EXHIBIT 4.23

14 is performed, the next page appears, but in the case of horizontal text, the previous page would appear. On the other hand, in the case of a vertical-text book, when rubbing from right to left using a forefinger, opposite from what is shown in Fig. 14, the previous page appears, but in the case of horizontal text books, the next page appears.

0086
In this manner, turning pages with the same logic used for a regular book is feasible so learning the operation is easy and enables provision of a user-friendly interface.

0087
Note that when turning a page, an in-between page-turning image such as what is shown in Fig. 14 can be displayed in conjunction with the action of a finger, but switching directly to the previous page or next page is also acceptable.

0088
In addition, a sound associated with turning a page (such as “para”) corresponding to the turning of the page can be output.

0089[2] Continuous page-turning input operation
As shown in Fig. 15, when a user touches an image simulating “thickness of a book” (hereinafter referred to as “thickness of a book”) 240, 242 continuously for a prescribed period of time or longer, pages are continuously turned. Here, the page-turning speed can be adjusted by adjustment of the user’s touch pressure. Specifically, if the user increases the touch pressure, the page-turning speed can be increased. Or, if the user lightens the touch pressure, the page-turning speed can be reduced. When the user finds the page he wants to read and removes his hand from the aforementioned “thickness of book,” page-turning is stopped and the display screen displays this page.

0090
Note that similar to the case for turning pages described above, next and previous pages are different for vertical text and horizontal text. Specifically, in the case of a vertical-text book, as shown in Fig. 15, continuously touching the book thickness on the left edge enables continuous page-turning in the forward direction, but in the case of horizontal text, this turns pages continuously in the backward direction. Conversely, in the case of a vertical text book, opposite from what is shown in Fig. 15, continuously touching the book thickness on the right edge enables continuous page-turning in the backward direction, but in the case of horizontal text, this turns pages continuously in the forward direction.

0091
In this manner, turning pages with the same logic used for a regular book is feasible so learning the operation is easy, enabling provision of a user-friendly interface.

0092
Note that when turning pages continuously, an in-between page-turning image such as shown in Fig. 15 can be displayed in conjunction with the action of a finger, but switching directly to the previous page or next page after a prescribed period of time is also acceptable.

0093
In addition, a sound associated with turning pages (such as “para-para”) corresponding to turning the pages can be output.

0094
[3] View bookmark insertion operations
Next, the bookmark function of this embodiment will be explained. Similar to inserting a bookmark in the location for viewing again when reading a regular book, attaching a bookmark in the page for viewing again is also feasible with this embodiment.

0095
As shown in Fig. 16, if the arrow part 260 is dragged to the bottom of the screen using a finger, a bookmark is inserted in this page. Specifically, a bookmark 270 is displayed at the top of the screen as shown in Fig. 17 after the operation described above is performed.

0096
If the user is viewing a different page, as shown in Fig. 18 (A), a bookmark 270 is displayed at the bottom of the screen.

0097
When the user wants to view a bookmarked page, by touching the bookmark displayed at the bottom of the screen as shown in Fig. 18 (B), the screen switches to the bookmarked page as shown in Fig. 18 (C).

0098
Note that an example was given of only inserting one bookmark, but it is not limited to this. For example, if bookmarks for multiple pages are desired, displaying multiple colors, etc., of bookmarks can be used.

0099
(5) Example of use of Today’s folder
A specific example of use of Today’s folder for this embodiment will described.

0100
In Fig. 3, when touching icons for input 280, as shown in Fig. 19, a toolbar configured with icons (282, 284, 286, 288) for various operations is displayed at the bottom of the screen.

0101
282 is an icon touched for switching to a mode for performing input of various settings for this electronic book. 284 is an icon touched for switching to a mode of taking a video or still picture using the camera that is an auxiliary component of this electronic book. 286 is an icon touched for switching to a mode of inputting memos of text or figures, etc., using the pen that is an auxiliary component of this electronic book. 288 is an icon touched for storing input data and information designated on the screen to Today's folder or viewing the content of Today's folder. This Today's folder is created every day automatically. Usage is daily storage of data created for scenarios used daily, just like a storehouse. Examples of various types of Today's folder are described below.

0102
[1] Example of storing information stored in an electronic book through floating
An example of storing information stored in an electronic book through floating is described using Fig. 20 to Fig. 22. For example, if information on "North India" is desired, touch the "North India" index to open and read it. Of the information shown, because the characters "Taj Mahal" are in red text, you touch these (see Fig. 20 (A)). The system is configured to automatically jump to the "Taj Mahal" page.

0103
For example, if [the user] desires to read about the "Taj Mahal" in a regular paper book and copy this portion to carry around, in the case of an electronic book, the following operation is possible.

0104
Specifically, the user draws a square by tracing around the area noting information that he wants to cut out by using the forefinger, and then removing the finger from the screen (see arrow 410 in Fig. 20 (B)). Here, the circumscribed portion is displayed as if it was floating on the screen (see 420 in Fig. 21). This is called floating.

0105
When the user presses the floating part by using a finger and moving it to Today's folder icon 288 using a drag-and-drop function and then removing the finger (hereinafter "drag and drop to Today's folder") (see Fig. 22), the floating part is stored in Today's folder. In this manner, in an electronic book, designating the content [the user] wants to cut out by using a finger to drag and drop to Today's folder allows for storage in Today's folder of the content designated on the screen .

0106
Incidentally, the floating area can be an area designated as an area surrounded by the edge of the screen and indicated by using a finger in addition to an area

surrounded by a closed curve or a polygon. For example, as shown in Fig. 42 (A), if a finger follows a track 840 drawn on the screen, the area 852 (cross-hatched area) surrounded by the track 840 and the edge line 850 at the edge of the screen can be set as floating.

0107
Furthermore, as shown in Fig. 42 (B), with the indication of two points P1, P2 on the screen with fingers, the rectangle area 854 (cross-hatched area) with the line that connects these two points as a diagonal can be set as floating.

0108
Furthermore, as shown in Fig. 42 (C), with the indication of three points P3, P4, P5 on the screen with a finger, the circle area 856 (cross-hatched area) with these three points on its periphery can be set as floating.

0109
[2] Example of storing a still picture and video
Next, Fig. 23 to Fig. 25 are used to describe an example of storage in Today's folder of video taken with a camera.

0110
For example, in a case when a user wants to take note of details of a schedule while traveling, if this electronic book is used, as shown in Fig. 24 (A), a camera lens 520 contained in the electronic book body can be pulled out, a picture of the schedule 510 can be taken, and the picture data can be stored in the electronic book.

0111
Specifically, when the user pulls up the tool bar on the electronic book and touches the camera icon 284 with a finger, the electronic book switches to a picture mode, and an operating screen for taking pictures as shown in Fig. 23 is displayed. Touching one of the screen switches 550, 540 on the screen for "video" and "still picture" displayed above the large finder screen 530 placed on the left side of the screen with a finger enables selection of taking videos or taking still pictures.

0112
For example, if the user touches the still-picture screen switch 540, the switch display 560 for taking pictures changes to a "shutter." When the user aims the camera lens at the schedule 510, the schedule image being seen by the camera lens 520 is displayed in the finder screen 530. When the user touches the "shutter" button 560 with a finger, the captured image data are automatically stored in a folder file, along with the date and time the picture was taken.

0113

The folder file is a file for recording information input to “Today’s folder.” The stored information is managed by date and time and is structured enabling reading using units of days.

0114
For example, if the user desires to take video images and touches the video switch 550, the switch display 560 for taking pictures changes to “Movie record standby.” When the user touches the “Movie record standby” button, recording of video images starts.

0115
Note that, as shown in Fig. 25, the camera lens 520 of this electronic book is a wireless type that can be detached from the electronic book body 522, so the user can take pictures without feeling awkward around other people. Furthermore, when the user pushes the switch 560 for taking pictures that displays “Movie record standby,” the display changes to “Recording.” When the user wants to stop taking pictures, touching of this “Recording” button with a finger stops taking of the picture and the display changes to “Movie record standby.” In addition, the image captured is automatically stored in a folder file, along with the date and time it was captured.

0116
[3] Example of storing written memos
Next, Fig. 26 and Fig. 27 will be used to describe an example of storing memos written by a user.

0117
When the user pulls up a tool bar at the bottom of the screen and touches the “Memo” icon 286, the memo input screen 600 shown in Fig. 26 is displayed. When the user inputs text and the like on the screen with the auxiliary pen 610 of this electronic book, it is recorded as image data. After finishing writing, as shown in Fig. 27, dragging and dropping of the memo input screen to Today’s folder enables storing details noted on the memo input screen 600, along with the storage date and time, in the folder file.

0118
[4] Reference processing of Today’s folder
When the user pulls out the tool bar at the bottom of the screen and touches the “Today’s folder” icon 288 with a finger, as shown in Fig. 28, the Today’s folder screen 700 for that day is displayed. Here, the data stored in the Today’s folder for that day are displayed as icons (710, 720, 730, 740). The data content stored by the user of the electronic book is converted to an icon as a scaled-down image, making it easy for the user to envision the contents of what is stored. Furthermore, the time when the data were stored is displayed at the bottom of the icon, which is useful for the user’s activity record and is also convenient when later organizing the data.

0119
When the user touches the data converted to icons 710, 720, 730, 740 and drags and drops them to the “See details” area 750, the details are displayed on the screen. Similarly, when placing them in a trash bin 780 labeled with the words “Throw away,” the contents can be automatically erased.

0120
Furthermore, when the area 760 labeled with “Previous day” is touched, the “Today’s folder screen” for the previous day is displayed and when the area 770 labeled with “Next day” is touched, the “Today’s folder screen” for the next day is displayed. Touching these “Previous day” and “Next day” areas enables the user to return to past folder screens as well as to return to the current folder screen.

0121
Furthermore, as shown in Fig. 29, when an icon is moved by a finger so as to contact another icon with related data, the icons in contact are grouped. This is convenient for organization of data.

0122
Fig. 30 is a diagram that describes an example utilizing Today’s folder.

0123
For example, a user carries the electronic book while traveling for 1 month and stores data to various Today’s folders while traveling. When the user opens the electronic book and looks, there are 30 Today’s folders recorded (see Fig. 30 (A)).

0124
The user writes the data in the Today’s folders stored on the electronic book 800 to a computer 810 connected to the Internet or the like and sends them to a travel data collection company 820 using the Internet (see Fig. 30 (B)).

0125
The travel data collection company 820 edits these retrieved data and supplies these most recent travel data to a travel software publication company 830. Furthermore, the travel software publication company 830 sells a new edition of their travel software based on these most recent data.

0126
If the electronic publication industry develops in this manner, digital software with content better reflecting the most recent data can be supplied. Furthermore, the speed and low cost of publishing using such devices enable easy publication by anyone, including the publication of specialized information where the number of readers is limited, thus achieving an ideal publication process.

0127
(6) Configuration of the electronic book
Next, Fig. 31 will be used to describe the configuration of the electronic book hardware for this embodiment.

0128
As shown in Fig. 31, the electronic book of this embodiment is made up of a CPU (Central Processing Unit) 1010, memory 1020, display controller 1030, touch panel controller 1040, bus 1050, touch panel 1060, display 1070, disk drive controller 1080, disk drive 1090, information storage media 1220, camera 1130, and pen 1120.

0129
The display 1070 is made up of liquid crystal or the like and output is controlled by the display controller 1030.

0130
The touch panel 1060 that is controlled by the touch panel controller 1040 is made up of a panel of an optical type, resistance type, capacitance type, or ultrasonic type or the like. The touch panel 1060, consisting of a transparent touch sensor, is overlaid on the display 1070. When the display screen is contacted by the tip of a user's finger or pen 1120 or the like, the touch panel 1060 detects contact position information, contact pressure, and contact area of the finger, or text or drawing image data input by the pen 1120.

0131
By overlaying a transparent touch sensor plate onto the surface of the display 1070 in this manner, input through finger movement and pen input on the display screen becomes feasible.

0132
The CPU 1010 controls the overall device, performs various types of data processing and executes various types of processing described in Fig. 2 to Fig. 30. The memory is made up of ROM and RAM; the RAM is the storing means used as the operation area, etc., of the CPU 1010 and stores given contents from the information storage media 1220 and ROM as well as calculation results, etc., from the CPU 1010.

0133
The disk drive 1090 writes and reads data to an information storage medium 1220 such as a floppy disk or the like and is controlled by the disk drive controller 1080.

0134

Data, programs, and information, etc., for various types of processing described in Fig. 2 to Fig. 30 for generating images are the primary types of information stored in the information storage medium 1220.

0135
The camera 1130 is for taking videos and still pictures.

0136
The pen 1120 is for memo input on the display screen and a rod shaped like a pen or anything that does not get ink or the like on the display is acceptable.

0137
When the user performs various types of finger operation on the display, memo input, or taking a picture with the camera, the CPU 1010 executes the operation indicated by the user based on the input details.

0138
Fig. 32 is an example of a functional block diagram for the electronic book.

0139
The finger movement detector 1110 is for detecting the movement history, contact pressure, and contact area of the finger performed on the display area by the user. The finger movement detector 1110 is configured with a transparent touch panel or the like overlaid on the display area 1240. Detection data obtained by the finger movement detector 1110 is input to the processor 1100.

0140
The pen input component 1120 is for input of the details noted using a pen on the display area by the user. The pen input component 1120 is configured so that when the user writes text or a drawing on the display area 1240 using the aforementioned pen 1120, the transparent touch panel overlaid on the display or the like detects the details of this written text or drawing as image data. The detection data obtained from this pen input component 1120 is input to the processor 1100.

0141
The picture-taking component 1130 enables the user to take either videos or still pictures. The picture-taking component 1130 is made up of a camera or video camera or the like. Picture data taken by the picture-taking component 1130 is input to the processor 1100.

0142
The processor 1100 performs processing for generating images displayed on the display area based on the aforementioned finger movements, detection data by pen input, picture data, given programs or the like, processing for storing data to folder files, and other processing tasks. This processor 1100 function is

implemented using hardware such as a CPU (CISC type, RISC type), DSP, custom (gate array etc.) IC, and memory and the like.

0143
The information storage medium 1220 is for storing programs and data. The function of the information storage medium 1220 is implemented using hardware such as a CD-ROM, cassette, IC card, MO, FD, DVD, hard disk, and memory and the like. This processor 1100 performs various types of processing based on programs and data from this information storage medium 1220.

0144
The processor 1100 includes a processing details determination part 1140, various processors 1150, an image generation part 1200, and a memory part 1230.

0145
The processing details determination part 1140 determines details for processing based on data input from the finger movement detector 1110, pen input component 1120, and picture-taking component 1130.

0146
Various types of processors 1150 include a zoom-in processor 1162, a zoom-out processor 1164, a rotation processor 1166, a scroll processor 1168, a normal search processor 1172, a logical product search processor 1174, a page-turning processor 1182, a continuous page-turning processor 1184, an insert bookmark processor 1186, a view bookmark insertion locations processor 1188, a floating processor 1192, a picture-taking processor 1194, a memory input processor 1196, and a see folder processor 1198; and based on the determination of the processing details determination part 1140, these perform map image zoom-out processing, zoom-in processing, rotation processing, scroll processing, normal search processing, logical product search processing, page-turning processing, continuous page-turning processing, insert bookmark processing, view bookmark insertion location processing, floating processing, picture-taking processing, memo input processing, view folders processing and the like.

0147
The memory part 1230 stores various types of information and includes a folder file 1232 for recording data stored in Today's folder.

0148
The image generation part 1200 generates an image on the display based on processing performed by various processors 1150.

0149
(7) Operation example for this embodiment

Fig. 33 to Fig. 41 are flow charts that show operation examples of the electronic book of this embodiment.

0150
When there is a finger movement, pen input, taking a picture or the like input to the electronic book of this embodiment, processing details are determined in the following manner (step S10 of Fig. 33). If currently in picture-taking mode, picture-taking processing is performed (step S20, S30). Note that, normally, it is in normal input mode and when the camera icon on the tool bar is touched, the mode switches to picture-taking mode. If an input is detected while in picture-taking mode, picture-taking processing described in Fig. 23 to Fig. 25 is performed.

0151
For example, when pushing of an operation button on the screen by the user is detected, processing corresponding to this button is performed. For example, if either the “Video” or “Still picture” button is touched, video or still picture selection processing is performed; if the “Shutter” button is touched, processing is performed for taking a still picture and storing picture data along with attached date and time in a folder file; if the “Movie record standby” button is touched, processing for starting to take a video is performed; if the “Recording” button is touched, processing is performed for stopping recording of a movie and storing the picture data along with attached date to a folder file.

0152
If currently in memo input mode, memo input processing is performed (step S40, S50). Note that, normally, it is in normal input mode and when the memo icon on the tool bar is touched, the mode switches to memo input mode. When input is detected in memo input mode, memo input processing described in Fig. 26 and Fig. 27 is performed.

0153
For example, if input of text or the like by the user using a pen on the screen is detected, the input content is displayed as an image in real time and processing of storing the input content as image data to the work area is performed. Furthermore, if the input details are dragged and dropped, processing is performed for storing the image data stored in the work area with date and time stored attached to a folder file.

0154
If in view current folder mode, processing of viewing the folder is performed (step S52, S54). Note that, normally, the mode is in normal input mode and if the Today’s folder icon on the tool bar is touched, the mode switches to view folder mode. When an input is detected while in folder view mode, folder view processing as described in Fig. 28 and Fig. 29 is performed.

0155
For example, if a user touches an icon on the screen and a drag-and-drop to the "See details" area is detected, processing for displaying the data details on the screen is performed. Furthermore, in a similar manner, if placement into the trash can labeled "Throw away" is detected, processing of erasing the data is performed. In addition, if touching of the area labeled "Previous day" is detected, processing for displaying the "Today's folder screen" for the previous day is performed and if touching of "Next day" is detected, processing for displaying the "Today's folder screen" for the next day is performed.

0156
While in normal input mode, if a finger contacts the touch panel, the following processing is performed (see Fig. 33 step 60 and Fig. 34).

0157
If an icon on the tool bar is contacted, processing for the various icon processing (see Fig. 41) is performed (Fig. 34 step S70, S80).

0158
If there is contact with various input marks such as "Search tag," "Book thickness," "Bookmark," or "Arrow for inserting bookmark" or the like, input mark operation processing (see Fig. 36) is performed (step S90, S100).

0159
When there is contact with two points on the touch panel, if a map image is being displayed, map operation processing is performed (step S110, S120, S130).

0160
If there are not two contact points, detection of whether or not the contact point is moving is performed and if moving, processing details are determined from the instructions being input based on contact area and contact pressure (step S140, S150).

0161
If the contact surface area and contact pressure are above a prescribed value, scroll processing is performed if the image displayed is a map image, while if it is a regular book page image, page-turning processing is performed (step S160, S180).

0162
If the contact surface area and contact pressure are less than a prescribed value, the following processing is performed (see Fig. 35). If not a drag-and-drop to "Today's folder" and there is information circumscribed using a finger, floating processing of the information circumscribed by the finger is performed (step S910, S960, S970).

0163
If there is a drag-and-drop to “Today’s folder” and the item is memo details, the memo details are stored with storage date and time attached to a folder file as image data (step S920, S930).

0164
If the item is floating data, the floating data are stored with date and time attached to a folder file (step S940, S950).

0165
Fig. 36 is a flowchart diagram describing detailed processing content for processing of detecting touch of an input mark (step S100 of Fig. 34).

0166
If the user’s finger contacts the search tag, search processing is performed (step S210, S220).

0167
If the user’s finger contacts the insertion bookmark arrow, processing for insertion of a bookmark is performed (step S230, S240).

0168
If the user’s finger contacts the bookmark, processing for viewing the bookmark insertion location is performed (step S250, S260).

0169
If the user’s finger contacts the mark for continuous page-turning, processing for continuous page-turning is performed (step S270, S280).

0170
Fig. 37 is a flow chart for describing detailed processing content of map operation processing (step S130 of Fig. 34).

0171
The change in distance between two points is calculated (step S310); if the distance between two points is increased, zoom-in processing is performed corresponding to the increased distance (step S320, S330).

0172
If the distance between two points is reduced, zoom-out processing corresponding to the reduced distance is performed (step S340, S350).

0173
If the distance between the two points does not change, rotation processing is performed (step S360, S370).

0174
Fig. 38 is a flow chart for describing detailed processing content of search processing (Fig. 36, step S220).

0175
If contact of a second finger by the user is not detected, a search is performed for the page, noting information that satisfies the search conditions of the search tag contacted by the user's finger, and normal search processing that displays the first page thereof is performed (step S410, S420).

0176
If contact of a second finger by the user is detected and the contact is on a search tag, logical product search processing is performed in which searching pages noting information that satisfies the conditions of the logical product of the two search conditions and displaying the first page on the display area are performed in a case when a logical product of the search conditions of the two search tags is anticipated (step S440, S450).

0177
Fig. 39 is a flow chart for describing detailed processing content of page-turning processing (step S180 of Fig. 34).

0178
If the contact position of the user's finger on the screen is moving from left to right and the book displayed uses vertical text, the image switches to the next page, but if the book displayed uses horizontal text, the image switches to the previous page (step S510, S520, S530, S540).

0179
If the contact position of the user's finger on the screen is moving from right to left and the book displayed uses vertical text, the image switches to the previous page, but if the book displayed uses horizontal text, the image switches to the next page (step S550, S560, S570, S580).

0180
Fig. 40 is a flow chart for describing detailed processing content of continuous page-turning processing (step S280 of Fig. 36).

0181
If the contact pressure of the user's finger is detected and not above a prescribed pressure, continuous page-turning is discontinued (step S610, S620, S630).

0182
If [finger contact is] above a prescribed pressure, continuous page-turning is performed in the following manner.

0183
Specifically, if the contact position of the user's finger is at the book thickness at the upper right corner of the screen and the book displayed uses vertical text, continuous page-turning in the backward direction is performed, and if [it uses] horizontal text, continuous page-turning in the forward direction is performed (step S640, S650, S660, S670).

0184
Analogously, if the contact position of the user's finger is at the book thickness at the upper left corner of the screen and the book displayed uses vertical text, continuous page-turning in the forward direction is performed, and if [it uses] horizontal text, continuous page-turning in the backward direction is performed (step S640, S680, S690, S700).

0185
Fig. 41 is a flow chart for describing detailed processing content for processing various icons (step S80 of Fig. 34).

0186
If the contact is on the camera icon, as shown in Fig. 23, an operation screen for taking pictures is displayed and mode switches to picture-taking mode (step S810, S820). If there is an input while in picture-taking mode, the picture-taking processing of step S30 in Fig. 33 is executed.

0187
If the contact is on the memo icon, as shown in Fig. 26, a memo input screen is displayed and mode switches to memo input mode (step S830, S840). If there is an input while in memo input mode, the memo input processing of step S50 in Fig. 33 is executed.

0188
If the contact is on the folder icon, as shown in Fig. 28, the Today's folder screen is displayed and mode switches to folder view mode (step S850, S860). If there is an input while in view folder mode, the view folder processing of step S54 in Fig. 33 is executed.

0189
(8) Other various embodiments
The present invention is not restricted to this embodiment and other modified embodiments that are within the range of elements of the present invention are acceptable.

0190
In this embodiment, a description was provided of an example for the case where operation input was performed using the thumb and forefinger, but input is not

limited to these. For example, the thumb and middle finger can be used and other combinations can be used as well.

0191
An electronic book was described as an example for this embodiment, so a first page noting search information for the logical product of search items was displayed, but the concept of pages does not exist for some mobile information terminals other than electronic books. Therefore, display on an information unit basis unrelated to page format is also acceptable.

0192
Furthermore, in this embodiment, output of search information that is the logical product of two items for simultaneous contact of two search items was described as an example, but the present invention is not limited to this. For example, simultaneous contact of three or more search items enabling output of search information that is the logical product of these three or more items would also be acceptable.

0193
Furthermore, this is not limited to simultaneous contact of fingers, but output of search information that is a logical product for contact by fingers within a specified amount of time would also be acceptable.

0194
Furthermore, in the case when there is not information related to the search conditions and logical product corresponding to the multiple search items contacted simultaneously or within a specified amount of time using fingers, a configuration that further includes a means of output of information to the display area with at least one of a logical sum or combination of logical sum and logical product would also be acceptable.

0195
For example, if the “South India,” “Lodging,” and “Food” tags were touched simultaneously, configuration for output of lodging information in South India and food information in South India would also be acceptable.

0196
In particular, this configuration is effective for the case of displaying information units not related to pages.

0197
For example, in an electronic book or cell phone information terminal that has telephone numbers stored, this [configuration] includes the case where search and output are performed on a telephone number basis, or the case where telephone numbers having logical sum and logical product relationships corresponding to the specifications are listed when multiple telephone number

search is specified in a table of contents. Specifically, this can be configured as follows: In a case where items anticipated to be a common set (e.g. “A region hospitals” for “A region” and “hospital”), search and output of information related to the logical product are performed; and in a case where items are not anticipated to be a common set (e.g. “A region” and “B region,” or “hospital” and “library”), search and output of information related to the logical sum are performed.

0198
Furthermore, in this embodiment, the memo input screen and picture mode screen were illustrated as using the entire screen, but having a window using part of the display would also be acceptable.

0199 BRIEF DESCRIPTION OF THE DRAWINGS
Fig. 1 is a functional block diagram of a mobile information device or electronic book with characteristic functions of the present invention.
Figs. 2 (A), (B), and (C) show an external appearance drawing of the electronic book for this embodiment.
Fig. 3 is a diagram illustrating a screen example displaying the case where travel information software is installed.
Fig. 4 is a diagram illustrating a display example of a map image.
Fig. 5 is a diagram illustrating an operation example of the zoom-in gesture for this embodiment.
Figs. 6 (A) and (B) are diagrams illustrating a finger movement example for this embodiment.
Fig. 7 is a diagram illustrating another operation example of the zoom-in gesture for this embodiment.
Fig. 8 is a diagram illustrating an operation example of the scroll gesture for this embodiment.
Fig. 9 is a diagram illustrating an operation example of the zoom-out gesture for this embodiment.
Fig. 10 is a diagram illustrating an operation example of the rotation gesture for this embodiment.
Fig. 11 is a diagram illustrating the rotation angle of a map for this embodiment.
Fig. 12 is a diagram illustrating an example of search processing for this embodiment.
Fig. 13 is a diagram illustrating an example of logical product search processing for this embodiment.
Fig. 14 is a diagram illustrating the page-turning operation for this embodiment.
Fig. 15 is a diagram illustrating the continuous page-turning operation for this embodiment.
Fig. 16 is a diagram illustrating the bookmark-insertion operation for this embodiment.
Fig. 17 is a diagram illustrating the bookmark-insertion operation for this embodiment.

Fig. 18 is a diagram illustrating the operation for viewing bookmark insertion location for this embodiment.
Fig. 19 is a diagram illustrating an example of a screen displaying the toolbar.
Fig. 20 is a diagram illustrating an operation example of floating processing for this embodiment.
Fig. 21 is a diagram illustrating an operation example of floating processing for this embodiment.
Fig. 22 is a diagram illustrating an operation example of drag-and-drop for this embodiment.
Fig. 23 is a diagram illustrating an operation screen for taking pictures for this embodiment.
Fig. 24 is a diagram illustrating still-image picture-taking processing for this embodiment.
Fig. 25 is a diagram illustrating video processing for this embodiment.
Fig. 26 is a diagram illustrating memo input processing for this embodiment.
Fig. 27 is a diagram illustrating the drag-and-drop operation of memo input for this embodiment.
Fig. 28 is a diagram illustrating a screen for viewing Today's folder for this embodiment.
Fig. 29 is a diagram illustrating view processing of Today's folder for this embodiment.
Fig. 30 is a diagram that illustrates an example utilizing Today's folder for this embodiment
Fig. 31 is a diagram illustrating the hardware configuration for the electronic book of this embodiment.
Fig. 32 is an example of a functional block diagram for the electronic book of this embodiment.
Fig. 33 is a flow chart illustrating an operating example of this embodiment.
Fig. 34 is a flow chart illustrating an operating example of this embodiment.
Fig. 35 is a flow chart illustrating an operating example of this embodiment.
Fig. 36 is a flow chart illustrating an operating example (input mark operation processing) of this embodiment.
Fig. 37 is a flow chart illustrating an operating example (map operating processing) of this embodiment.
Fig. 38 is a flow chart illustrating an operating example (search processing) of this embodiment.
Fig. 39 is a flow chart illustrating an operating example (page-turning processing) of this embodiment.
Fig. 40 is a flow chart illustrating an operating example (continuous page-turning processing) of this embodiment.
Fig. 41 is a flow chart illustrating an operating example (processing of various icons) of this embodiment.
Fig. 42 is a diagram describing another operation example of floating processing for this embodiment.

EXPLANATION OF CODES

10. Finger movement detector
20. Processor
30. Operating details determination part
40. Map operation processor
42. Zoom-in processor
44. Zoom-out processor
46. Rotation processor
48. Scroll processor
50. Image generation part
60. Display area
70. Information storage medium
1010. CPU (Central Processing Unit)
1020. Memory
1030. Display controller
1040. Touch panel controller
1050. Bus
1060. Touch panel
1070. Display
1080. Disk drive controller
1090. Disk drive
1100. Processor
1110. Finger movement detector
1120. Input component (pen)
1130. Picture-taking component (camera)
1140. Processing details determination part
1150. Various processors
1160. Map operation processor
1162. Zoom-in processor
1164. Zoom-out processor
1166. Rotation processor
1168. Scroll processor
1170. Search processor
1172. Normal search processor
1174. Logical product search processor
1182. Page-turning processor
1184. Continuous page-turning processor
1186. Bookmark insertion processor
1188. View bookmark insertion location processor
1192. Floating processor
1194. Picture-taking processor
1196. Memo input processor
1198. View-folder processor
1200. Image generation part
1220. Information storage media
1230. Memory
1232. Folder file

1240. Display area

Continued from front page

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					370C
					310Z
				15/403	380A

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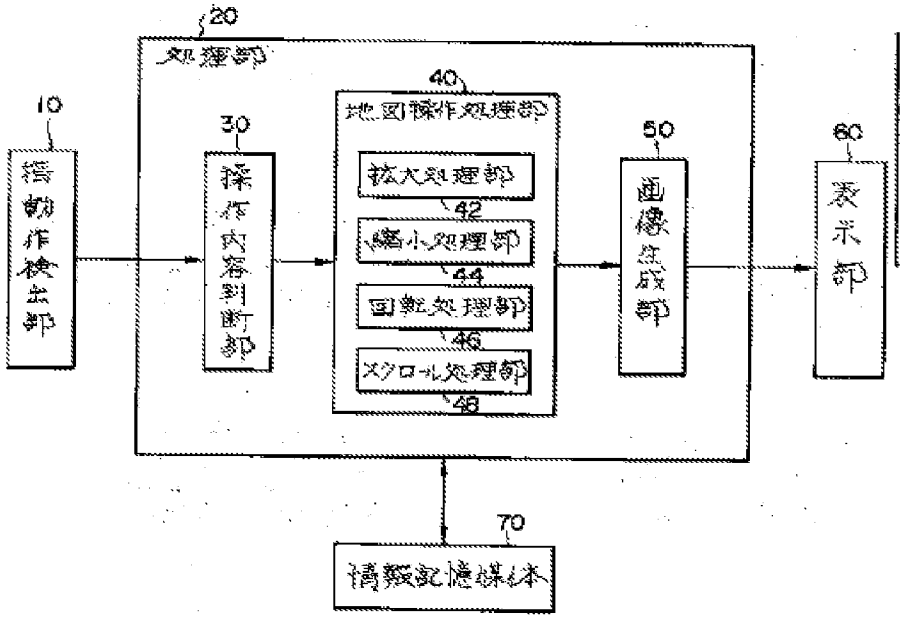
Fig. 1



10. Finger movement detector
20. Processor
30. Operation details determination part
40. Map operation processor
42. Zoom-in processor
44. Zoom-out processor
46. Rotation processor
48. Scroll processor
50. Image generation part
60. Display area
70. Information storage media

Fig. 2

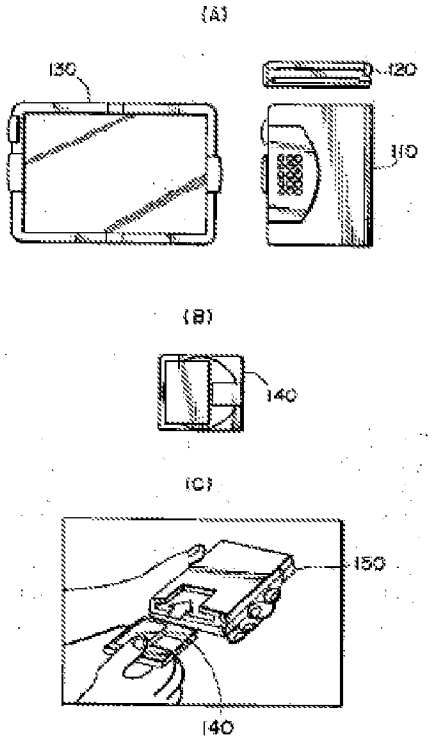


Fig. 3

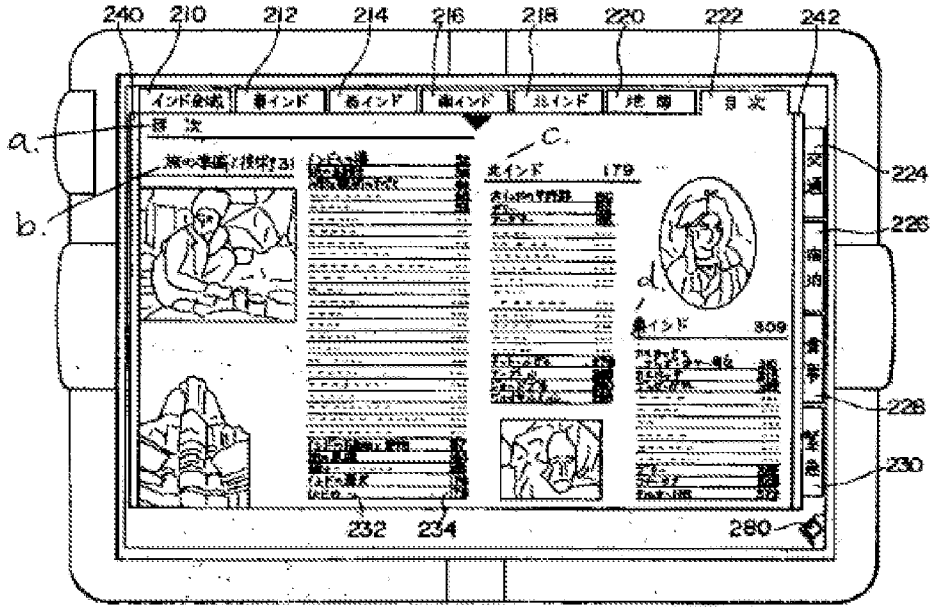


Image showing tabs and buttons enabling navigation in electronic book (a screen example displaying the case where travel information software is installed)

210. Entire area of India
212. East India

214. West India
216. South india
218. North India
220. Map
222. Table of contents
224. Transportation
226. Lodging
228. Dining
230. Emergency
a. Table of contents
b. Travel preparation and skills
c. North India
d. East India

Fig. 4

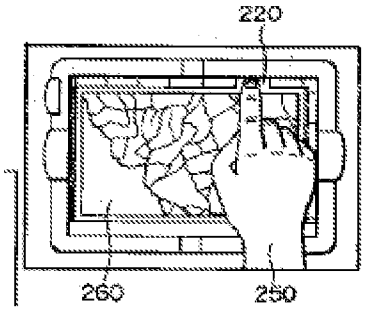


Fig. 5

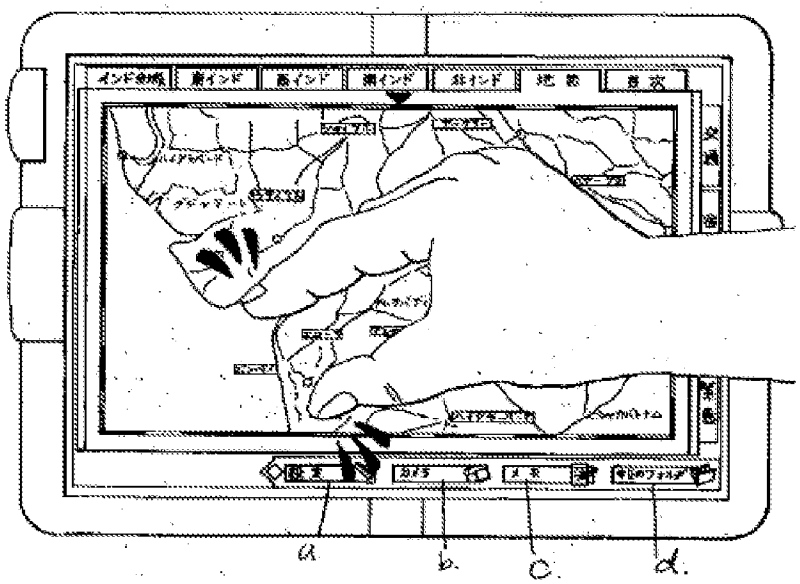


Image showing an example of the gesture used for zooming in (moving two fingers)
Items in horizontal and vertical tabs (210-230) are the same as in Fig.3

a. Setting
b. Camera
c. Memo
d. Today's folder

Fig. 6

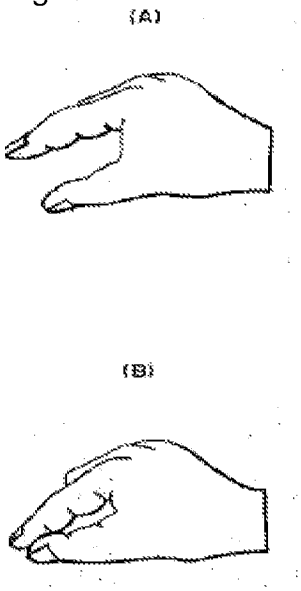


Fig. 7

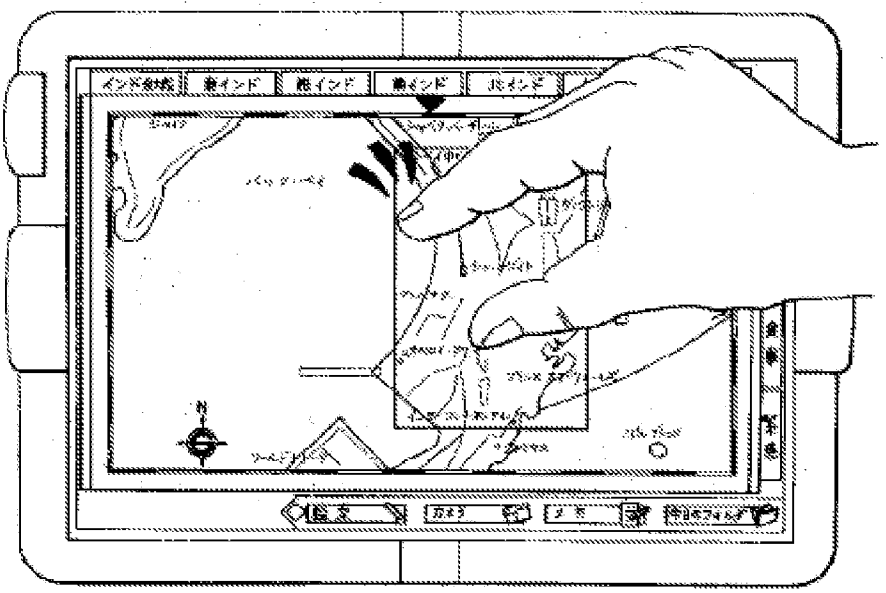


Image showing another example of a zoom-in gesture (moving one finger)
Items in horizontal and vertical tabs (210-230, a-d) are the same as in Fig.5

Fig. 8

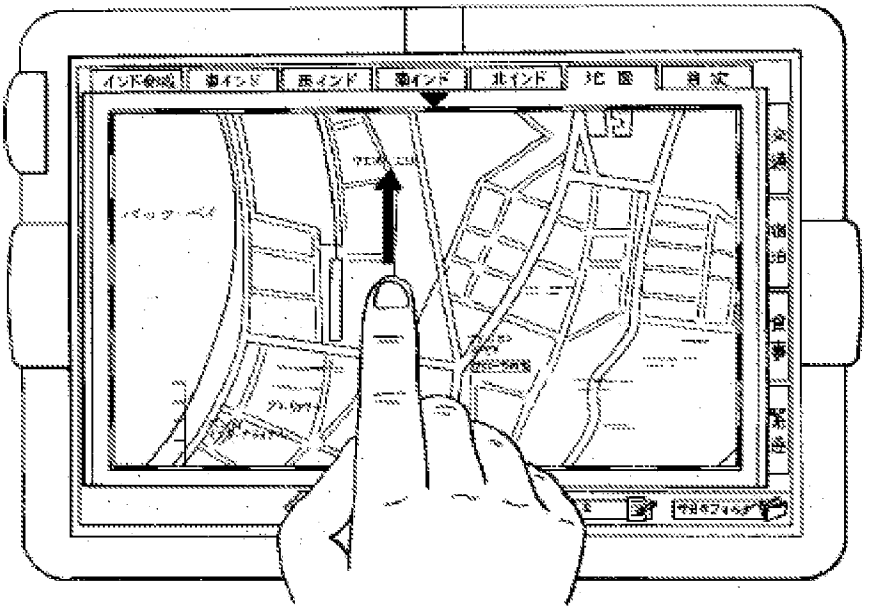


Image showing an example of a scroll gesture
Items in horizontal and vertical tabs (210-230, a-d) are the same as in Fig.5

Fig. 9

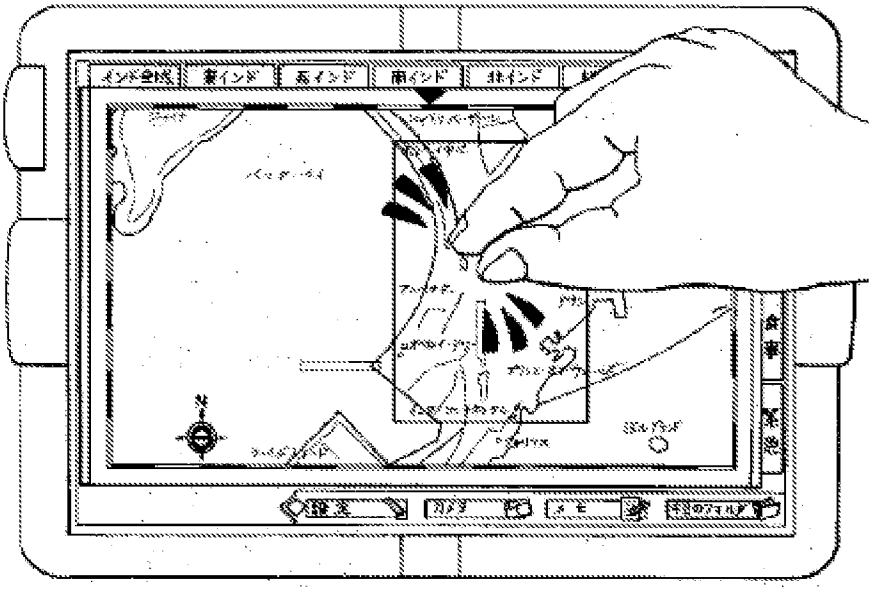


Image showing an example of a zoom-out gesture
Items in horizontal and vertical tabs (210-230, a-d) are the same as in Fig.5

Fig. 10

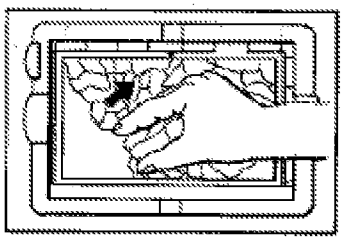


Fig. 11

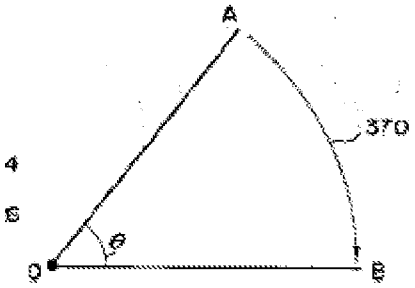
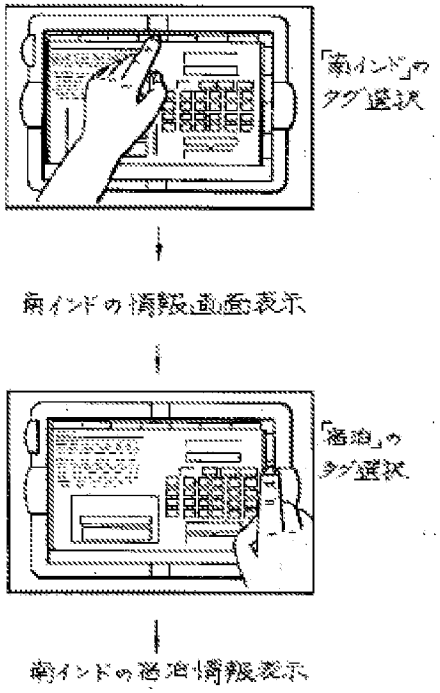
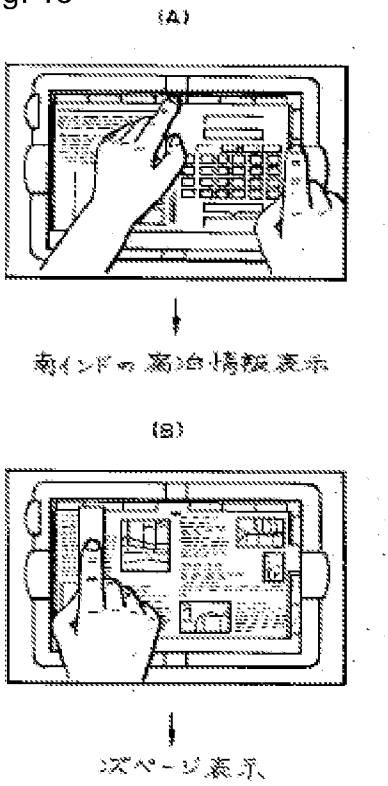


Fig. 12



Select “South India” tag
Displays information screen for South India
Select “Lodging” tag
Displays information for lodging in South India

Fig. 13



(A) Displays lodging information for South India
(B) Displays next page

Fig. 14

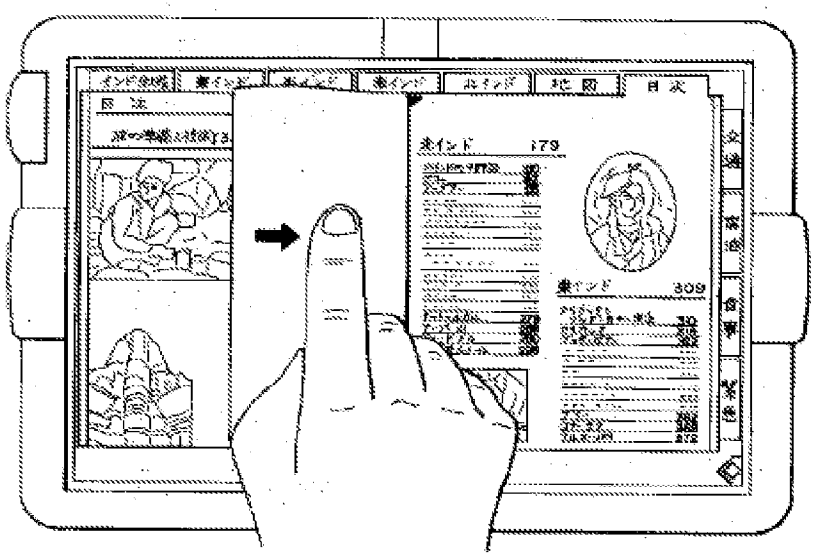


Image illustrating the page-turning operation
Items in horizontal and vertical tabs (210-230) and keys (a-d) are the same as in Fig.3

Fig. 15

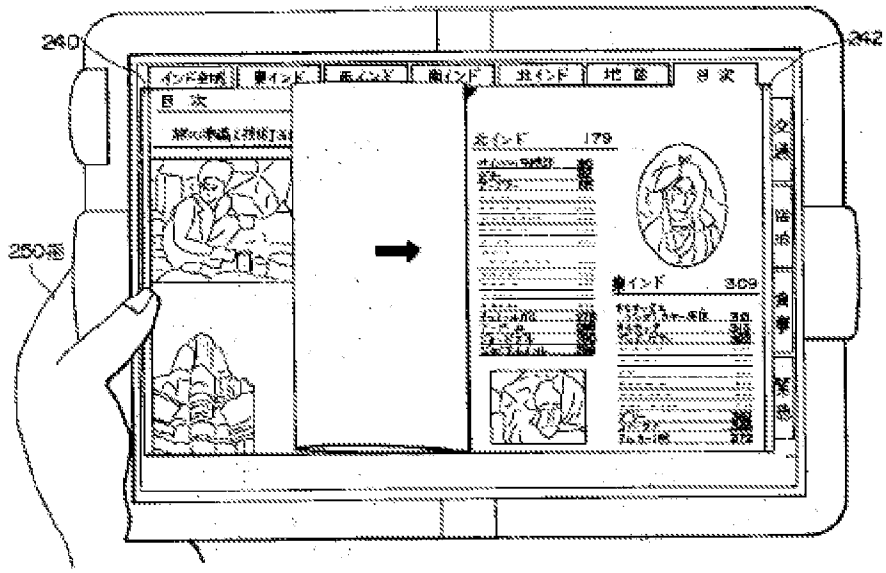


Image illustrating the page-turning operation
Items in horizontal and vertical tabs (210-230) and keys (a-d) are the same as in Fig.3

250. Finger

Fig. 16

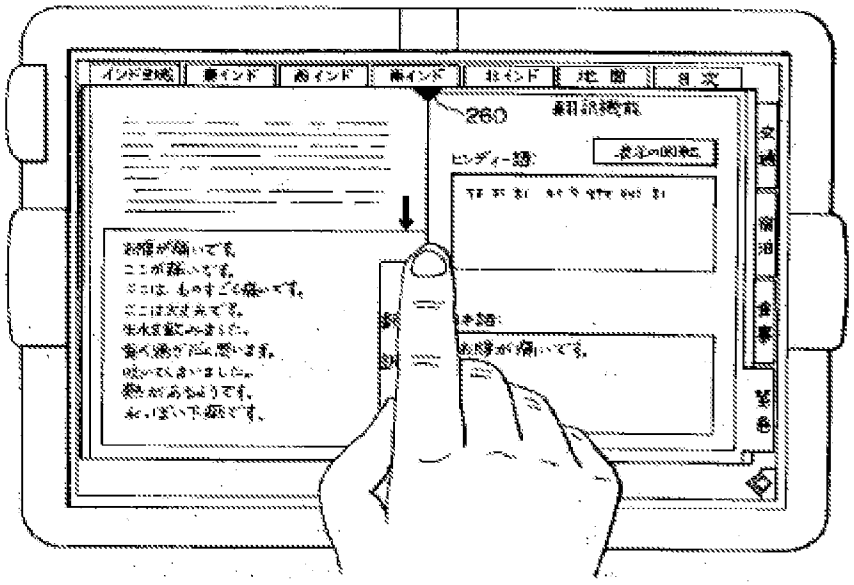


Image illustrating bookmark-insertion operation
Items in horizontal and vertical tabs (210-230) are the same as in Fig.3

Fig. 17

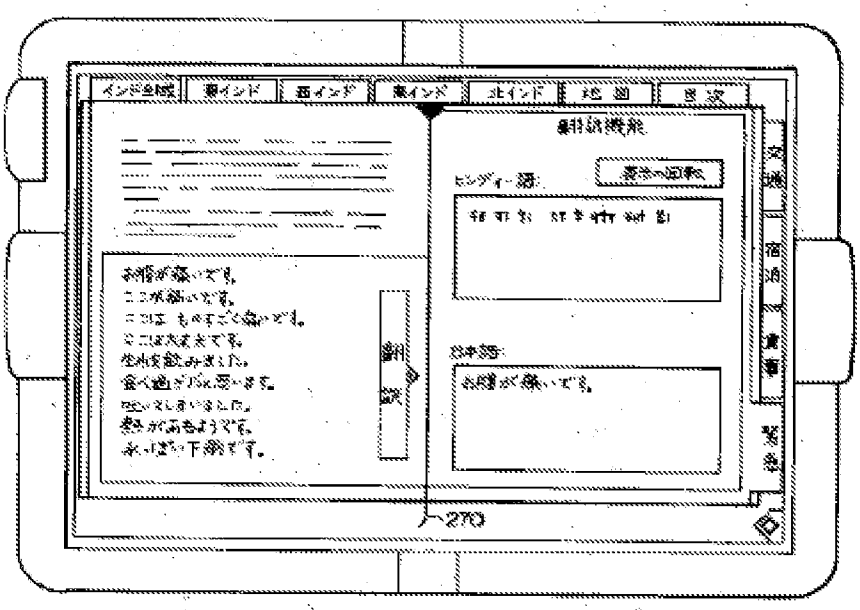


Image illustrating bookmark-insertion operation
Items in horizontal and vertical tabs (210-230) are the same as in Fig.3

Fig. 18

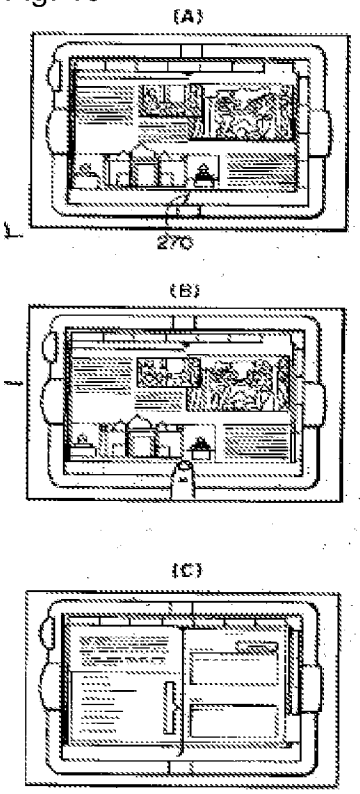


Fig. 19

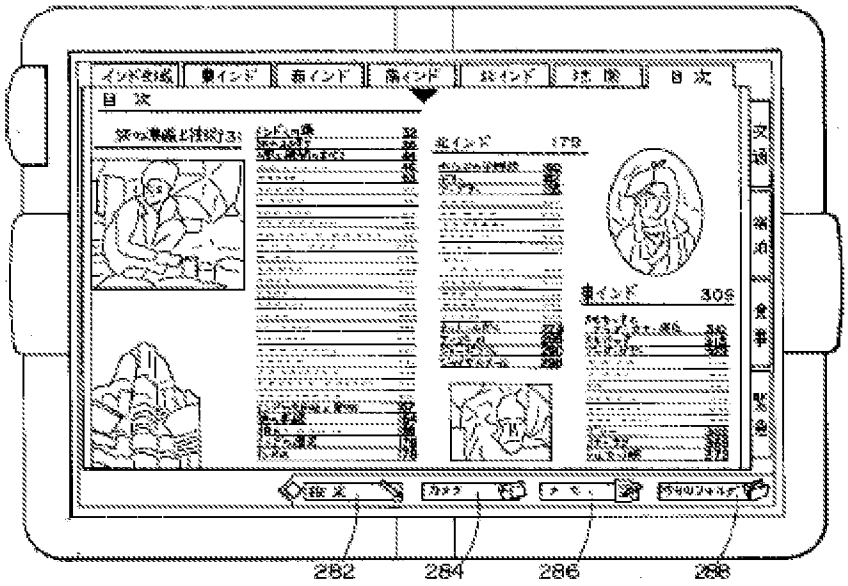


Image describing how to use the toolbar
Items in horizontal and vertical tabs (210-230) are the same as in Fig.3

282. Setting
284. Camera
286. Memo
288. Today's folder

Fig. 20

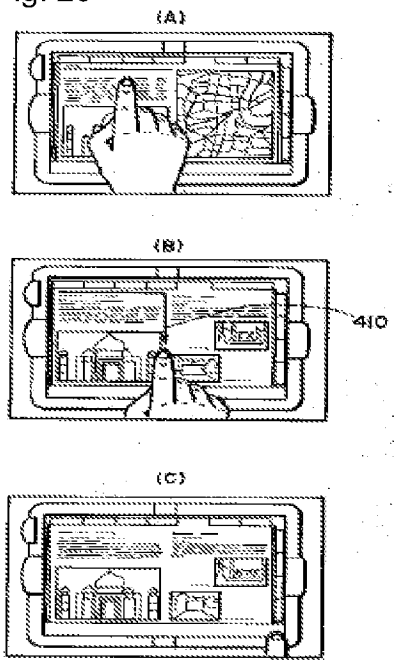


Fig. 21

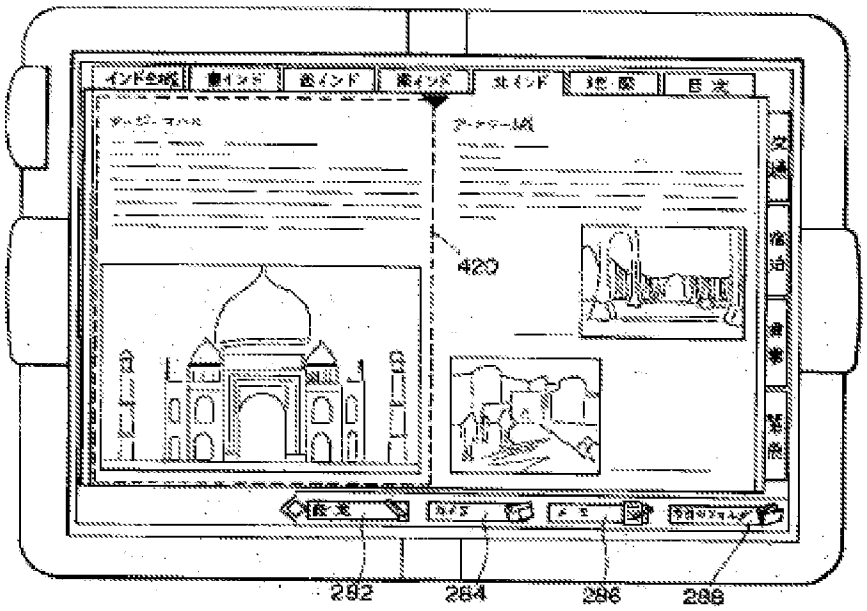


Illustration of how floating works
Items in horizontal and vertical tabs (210-230) are the same as in Fig.3
282. Setting
284. Camera
286. Memo
288. Today's folder

Fig. 22

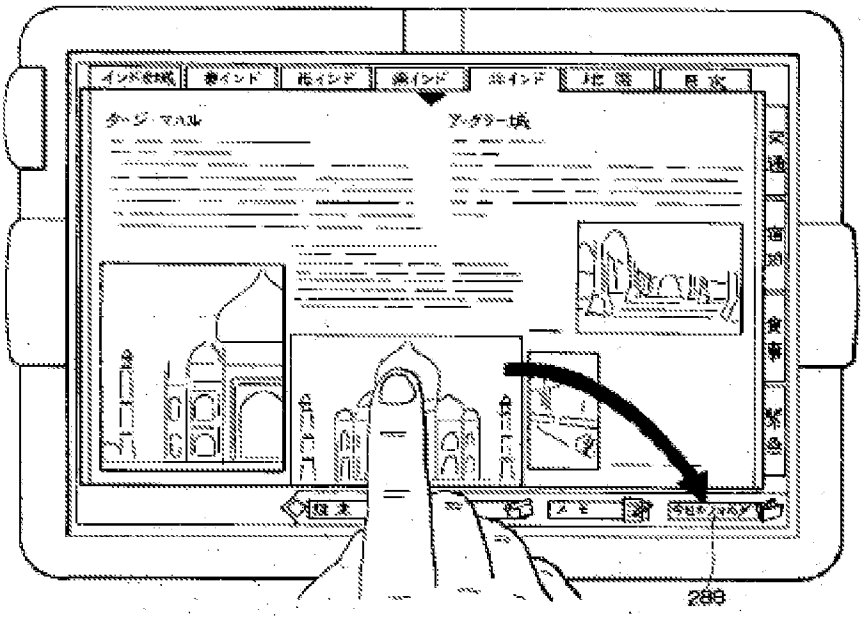


Image describing operation of drag-and-drop of content to Today's folder
Items in horizontal and vertical tabs (210-230) are the same as in Fig.3
288. Today's folder

Fig. 23

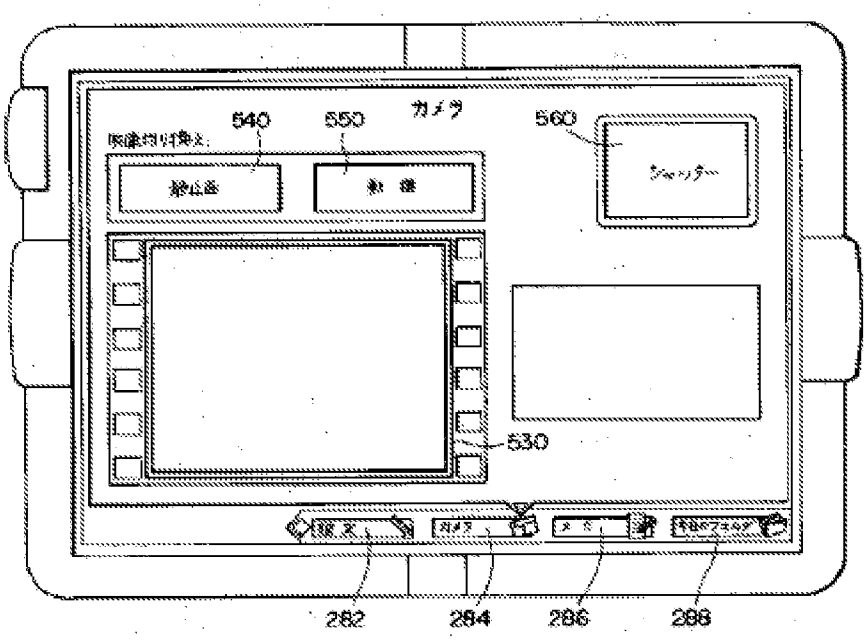


Illustration of operating screen for taking pictures

282. Setting
284. Camera
286. Memo
288. Today's folder
540. Still picture
550. Video
560. Shutter

Fig. 24

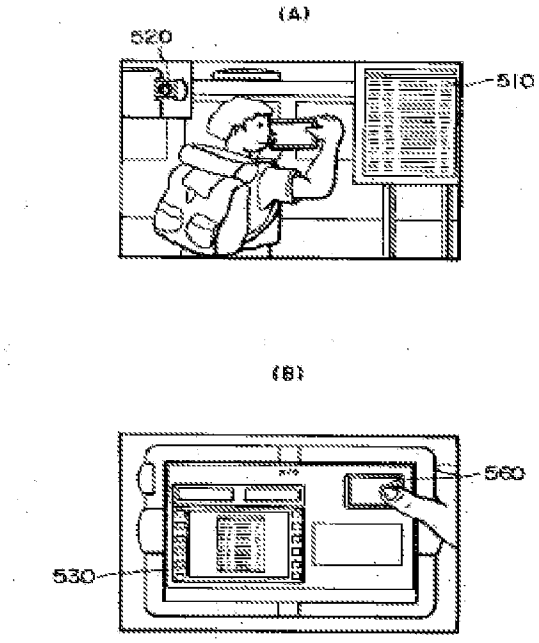


Fig. 25

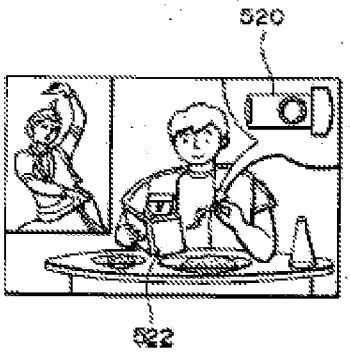


Fig. 26

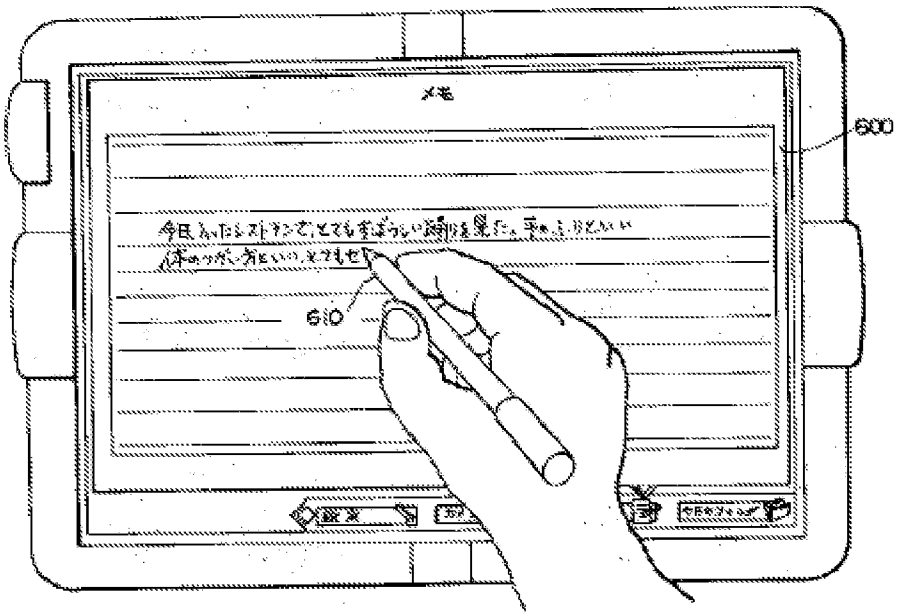


Image illustrating input of a memo

Fig. 27

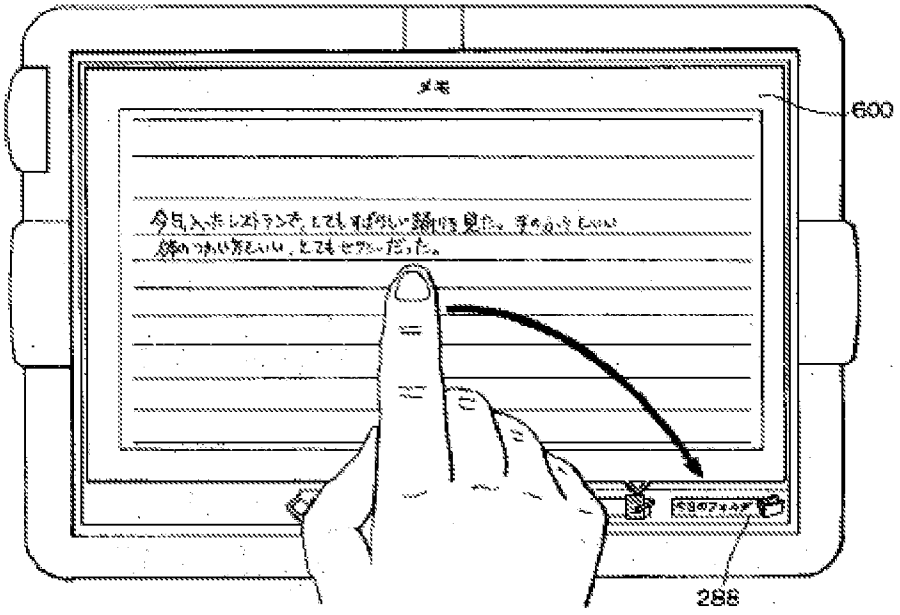


Image illustrating drag-and-drop of memo input material to Today's folder

288. Today's folder

Fig. 28

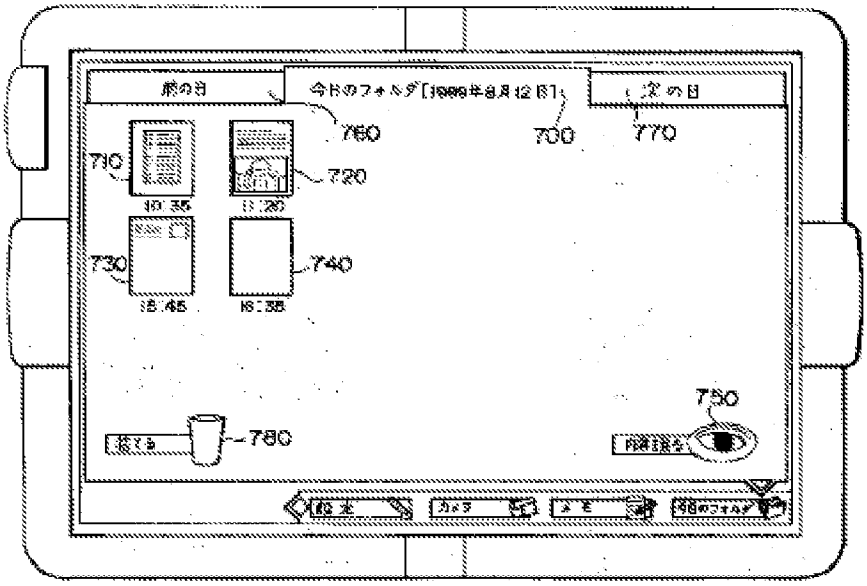


Image illustrating viewing of the content of Today's folder

700. Today's folder (August 12, 1999)
750. View contents
760. Previous day
770. Next day
780. Discard

Fig. 29

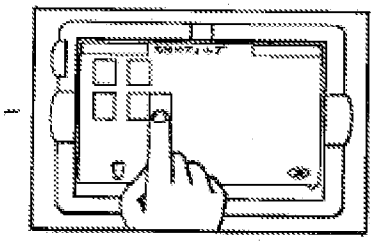
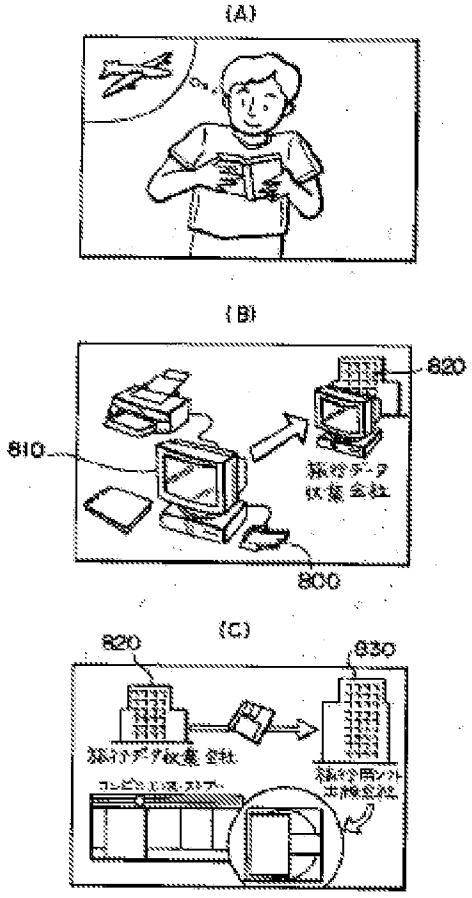
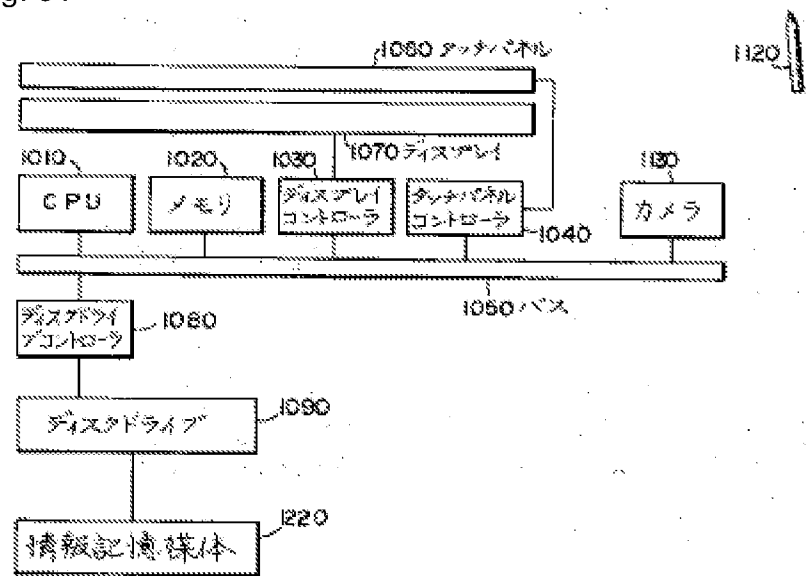


Fig. 30



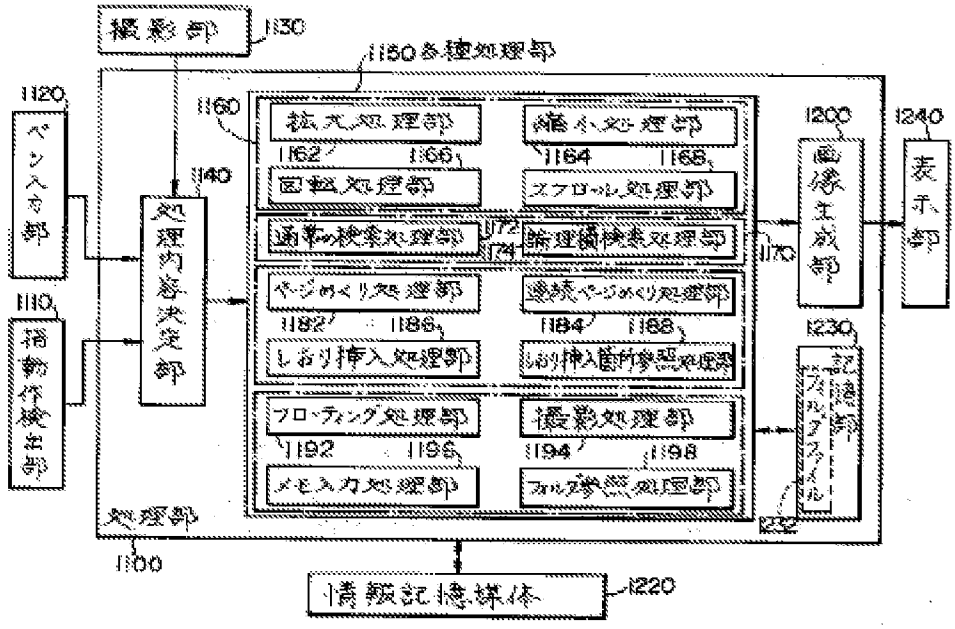
820. Travel data collection company

Fig. 31



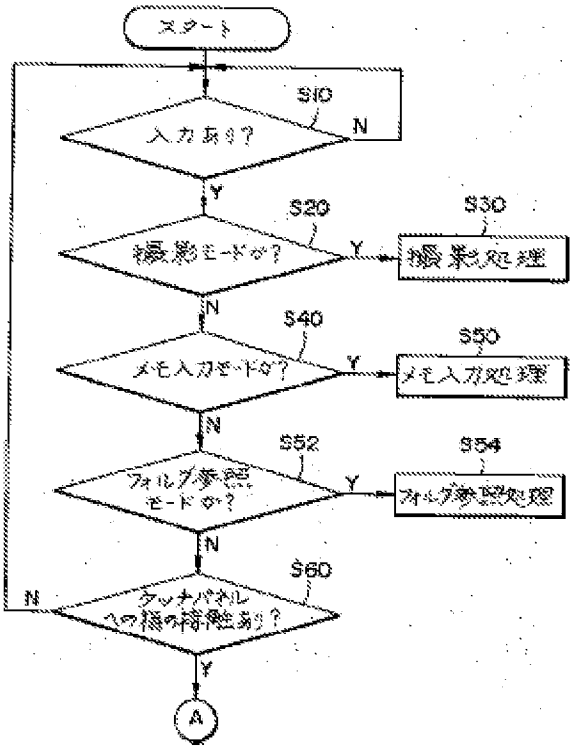
1010. CPU
1020. Memory
1030. Display controller
1040. Touch panel controller
1050. Bus
1060. Touch panel
1070. Display
1080. Disk drive controller
1090. Disk drive
1130. Camera
1220. Information storage medium

Fig. 32



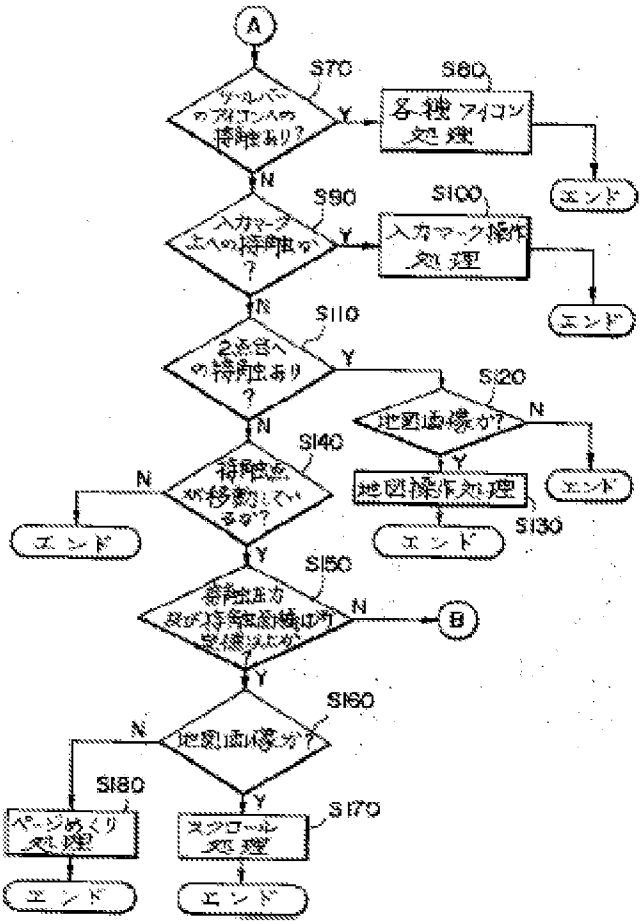
1100. Processor
1110. Finger movement detector
1120. Pen input component
1130. Picture-taking component
1140. Processing details determination part
1150. Various processors
1160. Map operating processor
1162. Zoom-in processor
1164. Zoom-out processor
1166. Rotation processor
1168. Scroll processor
1170. Search processor
1172. Normal search processor
1174. Logical product search processor
1182. Page-turning processor
1184. Continuous page-turuning processor
1186. Bookmark-insertion processor
1188. View bookmark insertion location processor
1192. Floating processor
1194. Picture-taking processor
1196. Memo input processor
1198. View folder processor
1200. Image generation part
1220. Information storage medium
1230. Memory
1232. Folder file
1240. Display area

Fig. 33



Start
S10. Is there an input?
S20. Is unit in picture-taking mode?
S30. Picture-taking processing
S40. Is unit in memo input mode?
S50. Memo input processing
S52. Is unit in view folder mode?
S54. View folder processing
S60. Is there contact of a finger on the touch panel?
(A)

Fig. 34



[First column]
End
S180. Page-turning processing
End

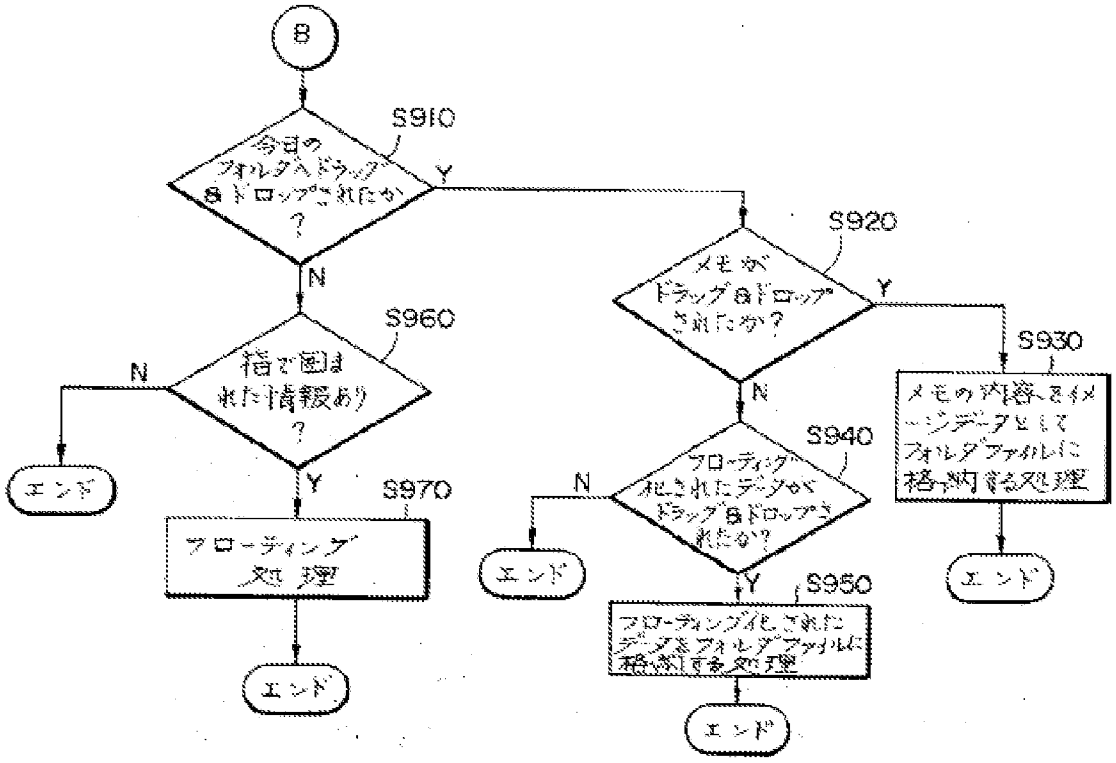
[Second column]
(A)
S70. Is there contact on an icon on the toolbar?
S90. Is there contact on the input mark?
S110. Is there contact with two items?
S140. Is the contact point moving?
S150. Is contact pressure and/or contact surface area above specified values?
S160. Is the display a map image?
S170. Scroll processing
End

[Third column]
S80. Various icon processing
S100. Input mark operation processing

S120. Is the display a map image?
S130. Map operation processing
End
(B)

[Fourth column]
End
End
End

Fig. 35



[First column]
End

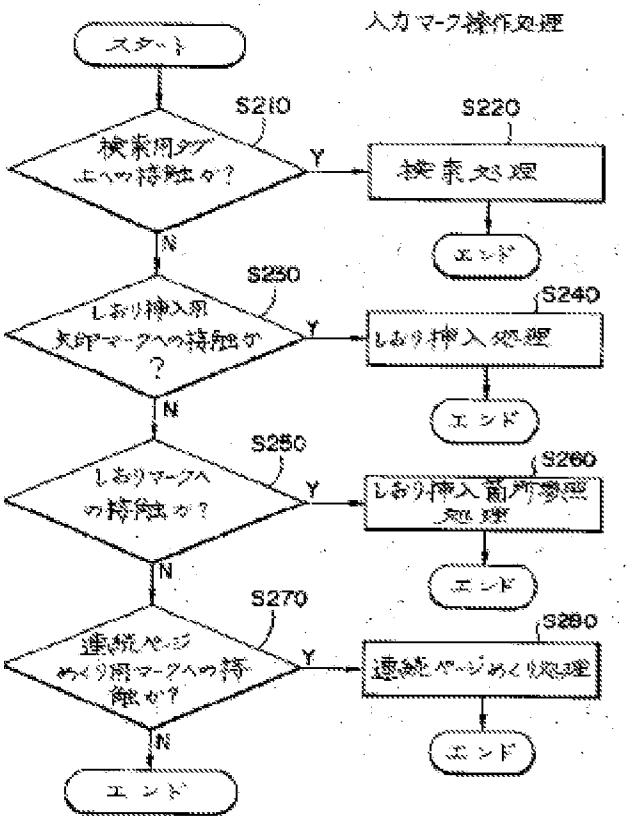
[Second column]
(B)
S910. Was drag-and-drop to Today's folder performed?
S960. Is there any information circumscribed using a finger?
S970. Floating processing
End

[Third column]
End

[Fourth column]
S920. Was drag-and-drop of memo performed?
S940. Was drag-and-drop of floating data performed?
S950. Store processing of floating data into folder file
End

[Fifth column]
S930. Store processing of memo content into a folder file as image data
End

Fig. 36

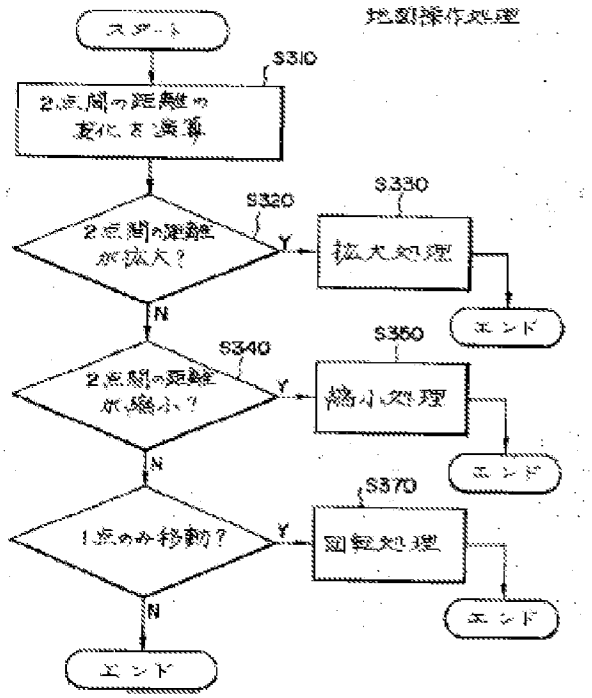


[First column]
Start
S210. Contact on search tag?
S230. Contact on arrow mark for bookmark insertion?
S250. Contact on bookmark?
S270. Contact on continuous page-turning mark?
End

[Second column]
Input mark operation processing
S220. Search processing
End

S240. Insert bookmark processing
End
S260. View bookmark insertion location processing
End
S280. Continuous page-turning processing
End

Fig. 37

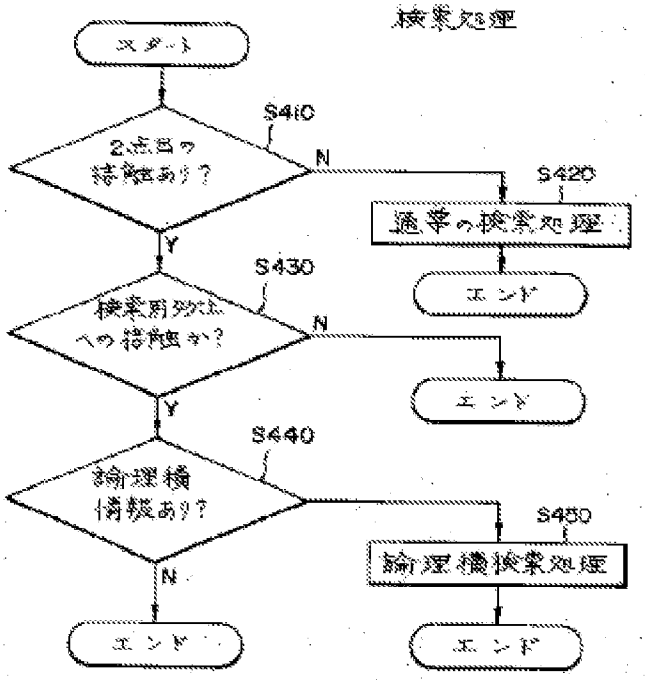


[First column]
Start
S310. Calculate change in distance between two points
S320. Did the distance between the two points become larger?
S340. Did the distance between the two points get reduced?
Did only one point move?
End

[Second column]
Map operation processing
S330. Zoom-in processing
S350. Zoom-out processing
S370. Rotation processing

[Third column]
End
End
End

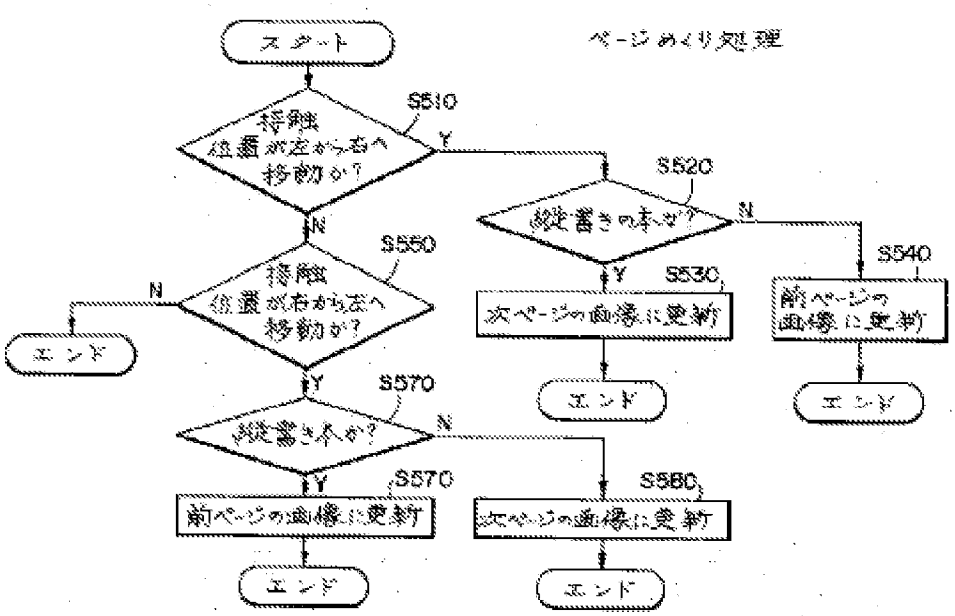
Fig. 38



[First column]
Start
S410. Is contact made with two points?
S430. Is there contact on a search tag?
S440. Is there any logical product information?
End

[Second column]
Search processing
S420. Normal search processing
End
End
S450. Logical product search processing
End

Fig. 39



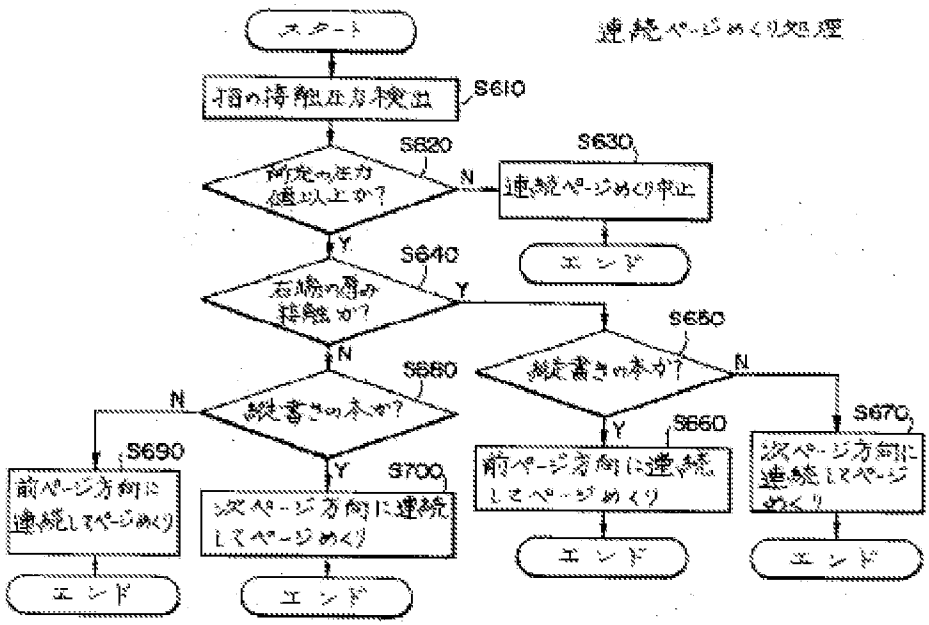
[First column]
End

[Second column]
Start
S510. Is the contact position moving from left to right?
S550. Is the contact position moving from right to left?
S570. Is this a vertical-text book?
S570. Change the image to the previous page?
End

[Third column]
Page-turning processing
S520. Is this a vertical-text book?
S530. Change the image to next page
End
S580. Change the image to next page
End

[Fourth column]
S540. Change the image to previous page
End

Fig. 40



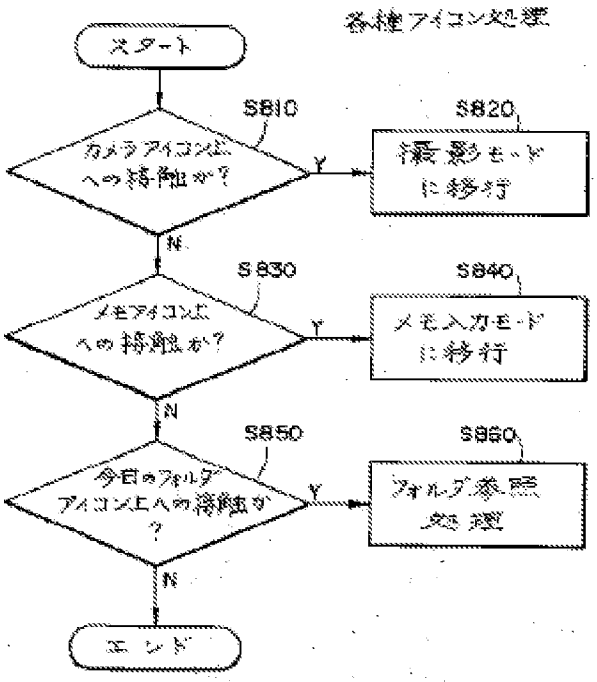
[First column]
S690. Continuous page-turning in backward direction
End

[Second column]
Start
S610. Detect finger contact pressure
S620. Is this above a prescribed pressure value?
S640. Is there contact with the right edge thickness?
S680. Is this a vertical-text book?
S700. Continuous page-turning in the forward page direction
End

[Third column]
Continuous page-turning processing
S630. Stop continuous page-turning
End
S650. Is this a vertical-text book?
S660. Continuous page-turning in backward direction
End

[Fifth column]
S670. Continuous page-turning in the forward page direction
End

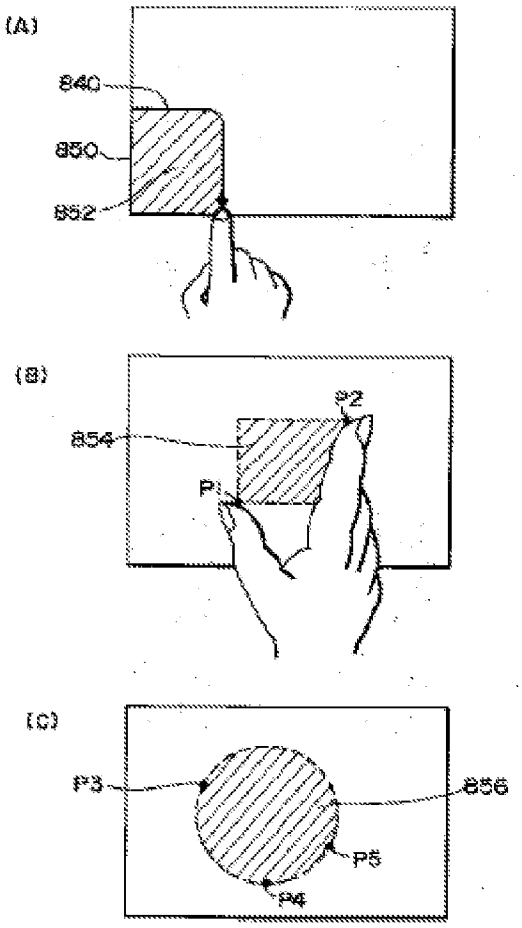
Fig. 41



[First column]
Start
S810. Is there contact on the camera icon?
S830. Is there contact on the memo icon?
S850. Is there contact on the icon for Today's folder?
End

[Second column]
Various icons processing
S820. Switch to picture-taking mode
S840. Switch to memo input mode
S960. View folder processing

Fig. 42



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Reference	Application No./Patent No.
~~FB9380F/E14549E~~ M1836DEP/0	06016857.2 - 1245 / 1717683

Applicant/Proprietor: Apple Inc.

Communication

The extended European search report is enclosed.

The extended European search report includes, pursuant to Rule 62 EPC, the European search report (R. 61 EPC) or the partial European search report/ declaration of no search (R. 63 EPC) and the European search opinion.

Copies of documents cited in the European search report are attached.

☑ 2 additional set(s) of copies of such documents is (are) enclosed as well.

The following have been approved:

☑ Abstract ☑ Title

☐ The Abstract was modified and the definitive text is attached to this communication.

The following figure(s) will be published together with the abstract: 1

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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 6857

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 479 528 A (SPEETER THOMAS H [US]) 26 December 1995 (1995-12-26) * multi-touch sensing array; column 2, line 62 - column 8, line 52; figures 1-10 *	1-5	INV. G06F3/033
A	TOMITA A ET AL: "AN IMAGE PROCESSING METHOD FOR USE IN A GUI FOR THE VISUALLY IMPAIRED" PROCEEDINGS OF THE IECON '97 : 23RD. INTERNATIONAL CONFERENCE ON INDUSTRIAL ELECTRONICS, CONTROL, AND INSTRUMENTATION. NEW ORLEANS, NOV. 9 - 14, 1997; [PROCEEDINGS OF IEEE IECON: INTERNATIONAL CONFERENCE ON INDUSTRIAL ELECTRONICS, CONTROL, AND INSTRU, 9 November 1997 (1997-11-09), pages 264-268, XP000894675 ISBN: 978-0-7803-3933-0 * the whole document *	1-5	
A	DAVIS J ET AL: "Determining 3-D hand motion" SIGNALS, SYSTEMS AND COMPUTERS, 1994. 1994 CONFERENCE RECORD OF THE TW ENTY-EIGHTH ASILOMAR CONFERENCE ON PACIFIC GROVE, CA, USA 31 OCT.-2 NOV. 1994, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, vol. 2, 31 October 1994 (1994-10-31), pages 1262-1266, XP010148780 ISBN: 978-0-8186-6405-2 * the whole document *	1-5	TECHNICAL FIELDS SEARCHED (IPC) G06F G06K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 February 2010	Arranz, José

CATEGORY OF CITED DOCUMENTS

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A : technological background
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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1

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5479528 A	26-12-1995	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

The examination is being carried out on the **following application documents**

Description, Pages

1-81 as originally filed

Claims, Numbers

1-5 as originally filed

Drawings, Sheets

1/45-45/45 as originally filed

1 The application does not meet the requirements of Article 84 EPC, for the following reasons.

1.1 Claim 1: according to the preamble of the claim, claim 1 is directed to a method "for extracting roll and tilt degrees of freedom ...from pressure changes". The characterising portion however merely defines the step of "measuring proximities". With respect to the description, both terms have different meanings. The intended limitations are therefore not clear from this claim, contrary to the requirements of Article 84 EPC.

1.2 Claim 1: the expressions "calibration proximity image" and "post-calibration proximity image" lack support in the description, contrary to the requirements of Article 84 EPC. As a result, the steps of "measuring proximities" and "computing an average hand contact position" are therefore also not clear.

1.3 Claim 1: the expression "the surface" relates to a feature which has not previously been defined in the claim.

1.4 Claim 1: the expressions "average hand contact position" and "weighted average hand contact position" are unclear since they lack support in the description. The step of computing said "average hand contact position" is based on one proximity image. With respect to the description (page 27), it appears that the expression merely relates to the calculation of the centroid of the detected proximity image. For the purpose of the following discussion, this feature has been interpreted accordingly.

1.5 Claim 1: the step of computing the "difference vector" is unclear since it has been merely defined by using the unclear terms, as stated above.

1.6 Claim 1: the step of "dead-zone filtering the difference vector" merely attempts to define the subject-matter in terms of the result to be achieved rather than in terms of how the effect is to be achieved.

1.7 Claim 1: the step of "transmitting the filtered vector from each post-calibration proximity image" is unclear since only one "post-calibration proximity image" has been previously defined in the claim for performing a computation.

1.8 Claim 1: the claim is not supported by the description, as required by Article 84 EPC, for the following reason: the claim does not define any feature of the device required to detect the hand motion. The scope of claim is therefore broader than justified by the description and drawings since the application as filed does not provide information to extend the particular teaching of extracting roll and tilt degrees of freedom to any kind of proximity detection device, e.g. camera based detection device, etc.

1.9 The statement in the description "...the spirit of the invention..." on page 81 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity of the claims (Article 84 EPC) when used to interpret them (see the Guidelines, C-III, 4.4). This statement should therefore be deleted.

2 The application does not meet the requirements of Article 83 EPC, that the invention shall be disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. In particular, according to the Guidelines C-II, 4.9, "the description must disclose any feature essential for carrying out the invention in sufficient detail to render it apparent to the skilled person how to put the invention into practice. The reasons being as follows:

2.1 Claim 1 relates to a method for extracting roll and tilt degrees of freedom of hand motion from proximity images detected on the surface of a capacitive sensing array. In oder to derive roll and tilt information from images representing a hand, information about the position of the hand in three dimensions is however required. Claim 1, on the contrary, attempts to define a method wherein said roll and tilt information is merely derived from the calculation of a difference vector resulting from two "average hand contact positions", i.e. from the centroids of the detected hand parts computed from two proximity images. Since the centroids merely represent two different points in the same plane, the resulting vector merely defines a direction in one plane. Accordingly, the claimed steps at most would merely allow to determine the direction of movement of a hand over the sensor. As a consequence, no roll and tilt of a hand can be derived from such a vector. Furthermore, the disclosure of the present application is insufficient to enable the skilled person to implement the claimed method for extracting roll and tilt information

3 It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed taking account of Rule 43(1) EPC. The applicant should also indicate in the letter of reply the difference of the subject-matter of the new claim vis-à-vis the state of the art and the significance thereof.

4 When filing an amended set of claims, the applicant should also take into account the following remarks:

5 Any amended independent claim should be filed in the two-part from (cf. Rule 43(1) EPC).

6 The features of the claims should be provided with reference signs placed in parentheses to increase the intelligibility of the claims (Rule 43(7) EPC). This applies to both the preamble and characterising portion (see Guidelines, C-III, 4.19).

7 The applicant should bring the description into conformity with the amended claims. Care should be taken during revision, especially of the introductory portion and any statements of problem or advantage, not to add subject-matter which extends beyond the content of the application as originally filed (Article 123(2) EPC).

8 In order to facilitate the examination of the conformity of the amended application with the requirements of Article 123(2) EPC, the applicant is requested to clearly identify the amendments carried out, irrespective of whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based.

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Reference	Application No./Patent No.
~~FB9380A/E14549E~~ K119366WEP1	06016833.3 - 1245 / 1717680
Applicant/Proprietor: Apple Inc.	

Communication

The extended European search report is enclosed.

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☑ Abstract ☑ Title

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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 6833

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DAVIS J ET AL: "Recognizing hand gestures" EUROPEAN CONFERENCE ON COMPUTER VISION, BERLIN, DE, vol. 1, 2 May 1994 (1994-05-02), pages 331-340, XP002360860 * the whole document *	1-11	INV. G06F3/048 G06F3/044
A	CHIN-CHEN CHANG ET AL: "A HASHING-ORIENTED NEAREST NEIGHBOR SEARCHING SCHEME" PATTERN RECOGNITION LETTERS, ELSEVIER, AMSTERDAM, NL, vol. 14, no. 8, 1 August 1993 (1993-08-01) , pages 625-630, XP000383902 ISSN: 0167-8655 * the whole document *	1-11	
A	PAVLOVIC V I ET AL: "VISUAL INTERPRETATION OF HAND GESTURES FOR HUMAN-COMPUTER INTERACTION: A REVIEW" IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE SERVICE CENTER, LOS ALAMITOS, CA, US, vol. 19, no. 7, 1 July 1997 (1997-07-01), pages 677-695, XP000698168 ISSN: 0162-8828 * the whole document *	1-11	TECHNICAL FIELDS SEARCHED (IPC) G06F G06K
A	EP 0 817 000 A1 (IBM [US]) 7 January 1998 (1998-01-07) * detecting size of finger on a touchscreen ; column 3, line 5 - column 12, paragraph 42; figures 1-9 *	1-11	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 February 2010	Arranz, José

CATEGORY OF CITED DOCUMENTS

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A : technological background
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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 6833

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 479 528 A (SPEETER THOMAS H [US]) 26 December 1995 (1995-12-26) * multi-touch touch-pad; column 2, line 61 - column 11, line 18; figures 1-12 *	1-11	

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 February 2010	Arranz, José

CATEGORY OF CITED DOCUMENTS

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D : document cited in the application
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 01 6833

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0817000 A1	07-01-1998	DE 69709991 D1	14-03-2002
		DE 69709991 T2	26-09-2002
		JP 3504462 B2	08-03-2004
		JP 10063424 A	06-03-1998
		US 5856824 A	05-01-1999
US 5479528 A	26-12-1995	NONE	

The examination is being carried out on the **following application documents**

Description, Pages

1-81 as originally filed

Claims, Numbers

1-11 as originally filed

Drawings, Sheets

1/45-45/45 as originally filed

1 The application does not meet the requirements of Article 84 EPC, for the following reasons.

1.1 Claims 1,6,7 have been drafted as separate independent claims. Under Article 84 in combination with Rule 43(2) EPC, an application may contain more than one independent claim in a particular category only if the subject - matter claimed falls within one or more of the exceptional situations set out in paragraph (a), (b) or (c) of Rule 43(2) EPC, which is not the case in the present situation. In order to overcome this objection, the applicant should file an amended set of claims defining the relevant subject - matter in terms of a single independent claim in each category followed by dependent claims covering features which are merely optional. A similar objection applies to claims 8,10,11.

1.2 Claim 1

1.2.1 The feature of "segmenting each proximity image" is unclear since the feature "proximity image" has not been previously defined in the claim.

1.2.2 The expression "...which indicate significant proximity" is unclear. The expression does not clearly define which electrodes are taken into consideration for indicating "significant" proximity.

1.2.3 The expression " each group representing ... of a distinguishable hand part" merely attempts to define the step by the result to be achieved without specifying any technical feature in order to achieve said result.

1.2.4 The expression "total proximity" is not clear per se and the claim does not provide any definition for such an expression.

1.2.5 The expression "orientation parameters" is unclear since it is not clear how an orientation can be merely derived from of a group of electrodes.

1.2.6 The expression "group paths" is not clear per se and the claim does not provide any definition for such an expression.

1.2.7 The expression "filtered position vectors" is not clear per se and the claim does not provide any definition for such an expression.

1.2.8 The step of "computing velocity" is unclear since the claim does not define whose velocity is computed.

1.2.9 The expression "assigning hand and finger identity" merely attempts to define the step by the result to be achieved without specifying any technical feature in order to achieve said result.

1.2.10 The expression "hand and finger identity" is unclear since the claim does not define what is meant by "identity".

1.2.11 Furthermore, it is not clear what is meant by "relative path positions and velocities since the claim does not provide any definition for such such a relative term.

1.2.12 It is not clear what is meant by "individual contact features" and to which technical features the expression refers.

1.2.13 It is not clear what is meant by "previous estimates" since there are no calculations of "previous estimates of hand and finger positions" being defined in the claim.

1.2.14 It is not clear what is meant by "maintaining estimates". Furthermore, the expression "paths currently assigned to the fingers" is unclear since the claim does not define any assignation between a path and an estimation of finger position.

1.2.15 The expression "the estimates provide high level feedback" is vague and unclear since it does not define to which technical features it refers.

1.2.16 Furthermore, the step is of "maintaining estimates..." is merely defined by the result to be achieved without specifying any technical feature in order to achieve said result.

1.2.17 The claim is not supported by the description, as required by Article 84 EPC, since it does not define any feature of the device required for tracking and identifying hand contacts. The scope of the claim is therefore broader than justified by the description and drawings since the application as filed does not provide information to extend the particular teaching to any kind of input devices.

1.3 Claim 2

1.3.1 The expression "a method for filtering and segmenting" is unclear. It is not clear to which steps of the method the expression refers since the claim does not define any step for "filtering" or "segmenting" hand contacts.

1.3.2 The expression "smoothed copy" is not clear per se and the claim does not provide any definition for such such a feature.

1.3.3 The expressions "using boundary test of pixel" and "neighboring pixel proximities" are vague and unclear since it does not define to which technical features they refer.

1.3.4 The expression "properties of hand contacts" is unclear since the claim does not provide any definition for a "property" of a hand contact.

1.3.5 It is not clear what is meant by "a segmentation region of the pixel". Such a feature lacks support in the description.

1.3.6 The feature of "combining groups of pixels which partially overlap" is unclear since the claim does not define any step for detecting overlapping areas.

1.3.7 The expression "group ... features" is not clear per se and the claim does not provide any definition for such a feature.

1.3.8 The step of "updating positions of the segmentation regions...in response to further analysis" merely attempts to define the step by the result to be achieved without specifying any technical feature in order to achieve the result of updating the positions.

1.4 Claims 3,4,5

1.4.1 The expressions "wherein sloppy segmentation regions...", "wherein a remaining image portion...", "wherein segmentation region rules of ..." and "wherein verified properties of ..." refer to steps which have not been defined in any previous claim to which the claim refers.

1.5 Claim 6

1.5.1 The feature of "predicting the current position... along existing paths" is unclear since the determination of said "existing paths" is not defined in the claim. A similar objection applies to the features of "existing path" and "predicted path position".

1.5.2 The feature of "path-dependent tracking radius" is not clear per se.

1.5.3 The feature of "path parameters" is not clear per se.

1.5.4 The expression "the measured parameters" is unclear since no step of measuring parameters has been previously defined in the claim.

1.6 Claim 7

1.6.1 The expression "for ordering surface contacts" is unclear. It is not clear to which step(s) of the method the expression refers since the claim does not define any step for "ordering" surface contacts.

1.6.2 The expression "assumed to be from a given hand" is vague and unclear since it does not define which technical features are involved to perform said assumption.

1.6.3 The feature of "finding the innermost contact" merely attempts to define the step by the result to be achieved without specifying any technical feature in order to achieve said result.

1.6.4 The feature of "determining whether the innermost contact is a..." merely attempts to define the step by the result to be achieved without specifying any technical feature in order to achieve said result.

1.6.5 The expression "vertical position" is not clear. It is not clear in which direction is meant relative to the assigned contacts.

1.6.6 The expression "contact" and "inner-contact features" are not clear per se.

1.7 Claim 8

1.7.1 The feature of " finding the nearest neighbor contact of a given contact" is unclear since no feature for identifying a "given contact" has been previously defined a the claim.

1.7.2 The claim is not supported by the description, as required by Article 84 EPC, since the scope of the claim is broader than justified by the description and drawings. The description and drawings do not provide information to implement an apparatus for "distinguishing palm heel contacts" by merely suppressing identification of a given contact in the case as defined in claim 8.

1.8 Claim 9

1.8.1 The feature of "contacts identified as forepalm hand contacts" merely attempts to define the step by the result to be achieved without specifying any technical feature in order to achieve the result of identifying said forepalm hand contacts.

1.9 Claim 10

1.9.1 The expressions "the total proximity", "orientation" and "eccentricity" are is not clear per se and the claim does not provide any definition for said features.

1.9.2 The expression "for encouraging identification" is vague and unclear.

1.10 The statement in the description "...the spirit of the invention..." on page 81 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity of the claims (Article 84 EPC) when used to interpret them (see the Guidelines, C-III, 4.3a). This statement should therefore be deleted.

2 It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed taking account of Rule 43(1) EPC. The applicant should also indicate in the letter of reply the difference of the subject-matter of the new claim vis-à-vis the state of the art and the significance thereof.

When filing an amended set of claims, the applicant should also take into account the following remarks:

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4 The applicant should bring the description into conformity with the amended claims. Care should be taken during revision, especially of the introductory portion and any statements of problem or advantage, not to add subject-matter which extends beyond the content of the application as originally filed (Article 123(2) EPC).

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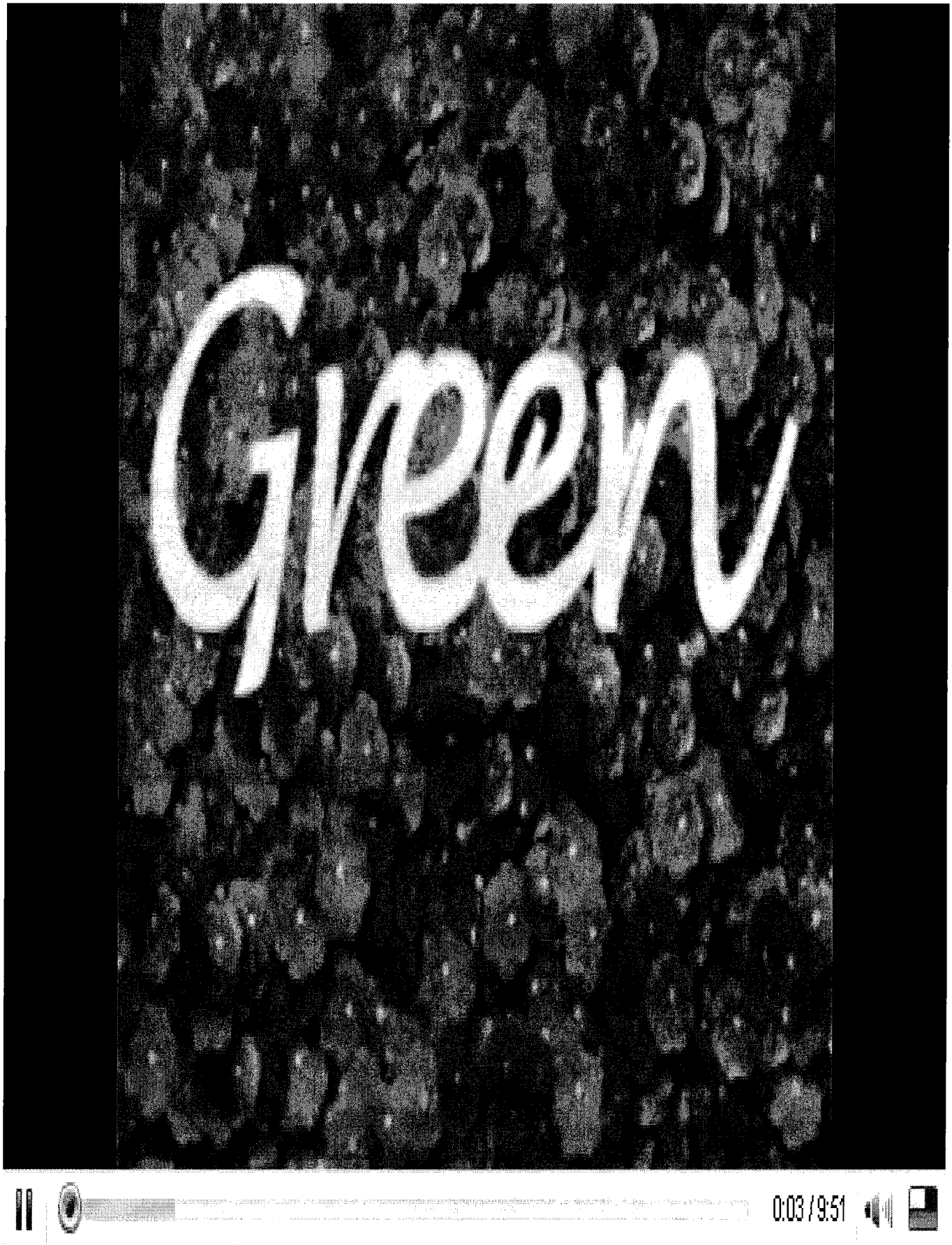

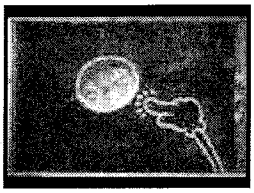

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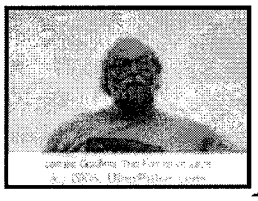

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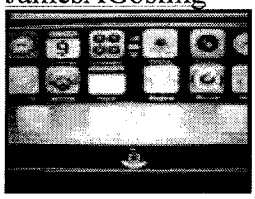
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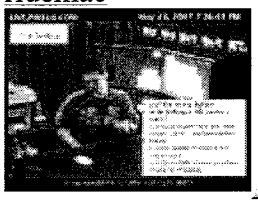
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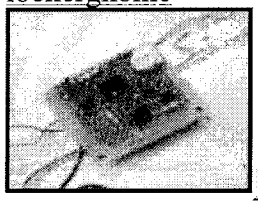
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VIA EFS WEB
Patent
Docket No. 106842508604
Client Reference No. P3950USC13

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Wayne WESTERMAN et al. Serial No.: 11/677,958 Filing Date: February 22, 2007 For: ELLIPSE FITTING FOR MULTI-TOUCH SURFACES	Examiner: Koosha Sharifi-Tafreshi Group Art Unit: 2629 Confirmation No.: 1844

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97 & § 1.98

MS Amendment
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P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO/SB/08a/b. Copies of the foreign document and non-patent literature are submitted herewith. The Examiner is requested to make these documents of record.

This Supplemental Information Disclosure Statement is submitted:

☐ With the application; accordingly, no fee or separate requirements are required.

☐ Before the mailing of a first Office Action after the filing of a Request for Continued Examination under § 1.114. However, if applicable, a certification under 37 C.F.R. § 1.97 (e)(1) has been provided.

☐ Within three months of the application filing date or before mailing of a first Office Action on the merits; accordingly, no fee or separate requirements are required. However, if applicable, a certification under 37 C.F.R. § 1.97 (e)(1) has been provided.

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The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 and § 1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

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Dated: March 11, 2010

Respectfully submitted,

By _____
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555 West Fifth Street
Los Angeles, California 90013-1024
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Electronic Patent Application Fee Transmittal

Application Number:	11677958
Filing Date:	22-Feb-2007
Title of Invention:	Ellipse Fitting for Multi-Touch Surfaces
First Named Inventor/Applicant Name:	Wayne Westerman
Filer:	Glen Masashi Kubota/Vivian Gutierrez
Attorney Docket Number:	10684-25086.04

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
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Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

An Image Processing Method for Use in a GUI for the Visually Impaired

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Abstract— This paper presents a method for processing the image of a human hand, in order to emulate the acts of moving a scroll bar by rotating the hand, and clicking on a mouse button by moving the thumb. This method can be used in a system that facilitates the operation of a graphical user interface (GUI) by a visually impaired person. The grayscale image acquired by a digitizer is thresholded and converted to a black-and-white image. The orientation of the hand, given by an angle θ with the vertical axis, is calculated based on the central moments. The image of the hand is then rotated by θ to a normalized position. The number of pixels in each column of the normalized image is counted, and the result is expressed in a histogram. The coefficient of asymmetry of this histogram is used to determine whether the thumb is positioned along the pointing finger or whether it is far from the other fingers, defining two states that correspond to a mouse button up or down. Experimental results showed a frame rate of 12.5 frames per second, demonstrating that this method is suitable for the real time processing demanded by the interface system.

I. Introduction

In the past, man-machine interfaces consisted of panels of mechanical switches and wires, that operators manipulated to program a computer at bit level. Throughout the years, they evolved to punched cards, teletype terminals and text based video monitors. In the future, multimodal interfaces [1] may allow interaction by using gestures, voice and sight, but presently the most common form of interactation in a desktop computer is by means of a graphical user interface (GUI).

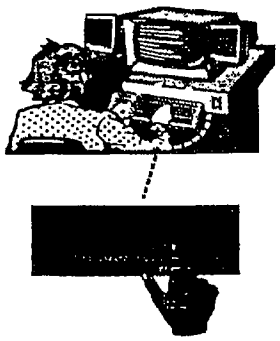

Fig. 1. Interface System with the Pin Display enlarged

A GUI provides a rich enviroment for interaction, with windows, icons and a cursor controlled by a pointing device, such as a mouse. Although this interface may be intuitive and easy to use for a typical user, its operation may be difficult for the visually impaired, to whom the graphical representation of the information is a barrier that has to be overcome by increasing the use of other senses, particularly hearing and touch. Exploiting these two senses, an interface system for a visually impaired person can be implemented in the following way (Fig.1): GUI objects (like menus and buttons), are converted to patterns conveyed by a pin display – a Braille reader. Sound from speakers gives audio cues, while a voice synthesizer reads the text displayed on the screen. For input, a voice recognition system takes the words spoken by the operator at a microphone, and a video camera captures the movements of its hand. Our research is focused on this last action.

II. Operation

In this paper, we address the problem that scrolling a text with the system described above is not a trivial task, and when scrolling a long text it consumes too much time. We propose to place a video camera above the pin display, and calculate the orientation of the hand from its image, so the scrolling speed can be controlled by rotating the hand. In addition, the position of the thumb can also be determined. Therefore, it is possible to emulate the acts of moving a scroll bar by rotating the hand, and clicking on a mouse button by moving the thumb.

An operation that could benefit by the method presented here is the cut-and-paste operation. Usually, a pin display outputs only one line at a time, making difficult to select a portion of text longer than one line. The problem is that this operation demands two-dimensional movements, while the one-line pin display is an one-dimensional device. With the method proposed here, a cut-and-paste operation could be performed by following the procedure bellow. It describes the action performed by the user *(user input)* and the response from the system *(system response*, either as a processing that was performed or as an output from the speakers):

1. *(user input):* moves the finger to the starting point and puts the thumb in the "button down" position,

0-7803-3932-0

as shown in Fig.2.
(system response): recognizes the thumb in the "button clicked" position and says "selection started".

2. *(user input):* moves the hand over the text to be selected.
(system response): none.

3. *(user input):* when the hand reaches the end of line, rotates the hand to scroll the text.
(system response): the text is scrolled at a speed determined by the angle of rotation of the hand.

4. *(user input):* when the desired point is reached, puts the thumb in the "button down" position.
(system response): recognizes the thumb in the "button clicked" position and says "selection finished".

5. *(user input):* moves the hand to the point where the text will be inserted and puts the thumb in the "button clicked" position again.
(system response): recognizes the thumb in the "button clicked" position and says "text inserted".

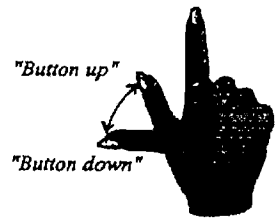

Fig. 2. Thumb emulating a mouse button

III. Proposed Method

The method proposed in this paper is summarized in Fig.4, that shows the processing flow. Firstly, the grayscale image acquired by a digitizer is thresholded and converted to a binary image. This is a simple segmentation algorithm, used in order to isolate the hand from the background elements in the image. The pin display used in our experimental setup is all painted in black, put over a table also black. This algorithm could be improved if we had used color images, and applied segmentation over a color histogram.

Secondly, the central moments of the binary image are calculated. As result, we obtain the coordinates of the center of mass and the orientation of the hand. The orientation, defined as the angle of the least moment of inertia, is expressed by the angle θ measured from the vertical, as shown in Fig.3.

The orientation of the hand controls the scrolling speed of the text. Next, we detect the state of the thumb, that

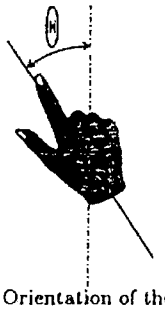

Fig. 3. Orientation of the Hand

determines if the button is either up or down. In order to do so, the image of the hand must be rotated by θ to a normalized position. In the normalized image, the center of mass is always in the center of the image, and the hand is oriented in the vertical, pointing upward. Under these two conditions, a histogram is obtained by counting the number of pixels in each column in the normalized image. Based on the coeficient of assymetry of this histogram we can determine if the thumb is either extended (in a position where it makes a right angle with the pointing finger) or retracted (oriented along the other fingers). These two states emulate a mouse button depressed or up, respectively.

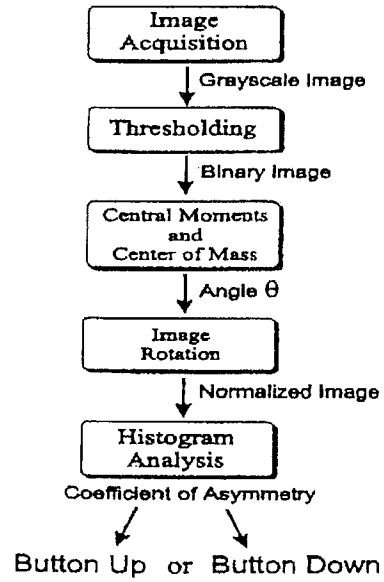

Fig. 4. Processing Flow

The details of each step are given next.

A. Thresholding

The input image is converted to a binary image by using Otsu's method [2]. It is an adaptive threshold-

ing method based on statistical calculations over the histogram of grayscale intensities. The threshold value divides the histogram in two groups, and the mean value and variance of the intensities are calculated for each group. The intra and inner variances of the groups are then calculated by these equations:

$$\sigma^2_{intra} = \omega_0(f_0 - f)^2 + \omega_1(f_1 - f)^2 \quad (1)$$

$$\sigma^2_{inner} = \omega_0\sigma^2{}_0 + \omega_1\sigma^2{}_1 \quad (2)$$

where
f = mean intensity value
f_0 = mean intensity in first group
f_1 = mean intensity in second group
σ_0 = variance of the first group
σ_1 = variance of the second group
ω_0 = accumulated histogram of the first group
ω_1 = accumulated histogram of the second group

The optimum threshold value is the one that maximizes the relation between the total intra variance and the total inner variance of the two groups:

$$thres = max\left(\frac{\sigma_{intra}}{\sigma_{inner}}\right) \quad (3)$$

B. Central Moments and Center of Mass

In the binary image, the center of mass of the hand is calculated by:

$$\bar{x} = \frac{1}{N}\sum_{(x,y)\in B} x \qquad \bar{y} = \frac{1}{N}\sum_{(x,y)\in B} y \quad (4)$$

where
B is the binary image
N is the total number of pixels in the image
(x, y) are the coordinates of each pixel

The (p, q) order central moments are defined by:

$$\mu_{p,q} = \sum_{(x,y)\in B}(x - \bar{x})^p(y - \bar{y})^q \quad (5)$$

Once the central moments are calculated, the orientation of the hand θ, defined as the angle of axis of the least moment of inertia [3], is obtained by:

$$\theta = \frac{1}{2}tan^{-1}\frac{2\mu_{1,1}}{\mu_{2,0} - \mu_{0,2}} \quad (6)$$

C. Normalized Image

The binary image is rotated to a normalized position by:

$$x' = x.cos\theta - y.sin\theta \qquad y' = x.sin\theta + y.cos\theta \quad (7)$$

The rotation is performed around the center of mass $(\bar{x}, \bar{y})$.

D. Histogram Analysis

An histogram is obtained by counting the number of pixels in each column of the normalized image. In the normalized position, the center of the mass of the hand is always in the center of the image, and the hand is oriented in the vertical axis. With these two conditions, we proposed to use the coefficient of asymmetry of the histogram to determine the position of the thumb.

The coefficient of asymmetry is defined as the ratio between the third-order central moment and the cube of the standard deviation of the histogram [4]:

$$a_3 = \frac{m_3}{s^3} \quad (8)$$

with

$$m_3 = \frac{\sum_{i=1}^{X} x_i^3.h_i}{N} - 3\bar{x}\frac{\sum_{i=1}^{X} x_i^2.h_i}{N} + 2\bar{x}^3 \quad (9)$$

$$s^2 = \frac{\sum_{i=1}^{X}(x_i - \bar{x})^2.h_i}{N} \quad (10)$$

where
X is the total number of columns
x_i is the i-th column
h_i is the number of pixels in the i-th column
N is the total number of pixels

A large value of a_3 means the histogram is asymmetric, and a small value of a_3 means it is symmetric. When the thumb is positioned along the pointing finger, the shape of the hand is symmetric, and so is the histogram. When the thumb is far from the other fingers, the shape of the hand becomes asymmetric, and a_3 becomes larger. Experimentally, we determined that the threshold that triggers the emulation of a mouse button click must be above 0.5. Therefore:

- if $a_3 < 0.5$, then the mouse button is up
- if $a_3 > 0.5$, then the mouse button is down

IV. Experimental Results

The method described above was implemented in a personal computer based on a Pentium Pro 200MHz CPU (SPECint95 8.5, SPECfp95 6.21). It was equipped with a Matrox Meteor video capture board, capable of achieving a video tranfer rate of 35MB/s for 640x480x24@30fps (NTSC). The programming was done in C, under the operating system Linux version 2.0.29.

Fig.5 illustrates the result of the processing. The upper right quadrant shows the original image. The binary image, obtained after the thresholding, is in the upper left. This image is rotated to a normalized position, and the result is the image in the bottom left. The bottom right shows the orientation axis of the hand and also the result from the detection of the position of the thumb, as

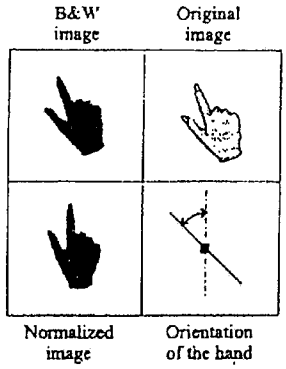

Fig. 5. Screen output of our program

the strings *"button up"* or *"button down"* are printed on the screen. Figs. 6 and 7 show two examples of frames captured and processed.

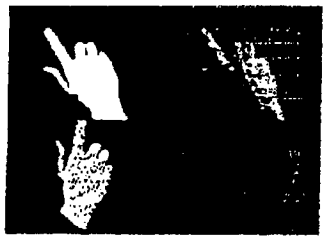

Fig. 6. Example of "button down" detected

Fig. 7. Example of "button up" detected

Fig.8 shows the histograms of these two frames. The calculated coefficients of asymmetry for these examples of button were 0.1051 for *"button up"*, and 0.7008 for *"button down"* .

The size of the processed images was 320x240 pixels, captured in YUV mode, but only the lumminance Y was used. The processing time was, on average, 0.08 seconds, distributed as:

Processing Step	Time Required	%
Thresholding	0.01s	12.5%
Moments	0.02s	25.0%
Normalization	0.03s	37.5%
Coeff. of Assymetry	0.02s	25.0%
Total	0.08s	100%

It can be observed that the normalization of the image took most of the processing time, as it involves the calculation of sines and cossines, used to perform the rotation of the image.

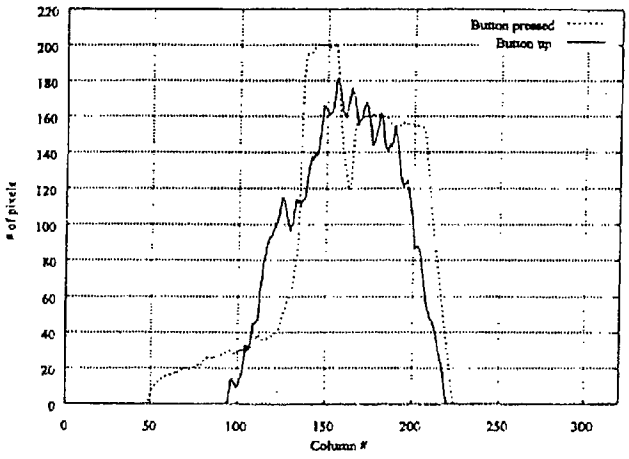

Fig. 8. Horizontal histogram

The variation of the coefficient of assymetry a_3 over a sequence of images is illustrated in Fig.9. In this example, a sequence of approximately 10 seconds was fed to the system, and 176 frames were processed. The user moved the thumb to the *"button down"* position three times, and they were all successfully detected, as shown in the three peaks in the graph above the threshold of 0.5.

V. Conclusions

This paper proposes an image processing method to be used in an interface system that facilitates the operation of a GUI by a visually impaired person. The novelty of this paper is in using the statistical definition of histogram asymmetry to determine the position of the thumb, thus emulating a mouse button. Experimental results showed a frame rate of 12.5 frames per second, demonstrating that this method is suitable for the real time processing demanded by the interface system.

In this paper, the threshold to detect the position of the thumb was determined experimentally at the value of 0.5, and the achieved recognition rate was 100%. However, this result has to be verified by submitting the system to use by users without previous experience with this system.

The motivation for this paper was to facilitate the op-

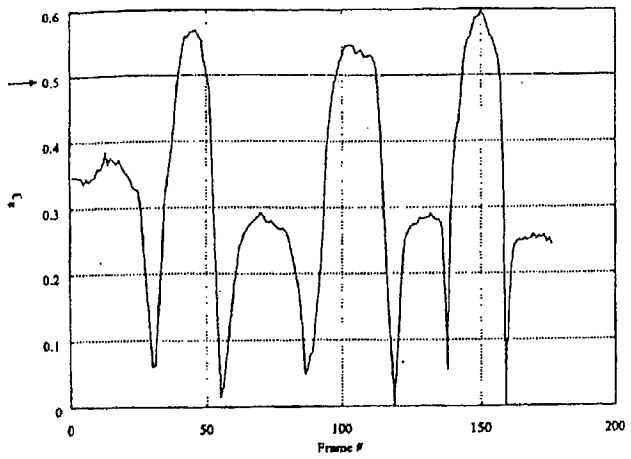

Fig. 9. Example of "button down" detected

eration of a GUI by visually impaired persons, but this system has also potential for applications in the industry, as movements of the hand can control parameters, emulating operations on a panel. It can also be combined with augmented reality and virtual reality systems, as it is a hands-free interface, meaning no gloves or sensors have to be attached to the hand.

Directions for further research include the use of color images. The thresholding could be improved by using color histograms, eliminating the black background, so this system can be used in any environment. Another possibility is the integration of this system to a pin display equiped with touch sensors, so the coordinates of the pointing finger could be used to perform other operations on the GUI. Finally, the evaluation of the proposed system under real use remains to be done.

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[2] N. Otsu, "An Automatic Threshold Selection Method Based on Discriminant and Least Squares Criteria", *Transactions of The Institute of Electronics, Information and Communication Engineers* vol. J63-D, no.4, April 1980.

[3] A.K. Jain, *"Fundamentals of Digital Image Processing"*, Prentice-Hall, 1989.

[4] P.C. Neto, *"Statistics"*, Edgard Blucher, 1977.

VIA EFS WEB
Patent
Docket No. 106842508604
Client Reference No. P3950USC13

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Wayne WESTERMAN et al.

Serial No.: 11/677,958

Filing Date: February 22, 2007

For: ELLIPSE FITTING FOR MULTI-TOUCH SURFACES

Examiner: Koosha Sharifi-Tafreshi

Group Art Unit: 2629

Confirmation No.: 1844

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MS Amendment
Commissioner for Patents
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Alexandria, VA 22313-1450

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