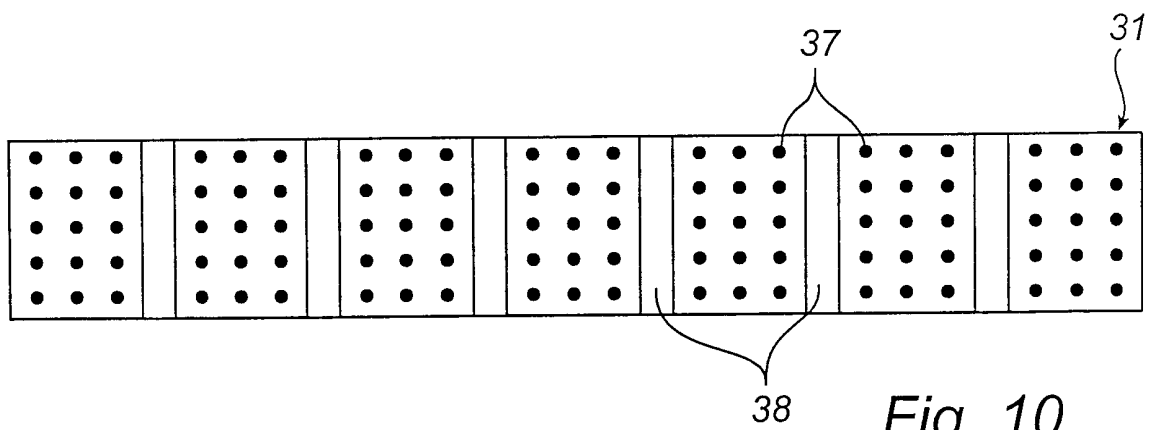
convert the recorded image to at least one character and store the character in response to the fact that the

recorded image corresponds to an address-coding pattern,
and

transmit stored positions to an address correspond-
ing to characters stored in the memory.

- 5 21. A memory medium as claimed in claim 20,
c h a r a c t e r i s e d in that the computer program
makes the computer (11) convert part of the stored char-
acters to writing position information which defines a
writing area, and to transmit only positions contained in
10 the writing area to the address.

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*Fig. 1**Fig. 10*

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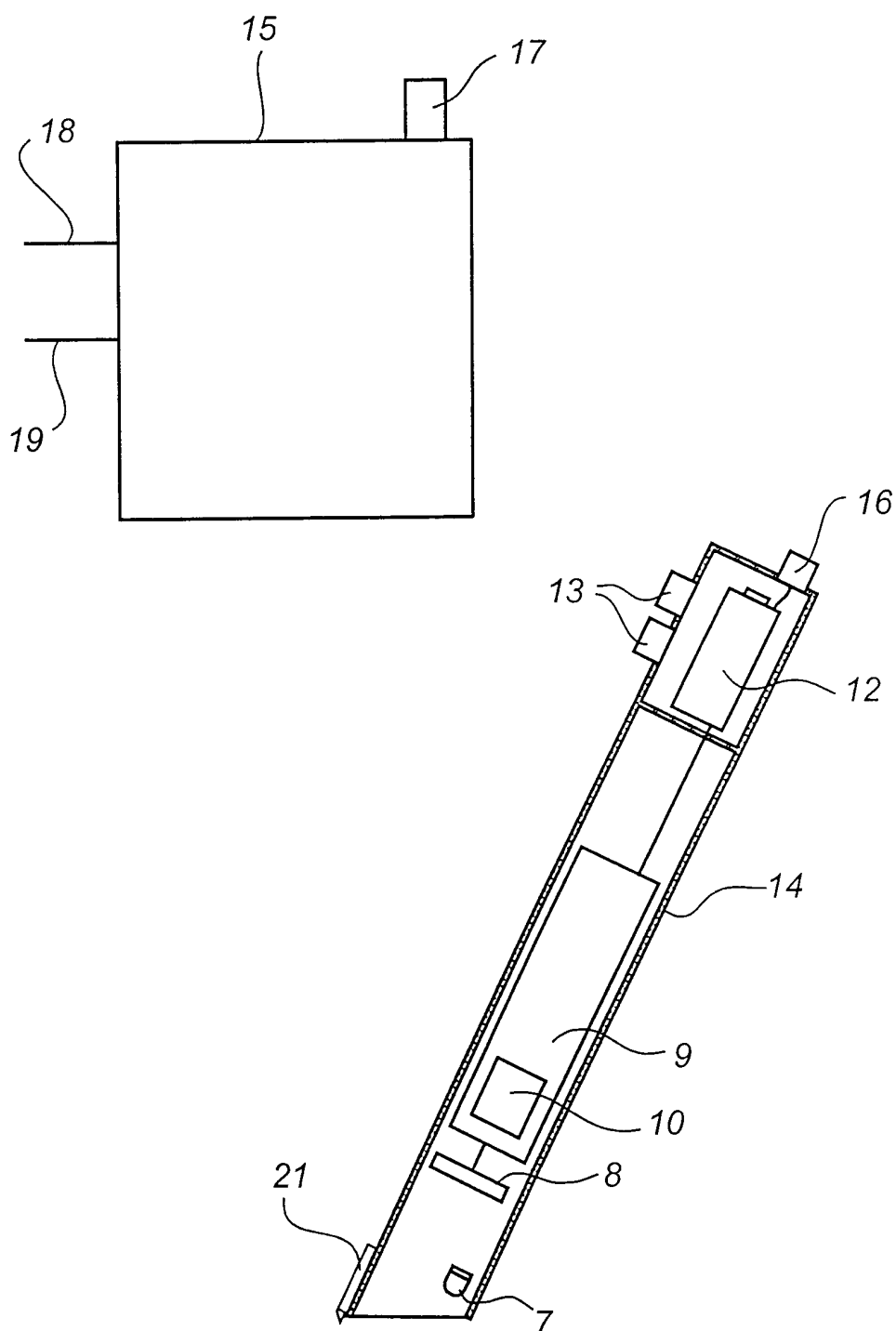
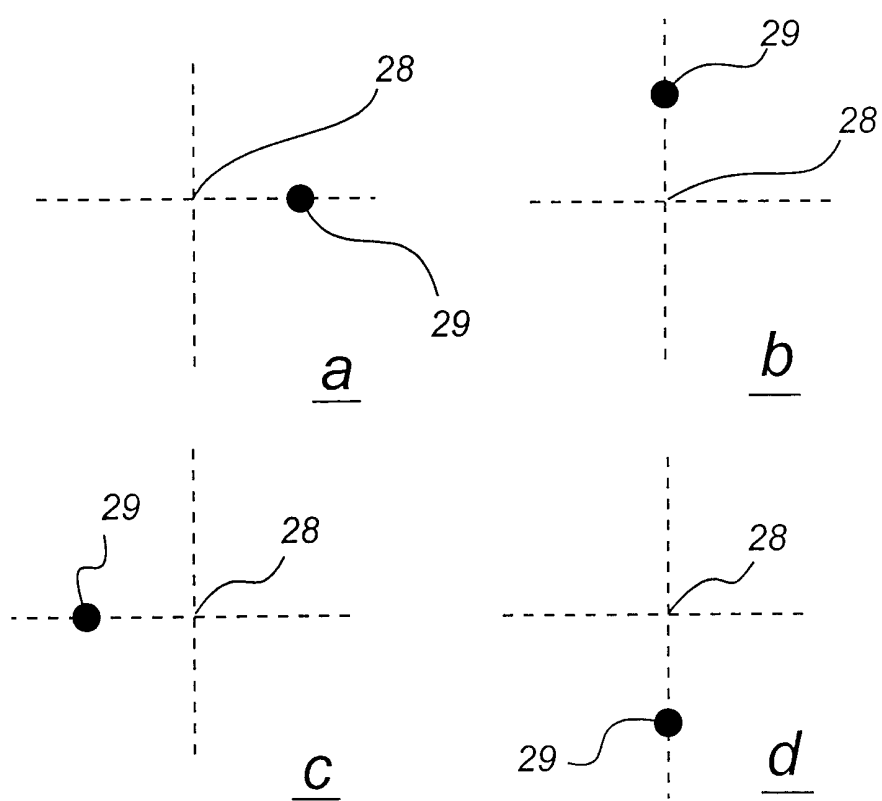


Fig. 2

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*Fig. 3*

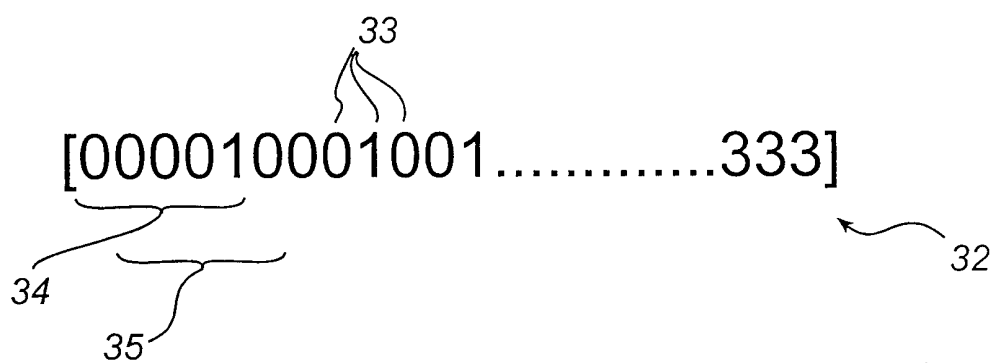


Fig. 4

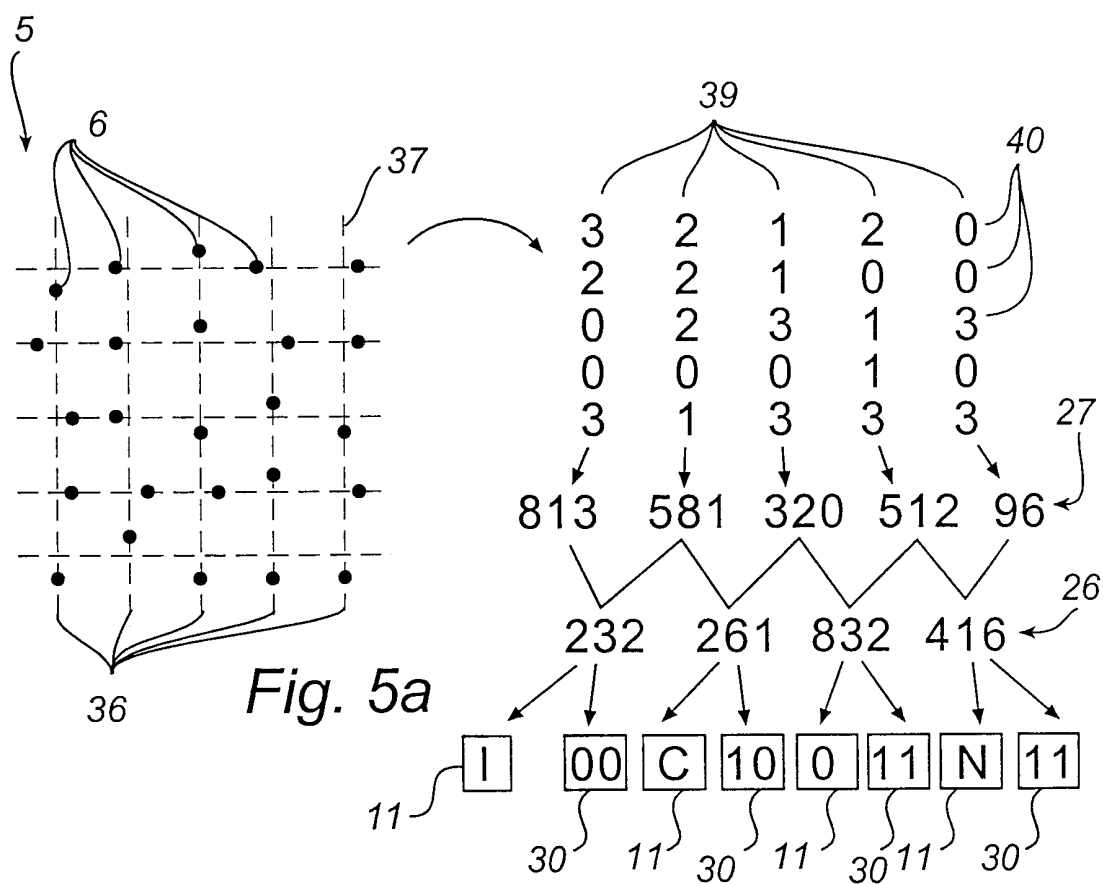


Fig. 5a

Fig. 5b

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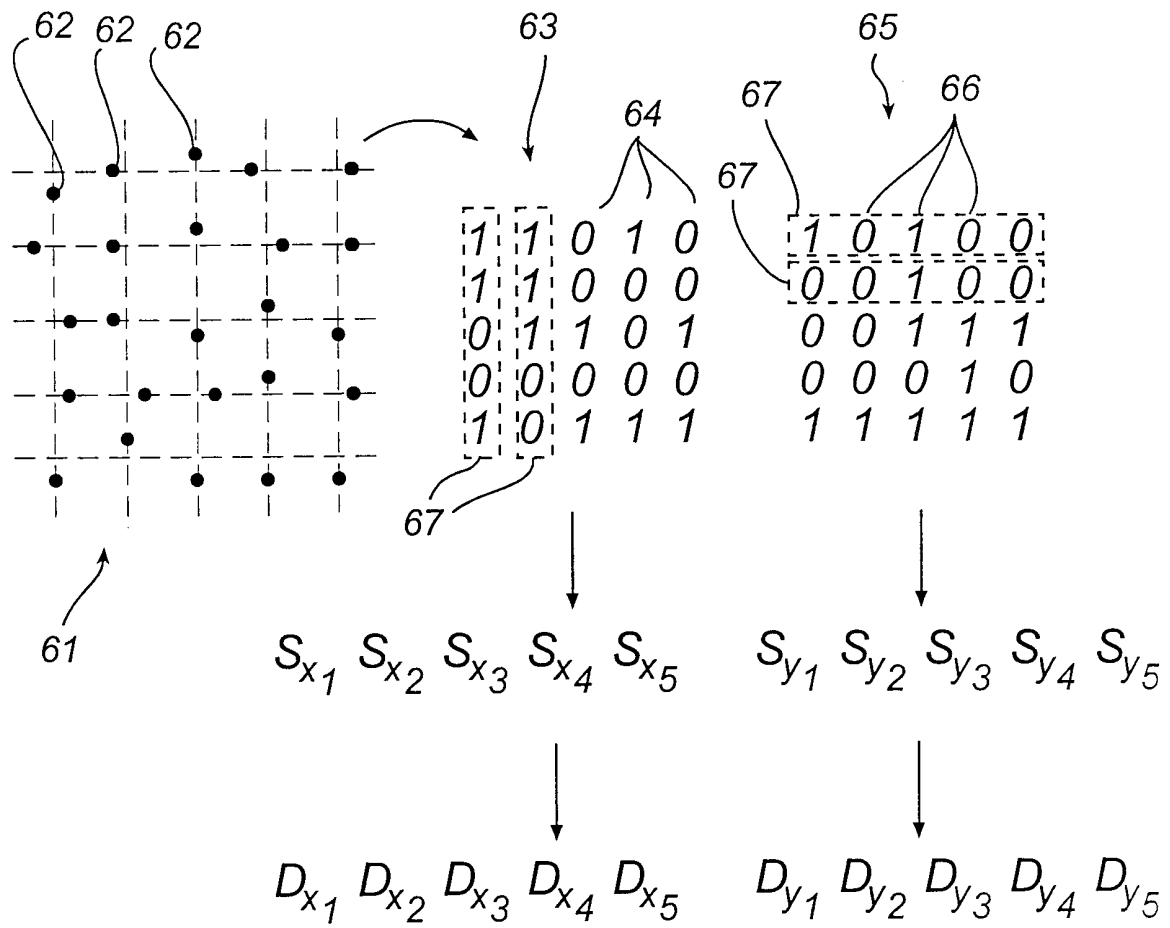


Fig. 6

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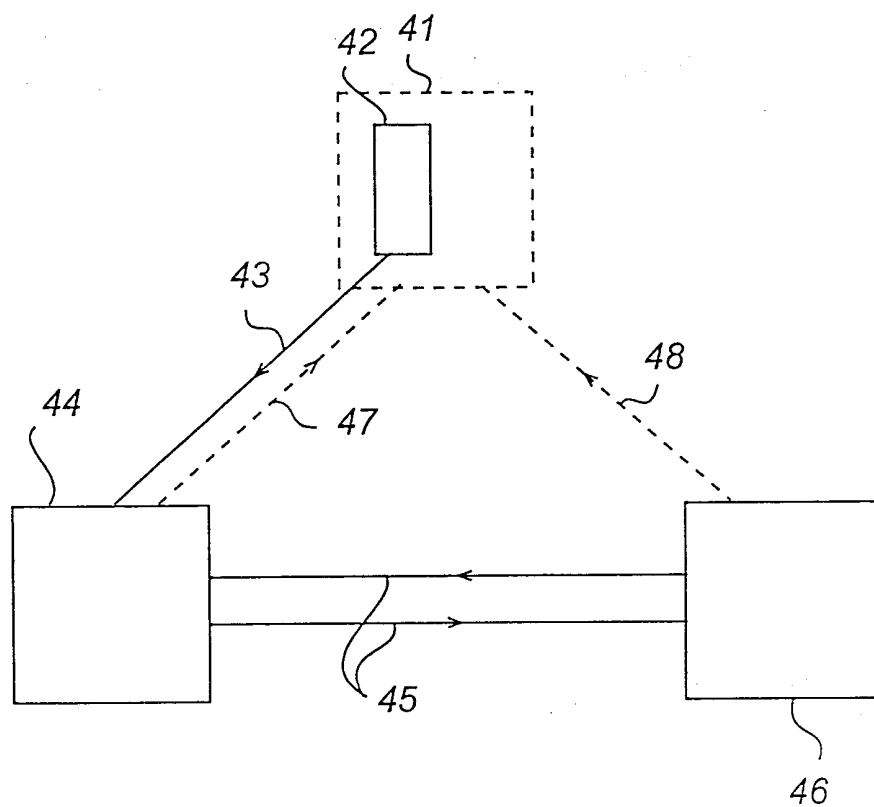


Fig. 8

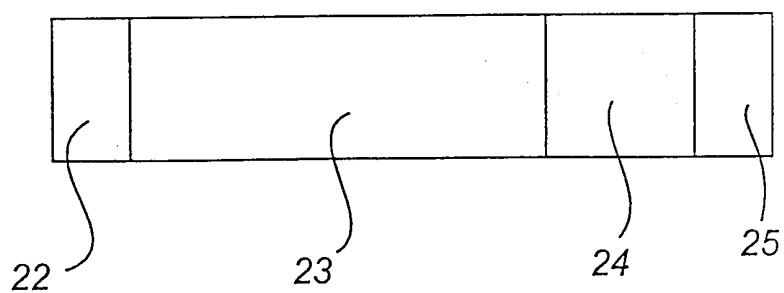
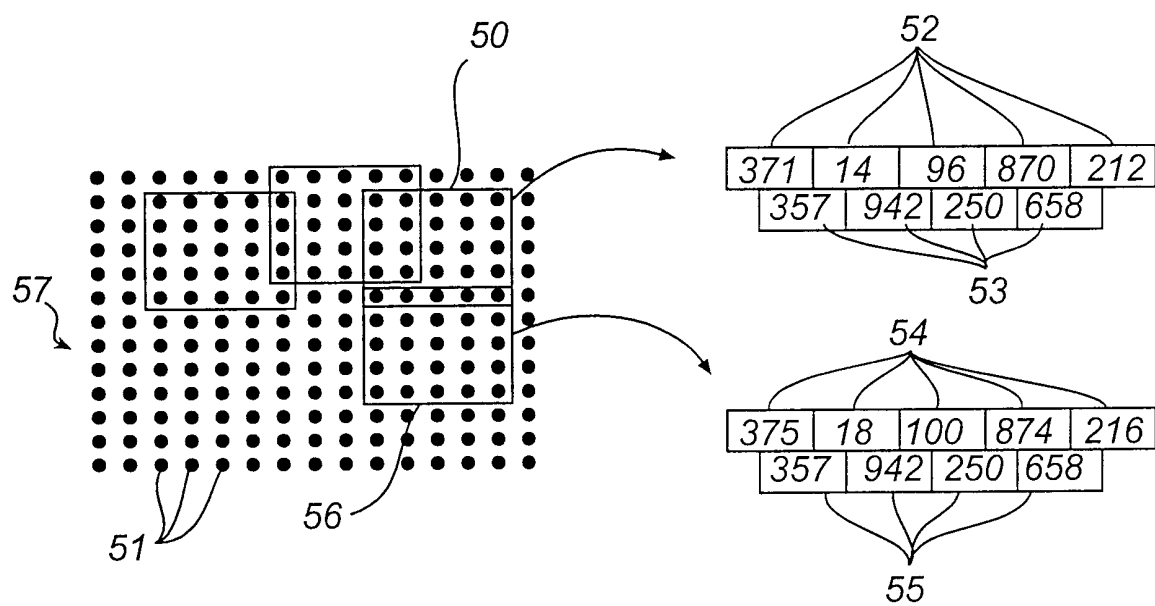


Fig. 7

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*Fig. 9*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/00607

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/033, G06K 11/18

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2306669 A (RICOH COMPANY LTD), 7 May 1997 (07.05.97), page 3, line 1 - page 4, line 3; page 6, line 21 - page 7, line 7; page 8, line 13 - line 20, figure 1, claims 12,14, abstract	1,2,4,15-21
A	--	3,5-14
X	GB 2329300 A (NOKIA MOBILE PHONES LIMITED), 17 March 1999 (17.03.99), page 1, line 1 - line 19; page 3, line 35 - page 4, line 6; page 6, line 5 - line 19, figure 6, abstract	1,2,4,15-21
A	--	3,5-14



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

22 May 2001

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/00607

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5852434 A (SEKENDUR), 22 December 1998 (22.12.98), column 2, line 40 - column 4, line 24, figures 1-7, claims 1-20, abstract --	1-21
A	US 5661506 A (LAZZOUNI ET AL), 26 August 1997 (26.08.97), column 2, line 39 - column 3, line 34, figures 8,12, claims 1-7, abstract -- -----	1-21

INTERNATIONAL SEARCH REPORT

Information on patent family members

30/04/01

International application No.

PCT/SE 01/00607

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				GB	9622632	D	00/00/00
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				US	6081261	A	27/06/00
GB	2329300	A	17/03/99	CN	1211891	A	24/03/99
				EP	0907278	A	07/04/99
				GB	9719584	D	00/00/00
				JP	11168545	A	22/06/99
US	5852434	A	22/12/98	AU	4529896	A	14/07/97
				US	5477012	A	19/12/95
				WO	9722959	A	26/06/97
US	5661506	A	26/08/97	NONE			