Apple Inc. v. Samsung Electronics Co. Ltd. et al Doc. 167 Att. 14

Exhibit 8-6

Dockets.Justia.com

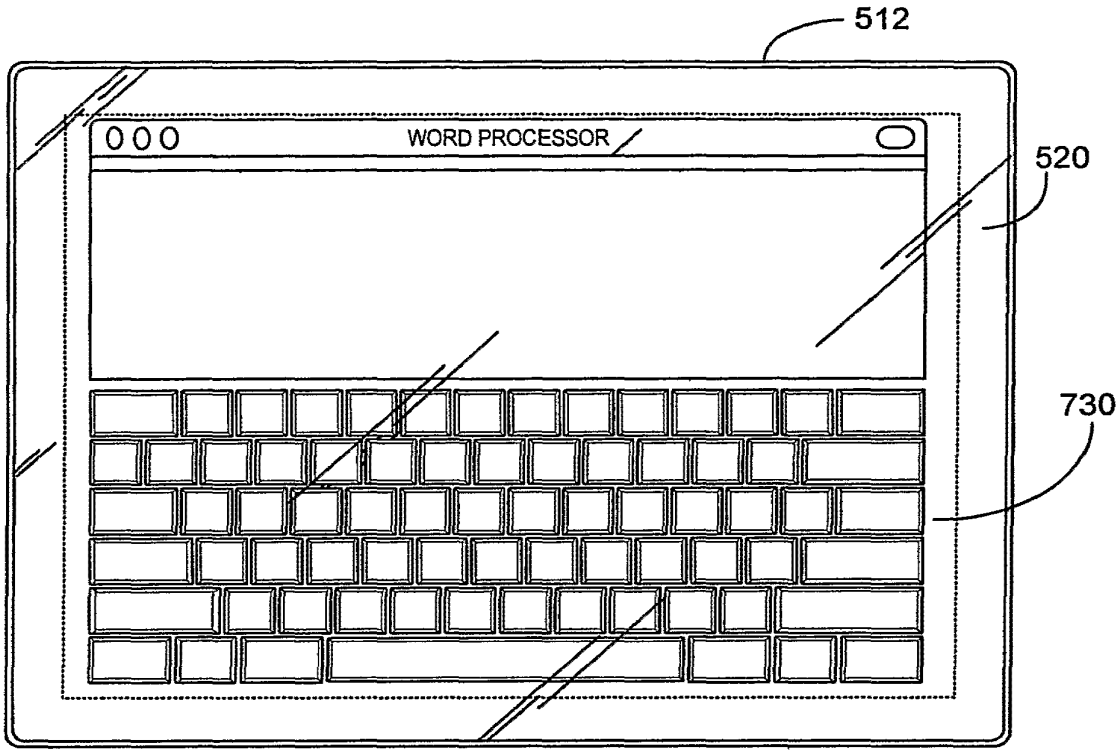

FIG. 25A

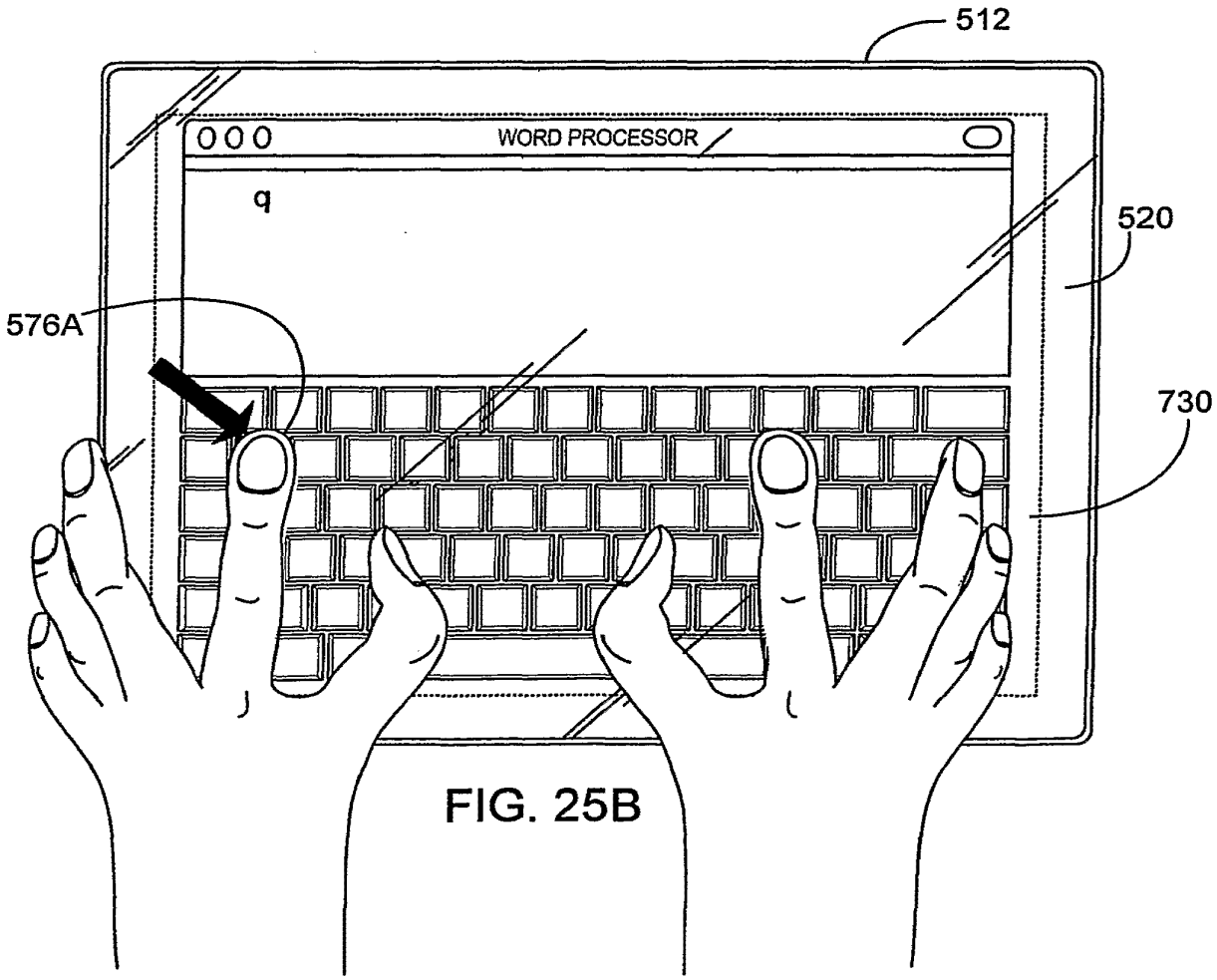

FIG. 25B

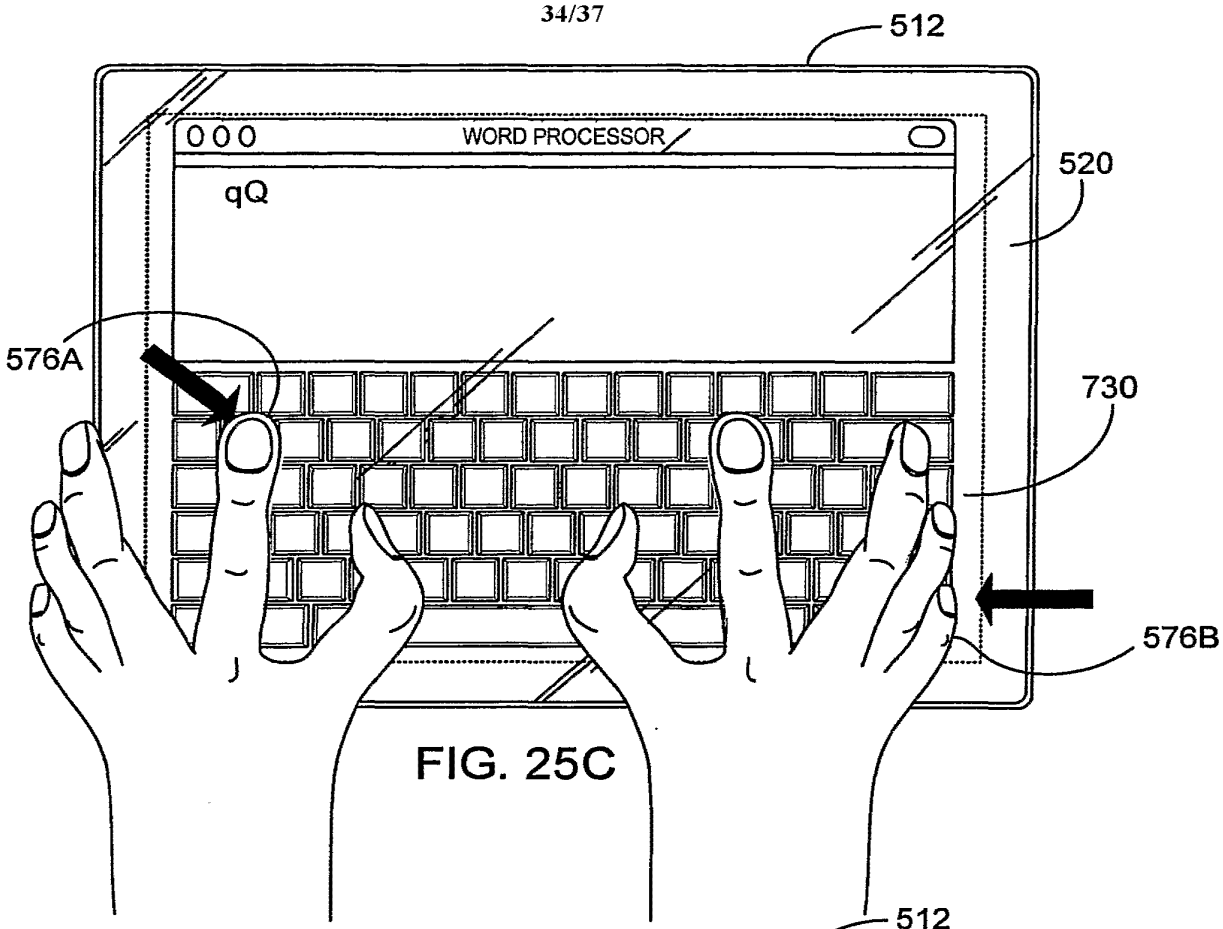

FIG. 25C

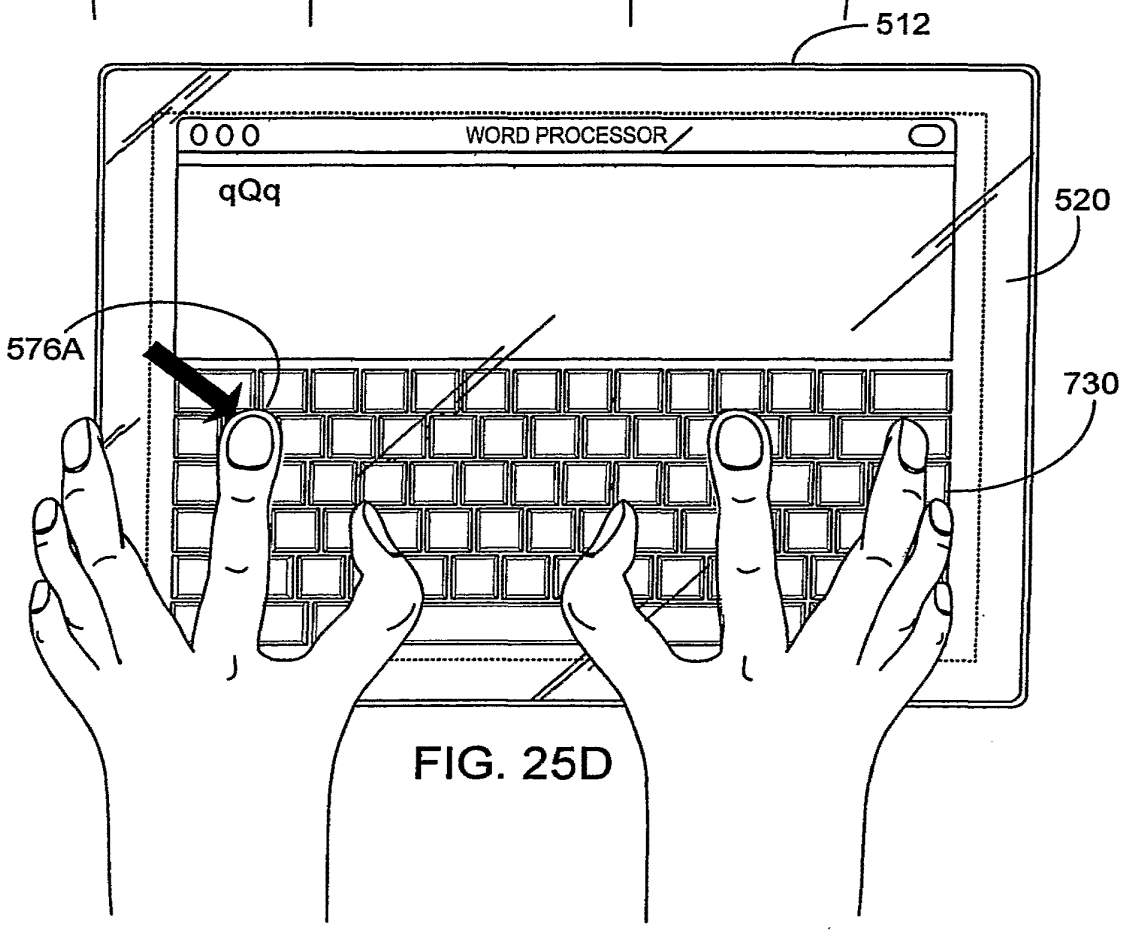

FIG. 25D

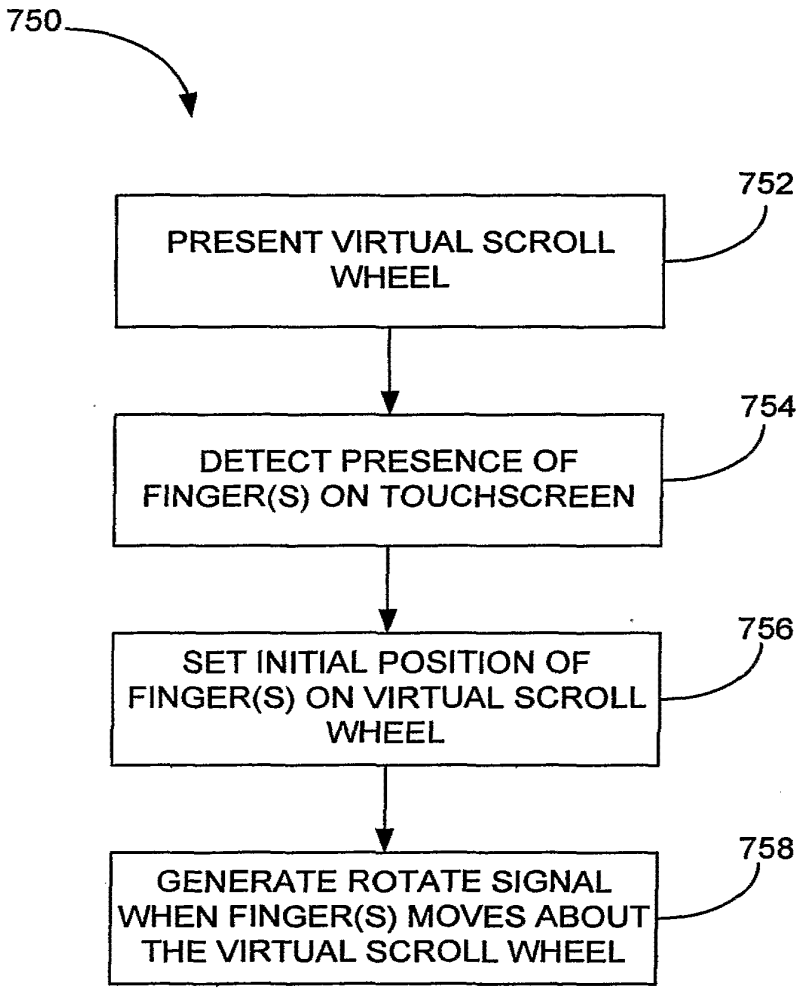
750
752
PRESENT VIRTUAL SCROLL WHEEL
754
DETECT PRESENCE OF FINGER(S) ON TOUCHSCREEN
756
SET INITIAL POSITION OF FINGER(S) ON VIRTUAL SCROLL WHEEL
758
GENERATE ROTATE SIGNAL WHEN FINGER(S) MOVES ABOUT THE VIRTUAL SCROLL WHEEL

FIG. 26

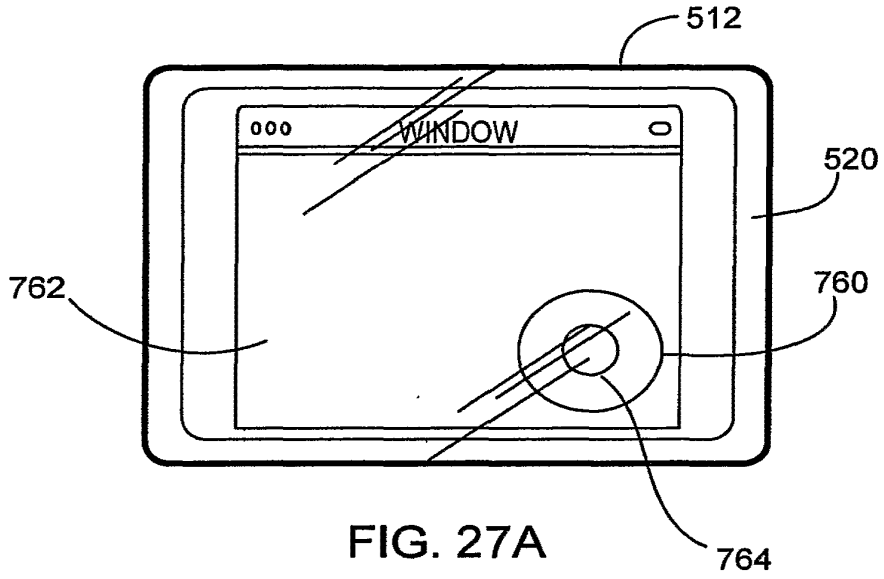

FIG. 27A

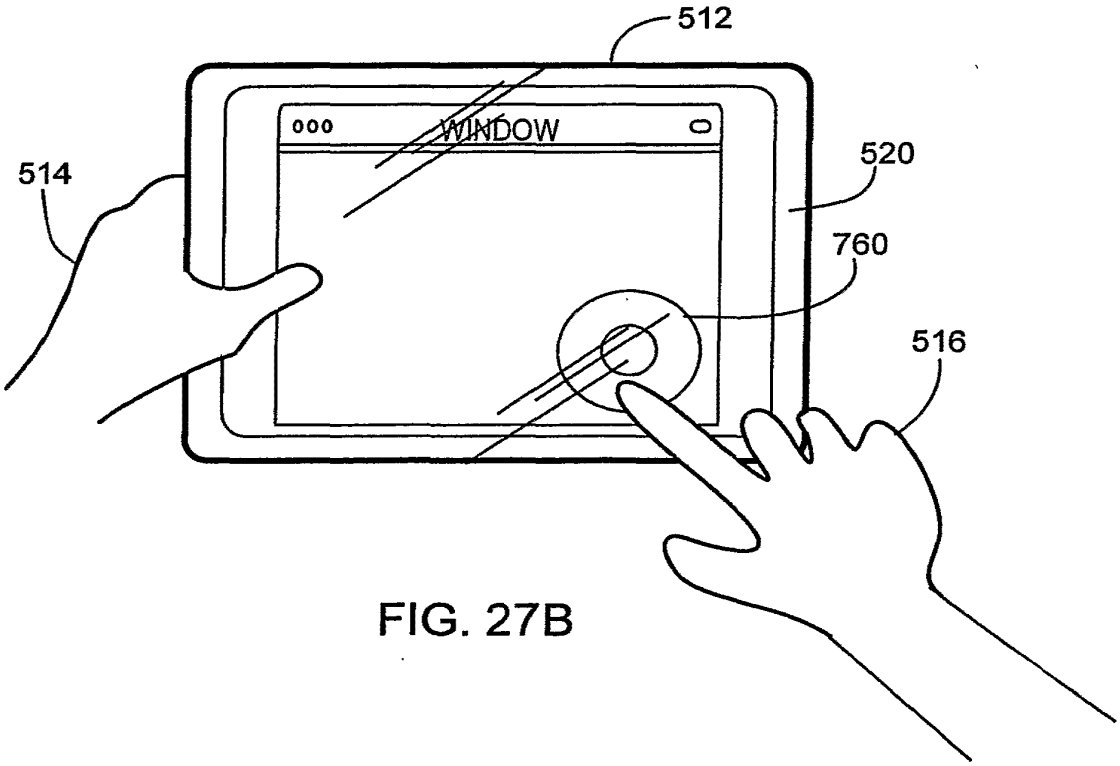

FIG. 27B

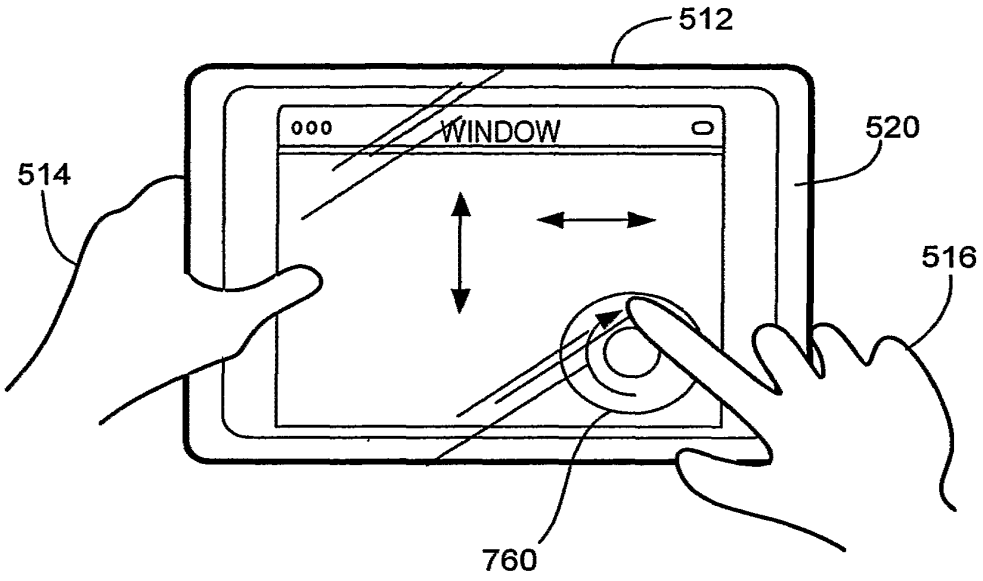

FIG. 27C

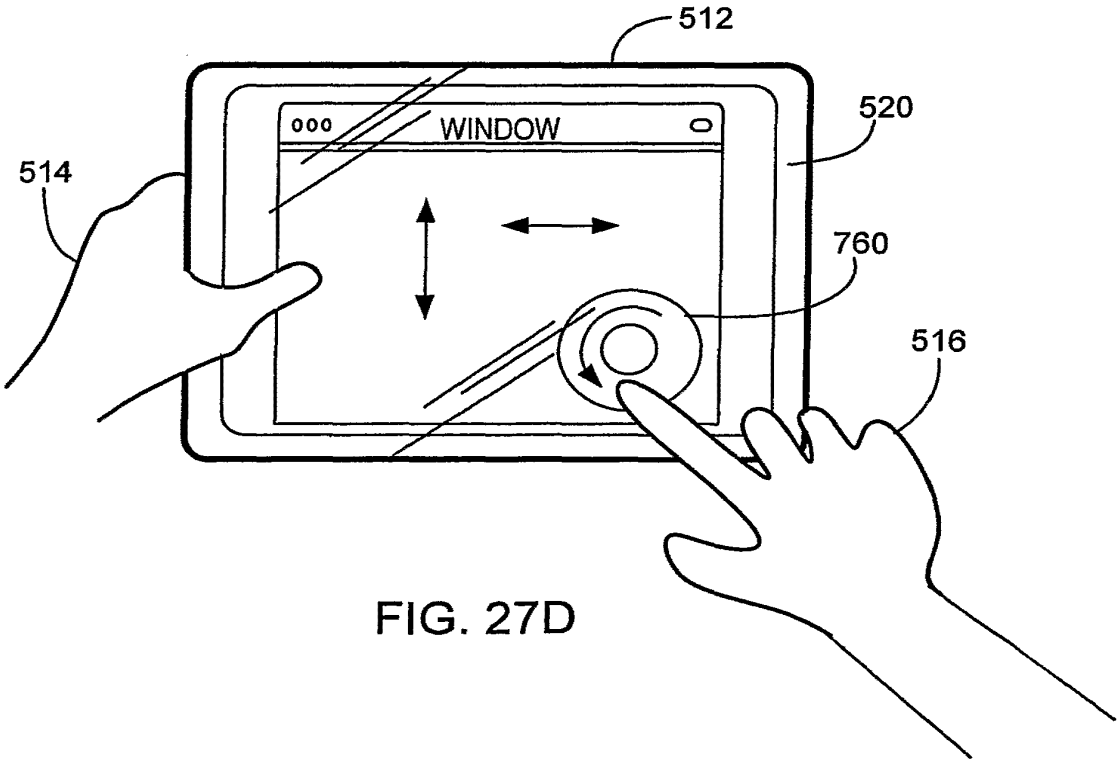

FIG. 27D

RA890-0175 EHD
R. D. DeWid

IBM® Technical Disclosure Bulletin Vol. 36 No. 04 April 1993

Scroll Control Box

In a windowing software environment, especially graphical interfaces, screen space and screen clutter are continual problems for both the user and the program designer. The need for diverse scrolling operations is common. Diversity includes scroll direction, speed, distance, "other" data chunks, flexibility in operation while visually scanning, etc. In windowing environments, these needs are potentially common for every scrollable window, and even for multiple scrollable objects within a window. Today's graphical or non-graphical scroll operators demand extensive screen space. For example:

- OS/2* scroll bars require about 8% of the useable space of each window.
- Other scroll mechanisms, i.e., PF Keys, Icon Arrows, Screen Push buttons, in the industry are:
  - inconsistently applied
  - are part of cluttered interfaces
  - require learning, relearning
  - require much screen space because packaging of scroll functions are inefficient
- much graphical interface complexity of function in addition to scrolling.
- current scrolling is inefficient and insufficient.
- new scrolling function difficult to add gracefully.

The Scroll Control Box (SCB) is a graphical object shown on a display screen which; singly, is used to do all scrolling operations. The SCB gives the user the capability, with one action (drag), to indicate what is to be scrolled. Also, with single action (point/slide), a user can do all of the following:

- Select one of 10 possible directions of scrolling on the x-y axis 8 compass points (N, NE, E...) and two directions on the y axis (depth), activated by pressure.
- Control the scroll speed or how large the scroll increments.
- Change direction, speed, and distance during this single action.
- Scroll any objects on screen by moving and placement of the SCB.

The user operates the SCB using a touch instrument (finger, stylus), or mouse or mouse-like device, a keyboard or other cursor operating device in much the same way icons and other graphical objects are operated on today. SCB dimensions, i.e., of speed, distance, etc., are customizable.

Results:

- Small footprint of the one SCB compared with other scroll methods, e.g., one or several scroll bars

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- Efficient, all direction and dimensional controls in one place with two, three, or more controls for each of 10 directions
- Simple to learn and remember
- Can be placed by user
- Single control for any scrollable area on a display screen
- Flexible design can use combinations that are useful and most usable, e.g., using pressure for speed and sliding for going from one data chunk to another
- Efficient, a "point-to-select" technique

FIG. 1

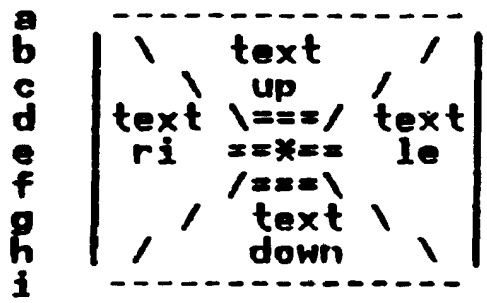
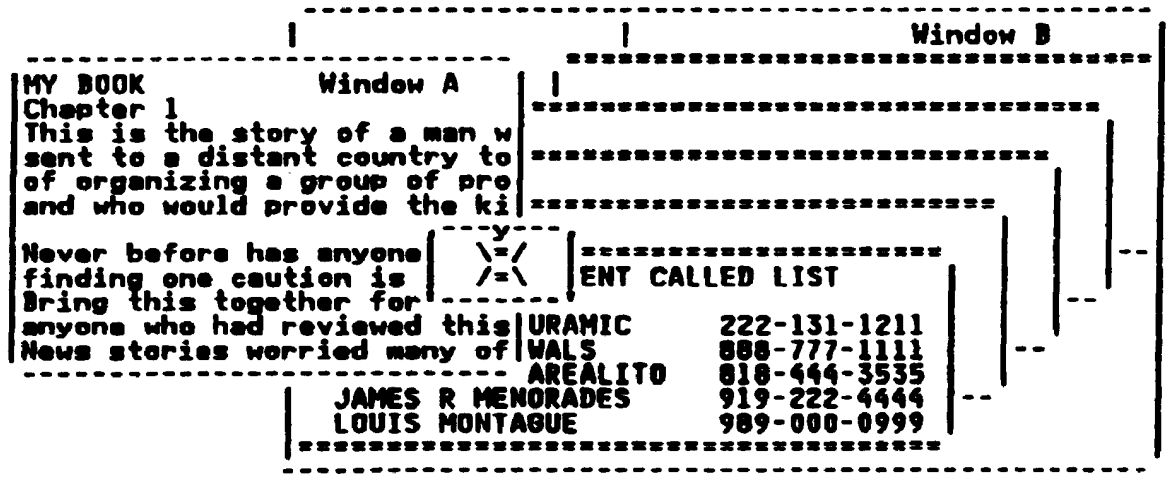


FIG. 2



The quadrant or area in Fig. 1 containing the term "text up" defines where mouse, touch, cursor, or some similar activation method causes scrollable text (or other scrollable objects) to move upward. This will bring into view what is below the visible window, and take from view that within the visible window, in successive timed steps.

Activation of the SCB is on touch down (finger or stylus), mouse point and button down, keyboard caused equivalent action, or other device equivalent, e.g., rollerball, etc. Activation causes either the scrolling movement (after slight delay) of screen content or the SCB-drag state (allows the SCB to be moved around on the screen). This Activation in the center area, as illus-

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trated in Fig. 1 by equal signs (=), allows movement of the SCB. Any other area causes scrolling movement.

"Text" scrolling is illustrated in the following example. Activation, e.g., touch down, near the top perimeter of the box causes scrolling in the slowest of timed steps. Activation closest to the center of the SC box causes the fastest of timed steps. Additionally, once activated, one can slide down to speed up, or slide up to slow the scroll rate. In addition to timing of the scroll, increments can be increased; e.g., from line-by-line, to page-by-page, by control of the application customization programming.

There are many possible choices of scroll increments, line-by-line, full page, full window, window minus one, chapter, etc. Several of these can be operated by the SC box, like line-by-line, window-by-window, and chapter-by-chapter or other increment that has been set up.

Activating on the center area, indicated by equal signs (=) in Fig. 1 initially causes the SCB to become moveable, thereby following any dragging action by the user to position the SCB. The SCB being positioned within any scrollable zone in any window or area defined as having scrollable text or objects within, becomes the scroll control for that zone. Areas can also be excluded from control of the SCB by the application developer.

When the SCB is not within a scrollable zone, or scrolling has not been enabled by the application program, the SCB changes its visual appearance; e.g., it is reduced in size and can be de-emphasized color.

When at the scroll limit (at bottom of text), the "text up" area of the SCB becomes solid in color, obscuring the "text up" and becoming inoperative for that direction.

The terms used within the SCB are for illustration only. They are modifiable and may be symbolic, text, or graphical representations. The illustration in Fig. 1 is only an approximation and art work is needed.

After initial activation within a scroll direction area (up), sliding to an adjacent direction area (left), causes diagonal scroll at the transition point in the averaged direction of the two. This facility can be turned off. The SCB is only present when there is a scrollable areas on screen.

Fig. 2 shows an example user display screen with two windows opened -- window A and window B. Window A overlaps window B and some of window B contents are visible. Window A shows 12 lines of a document that is 150 pages long and having 10 chapters. Window B shows six of a deck of 50 cards, each offset to the right and in back of the previous card. The front card in window B shows seven lines of a list of 36 lines. Window A, then has one scrollable area, and window B has two scrollable area (deck of cards, and first card content).

An example SCB is located in about the center of Fig. 2. It is adjacent to the right of the phrase "Never before has anyone". The SCB is shown in a position where it will, when operated, scroll the text content of window A, it having the majority of its box area within window A.

By touch down in the center drag area, the SCB can be dragged to the right one inch, the SCB would then be in a position in window B to activate scrolling of the list on the front card.

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By touching down within the center drag area, the SCB can be dragged directly up to a position still within window B, where most of it was above the front card, the scrolling action would be directed to scrolling the deck of cards.

1. Touching on the SCB at point "Y" (12 o'clock), causes text in window A to move upward at a relatively slow rate.
2. Sliding towards the center of the SCB increases the scroll rate.
3. Sliding away from the center of the SCB, but staying within the SCB, stops scrolling.
4. Sliding outside the SCB stops scrolling.
5. Sliding across a diagonal border within the SCB; e.g., from a position at 12 o'clock to one at 3 o'clock, changes the direction of the text scrolling direction from upward to leftward.
6. Sliding across a diagonal border without continuing into another quadrant (as in previous step) changes scrolling direction so as to make text already in the window to move out of view to the southwest, bring next text into view from the northeast.
7. There is a slight time delay in activating any scrolling movement to prevent unintentional diagonal movement when changing between direction of 90°, or when accidentally touching the diagonal transition zone, or when touching any SCB area unintentionally.

The act of sliding within the SCB direction quadrant to produce faster or slower scrolling can be replaced with the act of increasing pressure, either on a touch display screen directly, or from a stylus, mouse, or other device. Benefits of this can include reducing the area required by the SCB, allowing more change graduations, easier or more efficient to operate.

More Controls: A depth dimension of scrolling can be added with "pressure" selection technology. Keeping in tact with eight directional capabilities of the SCB described above, "pressure" can add depth directions. Following are examples:

- Limits of the SCB - Touching the SCB "Text Up" area scrolls line-by-line. It can be made to scroll faster as the touch is dragged toward the SCB center. Increments closer to the SCB center can also be programmed to scroll chapters or sections, or articles, or documents, but there is a limit to how many delineations can be put into a small SCB quadrant. So, with pressure, dimension function can reduce demands on the quadrant space.
- Working with a document - When an SCB is associated with a document, it may have SCB increments set to scroll text lines, then paragraphs, then pages as one slide towards its center. With depth direction (pressure increments), one may, while scrolling at page 7, press harder to jump to the next chapter, and harder yet to go to the end. Direction scrolling is momentarily suspended when a pressure threshold is detected.

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- Working with an appointment book - The SCB is dragged from a document to appointments where SCB increments are set to scroll line-by-line, then sliding towards the SCB center, it scrolls faster line-by-line.then appointment-to- appointment, then day-by-day. With depth direction (pressure increments), one may, while at line 2 of 3:30 a.m. of Tuesday, jump to same time and day week-by-week. More pressure might cause month-by-month, and so on.

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APLNDC00004238

Patterns for Effective Interaction Design

Designing Interfaces

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Jenifer Tidwell

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Designing Interfaces
by Jenifer Tidwell

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[C] [4/06]

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82 one-off mode 255

When a mode is turned on, perform the operation once. Then switch back automatically into the default or previous mode.

83 spring-loaded mode 257

Let the user enter a mode by holding down a key or a mouse button. When the user releases it, leave the mode and go back to the previous one.

84 constrained resize 259

Supply resize modes with different behavior, such as preserving aspect ratio, for use under special circumstances.

85 magnetism 261

Make the objects "magnetic" to the things a user positions them against. When the user drags an object very near one of these things, it should stick.

86 guides 263

Offer horizontal and vertical reference lines to help users align objects.

87 paste variations 266

Provide specialized paste functionality in addition to the standard paste operation.

09 MAKING IT LOOK GOOD: VISUAL STYLE AND AESTHETICS 268

Same Content, Different Styles 270

The Basics of Visual Design 279

What This Means for Desktop Applications 287

The Patterns 290

88 deep background 291

Place an image or gradient into the page's background that visually recedes behind the foreground elements.

89 few hues, many values 294

Choose one, two, or at most three major color hues to use in the interface. Create a color palette by selecting assorted values (brightnesses) from within those few hues.

90 corner treatments 297

Instead of using ordinary right angles, use diagonals, curves, or cutouts for some of the interface's box corners. Make these corner treatments consistent across the interface.

91 borders that echo fonts 300

When drawing borders and other lines, use the same color, thickness, and curves used by one of the design's major fonts.

92 hairlines 303

Use one-pixel-wide lines in borders, horizontal rules, and textures.

93 contrasting font weights 306

Use two contrasting fonts—one thin and lightweight, and the other heavier and darker—to separate different levels of information and add visual interest.

94 skins 308

Open up the look-and-feel architecture of your application so users can design their own graphics and styles.

REFERENCES 312

INDEX 318

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85 magnetism

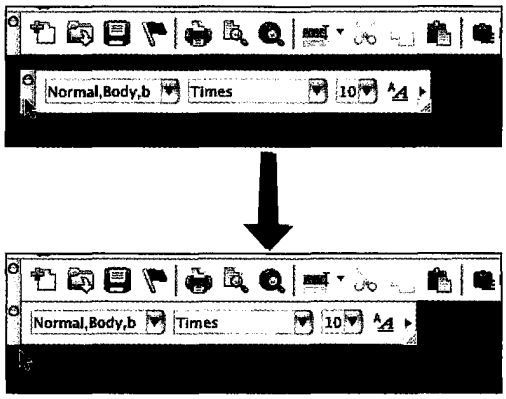

FIGURE 8-14 / A Word toolbar "snapped" into place

what

Make the objects "magnetic" to the things a user positions them against. When the user drags an object very near one of these things, it should stick.

use when

The user needs to position objects very precisely, such as next to other objects or against **Guides**. This often happens in graphic editors, of course, but it's also common in window managers and desktop frameworks, in which a user needs to move windows and palettes, for example.

why

Magnetism helps compensate for users' lack of perfect dexterity with a mouse. If the user really does want the moved object to end up right against another one—and you need to be sure about this—then the computer can help by doing it for her.

What magnetism does is make the mouse "target zone" effectively bigger than it really is. If the user tries to put one thing precisely next to another thing, the target zone is one pixel wide; beyond that, they either overlap or don't touch, and she has to keep trying to position it exactly right. But a one-pixel target is awfully tiny. If magnetism snaps the object into place when the user gets within, say, four pixels of the edge, then the target zone is two times four (i.e., eight) pixels wide. Much easier!

And much faster, too. This device also helps users who do have the dexterity necessary to place objects within one-pixel target zones. Magnetism saves them the time and effort they'd otherwise need to do that, and it makes the application feel more responsive and helpful in general.[2]

how

When the user drags an object close to another object's edge, make it snap to the other object. Likewise, when it's dragged away, keep it there for a few pixels, and then let it move away.

2 Martijn van Welie first described this pattern in his online patterns catalog: *http://www.welie.com/patterns/gui/magnetism.html*.

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Objects that can be "magnetic" might include:

- Objects of the same type as the one moved, such as windows to windows or shapes to shapes.
- Canvas edges, margins, and screen edges.
- **Guides** and grid lines—devices that exist strictly for the purpose of aligning objects with one another.
- Easily detectable "hard edges" in picture layers, as seen in Photoshop.

examples

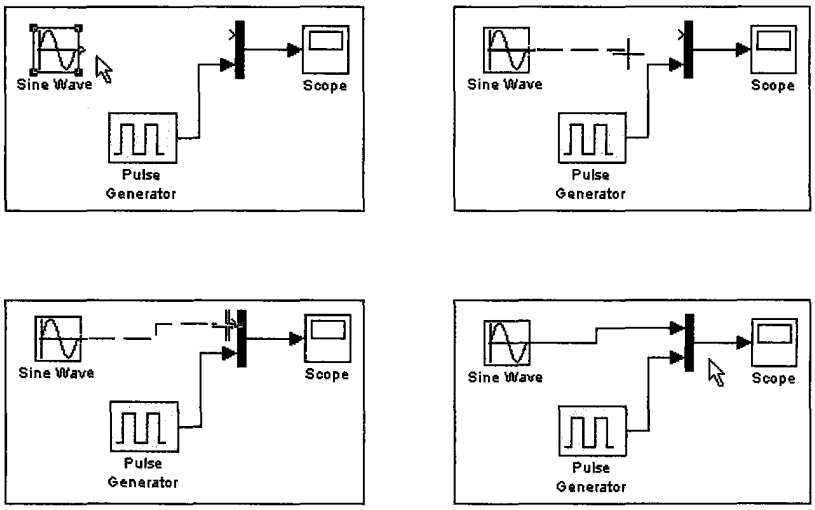

FIGURE 8-15 / Diagram builders and visual programming environments sometimes use magnetism to help the user link together a diagram. Here, you can use the Simulink application to put together a miniature signal-generator simulation. The user needs to connect the output port of the Sine Wave source to an input port of a multiplexer, shown as a dark vertical bar.

Without magnetism, this task would require the user to position the mouse on a very tiny target, click down on the mouse button, and then drag and release the connection to another very tiny target. However, the source output port actually is bigger than the few pixels shown. And as the user drags the connection—illustrated by a dotted line—toward the multiplexer's input port, the connection "snaps" into the input port as the mouse approaches within ten pixels or so. (Simulink even puts corners into the connection automatically.) In the last frame, the user has released the mouse button, finishing the connection.

APLNDC00004243

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
MORGAN LEWIS & BOCKIUS LLP
Attn. Williams, Gary S.
2 Palo Alto Square
3000 El Camino Real, Suite 700
Palo Alto, CA 94306
ETATS-UNIS D'AMERIQUE

INVITATION TO PAY ADDITIONAL FEES AND, WHERE APPLICABLE, PROTEST FEE

(PCT Article 17(3)(a) and Rule 40.1 and 40.2(e))

by fax and post

Date of mailing *(day/month/year)* 18/07/2008	
Applicant's or agent's file reference 63266-5054WO	**PAYMENT DUE** within **ONE MONTH** from the above date of mailing
International application No. PCT/US2008/050292	International filing date *(day/month/year)* 04/01/2008

Applicant

APPLE INC.

1. This International Searching Authority

(i) considers that there are 3 *(number of)* inventions claimed in the international application covered by the claims indicated on an extra sheet:

(ii) therefore considers that **the international application does not comply with the requirements of unity of invention** (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet:

(iii) [X] has carried out a partial international search (see Annex) [ ] will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

see extra sheet

(iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby **invited to pay,** within the time limit indicated above, the amount indicated below:

EUR 1,700.00	x	2	=	EUR 3,400
Fee per additional invention		number of additional inventions		currency/total amount of additional fees

3. The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest,** i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.

Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 750,00 *(currency/amount)*

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so declare.

4. [ ] Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Matthew Davis

Form PCT/ISA/206 (April 2005)

INVITATION TO PAY ADDITIONAL FEES

International application No.
PCT/US2008/050292

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-42

Translating an electronic document or list of items in response to gestures on a touch screen display.

---

2. claims: 43-47

Executing rotation commands in response to a multifinger twisting gesture on a touch screen display.

---

3. claims: 48-73

Scaling of an electronic document in response to a gesture on a touch screen display.

The use of gestures on a touch screen display for translation, rotation and scaling is known, e.g., from document WO2006/020305 (see, e.g., figures 13A-13D, 15A-15C, 11A-11H respectively and the associated text of the description).

The remaining features (i.e., special technical features in the sense of Rule 13.2 PCT) of the independent claims, in particular claims 2, 43 and 63, relate to a) translating in a second direction for aligning a document's edge with an edge of a display region, b) executing a 90° or reverse rotation command, depending on the degree of rotation of the gesture and c) displaying a portion of an electronic document in a predefined magnification, i.e., they relate to different aspects, each peculiar to translation, rotation or scaling respectively.

In conclusion, the groups of claims are not linked by common or corresponding special technical features and define three different inventions not linked by a single general inventive concept.

The application, hence does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

APLNDC00004245

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International Application No
PCT/US2008/050292

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
see 'Invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.

3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.

4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/021676 A1 (CHEN HUNG-MING [TW] ET AL) 5 February 2004 (2004-02-05) the whole document	1-22
Y	WO 03/060622 A (KONINKL PHILIPS ELECTRONICS NV [NL]) 24 July 2003 (2003-07-24) the whole document	23-42
Y	TIDWELL ET AL: "Designing Interfaces" 20051101, 1 November 2005 (2005-11-01), XP002478404 Section "85. magnetism"	1-42
A	WO 2006/020305 A (APPLE COMPUTER [US]; HOTELLING STEVE [US]; STRICKON JOSHUA A [US]; HUP) 23 February 2006 (2006-02-23) page 24, line 1 - page 28, line 10 figures 10-15C	1-42
A	WO 02/01338 A (INTEL CORP [US]; MILLER ALYSON [US]; MERRILL CINDY [US]; LUNDELL JAMES) 3 January 2002 (2002-01-03) page 3, line 5 - page 4, line 12 figures 2-4	1-42

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

APLNDC00004246

Patent Family Annex

Information on patent family members

International Application No
PCT/US2008/050292

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004021676 A1	05-02-2004	TW 591488 B	11-06-2004
WO 03060622 A	24-07-2003	AU 2002367041 A1	30-07-2003
		CN 1695105 A	09-11-2005
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		JP 2008508601 T	21-03-2008
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WO 0201338 A	03-01-2002	AU 6830201 A	08-01-2002
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		TW 525080 B	21-03-2003
		US 6912694 B1	28-06-2005

APLNDC00004247

Electronic Acknowledgement Receipt

EFS ID:	3642591
Application Number:	11956969
International Application Number:	
Confirmation Number:	8460
Title of Invention:	List Scrolling and Document Translation, Scaling, and Rotation on a Touch-Screen Display
First Named Inventor/Applicant Name:	Bas Ording
Customer Number:	61725
Filer:	Robert B. Beyers./Deborah Carney
Filer Authorized By:	Robert B. Beyers.
Attorney Docket Number:	P4304US1/63266-5054US
Receipt Date:	18-JUL-2008
Filing Date:	14-DEC-2007
Time Stamp:	16:13:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	63266-5054US_IDS.pdf	353768 91d484a3c17e49ffc2a6c3698179f46f98d2c6d1	no	7

Warnings:	
Information:	

This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	EP_0635779.pdf	2903584 d7ee8f47ad8910c487409bd897655642b83c5fb7	no	46
Warnings:					
Information:					
3	Foreign Reference	EP_0880091.pdf	514717 2c3729793c1881e53b2fe86d28aa7bf2efe300de	no	10
Warnings:					
Information:					
4	Foreign Reference	WO0201338.pdf	532640 834e9ce4e62942c92743aefac71eaa8cb68c5961	no	19
Warnings:					
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5	Foreign Reference	WO03060622.pdf	369725 93f24c8057f03abcba272b62160d11ae3a828f8d	no	18
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6	Foreign Reference	WO2006020305.pdf	3664165 9fe57df2d39bf78f7b635b290828924ff36e726f	no	88
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7	NPL Documents	ScrollControl.pdf	220530 5e24d6047f896d46f511aa368167c035cd0f1f92	no	6
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8	NPL Documents	Tidwell.pdf	1522215 d16bafdb22e966f09de12926555550bbced6bd25	no	5
Warnings:					
Information:					
9	NPL Documents	Invitation08_050292.pdf	171313 0d1ddffcdd1c2ff0221344310297578cefd5ab11	no	4
Warnings:					
Information:					
			Total Files Size (in bytes):	10252657	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronically filed July 18, 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Bas Ording	Confirmation No.:	8460
Serial No.:	11/956,969	Art Unit:	2174
Filed:	December 14, 2007	Examiner:	Pesin, Boris M.
For:	*List Scrolling and Document Translation, Scaling, and Rotation on a Touch-Screen Display*	Attorney Docket No.:	P4304US1/63266-5054US

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure provisions of 37 C.F.R. §1.56, there is hereby provided certain information which the Examiner may consider material to the examination of the subject U.S. patent application. It is requested that the Examiner make this information of record if it is deemed material to the examination of the application.

1. Enclosures accompanying this Information Disclosure Statement are:

1a. ☒ A list of all patents, publications, applications, or other information submitted for consideration by the office.

1b. A legible copy of :

☒ Each foreign patent;

☒ Each publication or that portion which caused it to be listed on the PTO-1449;

☐ For each cited pending U.S. application, the application specification including the claims, and any drawing of the application, or portion of the application which caused it to be listed on the PTO-1449 including any claims directed to that portion;

☐ all other information or portion which caused it to be listed on the PTO-1449.

1c. ☒ An English language copy of search report(s) from a counterpart foreign application or PCT International Search Report.

1d. ☐ Explanations of relevancy (ATTACHMENT 1(d), hereto) or English language abstracts of the non-English language publications.

APLNDC00004251

2. ☒ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(b):

☐ Within three months of the filing date of a national application other than a continued prosecution application under §1.53(d);

☐ Within three months of the date of entry of the national stage as set forth in §1.491 in an international application;

☒ Before the mailing of the first Office action on the merits;

☐ Before the mailing of a first Office action after the filing of a request for continued examination under §1.114.

3. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(c) after the period specified in 37 C.F.R §1.97(b), but before the mailing date of any of a final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311 or an action that otherwise closes prosecution in the application.

(Check either Item 3a or 3b)

3a. ☐ The Certification Statement in Item 5 below is applicable. Accordingly, no fee is required.

3b. ☐ The $180.00 fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is:
☐ enclosed
☐ to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

(Item 3b to be checked if any reference known for more than 3 months)

4. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(d) after the period specified in 37 C.F.R. §1.97(c), but on or before the date of payment of the issue fee.

(Check either Item 4a or 4b)

4a. ☐ The Certification Statement in Item 5 below is applicable.

4.b ☐ The $180.00 fee set forth in 37 C.F.R. §1.17(p) is:
☐ enclosed.
☐ to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no.).

5. ☐ Certification Statement (applicable if Item 3a or Item 4a is checked)

(Check either Item 5a, 5b or 5c)

5a. ☐ In accordance with 37 C.F.R. §1.97(e)(1), it is certified that each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.

5b. ☐ In accordance with 37 C.F.R. §1.97(e)(2), it is certified that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application,

and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.

5c. ☐ Pursuant to 37 C.F.R. §1.704(d), each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and the communication was not **received** by any individual designated in 37 C.F.R. §1.56(c) more than thirty days prior to the filing of this information disclosure statement.

6. ☒ Copies of each cited U.S. patent and each U.S. patent application publication are not enclosed pursuant to the USPTO OG Notice dated 05 August 2003 waiving the requirement under 37 C.F.R. 1.98(a)(2)(i) for U.S. patent applications filed after June 30, 2003.

7. ☐ This application is a continuation application under 37 C.F.R. §1.53(b) or (d).

(Check appropriate Items 7a, 7b and/or 7c)

7a. ☐ A Petition to Withdraw from issue under 37 C.F.R. §1.313(b)(5) is concurrently filed herewith.

7b. ☐ Copies of publications listed on Form PTO-1449 from prior application Serial No. , filed on , of which this application claims priority under 35 U.S.C. §120, are not being submitted pursuant to 37 C.F.R. §1.98(d).

7c. ☐ Copies of the publications listed on Form PTO-1449 were not previously cited in prior application Serial No. , filed on , and are provided herewith.

8. ☐ This is a Supplemental Information Disclosure Statement. (Check Item 8a)

8a. ☐ This Supplemental Information Disclosure Statement under 37 C.F.R. §1.97(f) supplements the Information Disclosure Statement filed on . A bona fide attempt was made to comply with 37 C.F.R. §1.98, but inadvertent omissions were made. These omissions have been corrected herein. Accordingly, additional time is requested so that this Supplemental Information Disclosure Statement can be considered as if properly filed on .

9. ☐ In accordance with 37 C.F.R. §1.98, a concise explanation of what is presently understood to be the relevance of each non-English language publication is:

(Check Item 9a, 9b, or 9c)

9a. ☐ satisfied because all non-English language publications were cited on the enclosed English language copy of the PCT International Search Report or the search report from a counterpart foreign application indicating the degree of relevance found by the foreign office.

9b. ☐ set forth in the application.

9c. ☐ enclosed as an attachment hereto.

10. ☒ The Commissioner is authorized to charge any additional fee required or credit any overpayment for this Information Disclosure Statement and/or Petition to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 63266-5054-US).

11. ☒ No admission is made that the information cited in this Statement is, or is considered to be, material to patentability nor a representation that a search has been made (other than a search report of a foreign counterpart application or PCT International Search Report if submitted herewith). 37 C.F.R. §§1.97(g) and (h).

Respectfully submitted,

Date: July 18, 2008

Robert Beyers 46,552

Robert B. Beyers (Reg. No.)
MORGAN, LEWIS & BOCKIUS LLP
2 Palo Alto Square
3000 El Camino Real, Suite 700
Palo Alto, CA 94306
(650) 843-4000

APLNDC00004254

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	11/956,969	ORDING, BAS	
	Examiner	Art Unit	
	BORIS PESIN	2174	

All Participants:

(1) *BORIS PESIN*.

(2) *Robert Beyers*.

Status of Application: _____

(3) *Cindy Wheeler*.

(4) _____.

Date of Interview: *4 August 2008*

Time: *1:00*

Type of Interview:
- ☒ Telephonic
- ☐ Video Conference
- ☐ Personal (Copy given to: ☐ Applicant ☐ Applicant's representative)

Exhibit Shown or Demonstrated: ☐ Yes ☐ No
If Yes, provide a brief description:

Part I.

Rejection(s) discussed:

Claims discussed:
All

Prior art documents discussed:
Photo Mesa, and Jeeger

Part II.

SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
See Continuation Sheet

Part III.

☒ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.

☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

/Boris Pesin/
Examiner, Art Unit 2174

(Applicant/Applicant's Representative Signature – if appropriate)

APLNDC00004255

Continuation of Substance of Interview including description of the general nature of what was discussed: The Examiner and the Applicant discussed the proposed amended claims. The Examiner agreed that the proposed amended claims were patentable over the cited art. The Examiner further agreed to make the proposed amended claim via an Examiner's amendment. .

INFORMATION DISCLOSURE CITATION PTO-1449				*Complete If Known*	
				Application Number	11/956,969
				Filing Date	December 14, 2007
				First Named Inventor	Bas Ording
				Art Unit	2174
				Examiner Name	Pesin, Boris M.
Sheet	1	of	1	**Attorney Docket No.**	P4304US1/63266-5054US

U.S. PATENT DOCUMENTS							
Examiner Initials	Cite No.	Document Number Number - Kind Code[1]	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Class	Subclass	Filing Date if Appropriate
		2003/0184525	10-02-2003	Tsai	345	173	
		2004/0155888	08-12-2004	Padgitt et al.	345	619	
		2005/0145807	07-07-2005	Lapstun et al.	250	566	
		2006/0025218	02-02-2006	Hotta	463	37	

FOREIGN PATENT DOCUMENTS								
Examiner Initials	Cite No.	Foreign Patent Document Country Code[2] - Number[3] - Kind Code[4] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Class	Subclass	Translation	
							Yes	No
		EP 0 701 220 A	03-13-1996	Adobe Systems Inc.	G06F	17/21		
		WO 05/052773 A2	06-09-2005	Nokia Corporation	G06F	3/00		
		WO 2006/003591 A	01-12-2006	Konin-Klijke Philips Electronics, N.V.	G06F	3/033		

OTHER NON PATENT LITERATURE DOCUMENTS		
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
		International Search Report and Written Opinion for International Application No. PCT/US2008/050292, mailed September 19, 2008.

Examiner Signature	DB2/20858183.1	Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [2] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [5] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Electronic Acknowledgement Receipt

EFS ID:	4065168
Application Number:	11956969
International Application Number:	
Confirmation Number:	8460
Title of Invention:	List Scrolling and Document Translation, Scaling, and Rotation on a Touch-Screen Display
First Named Inventor/Applicant Name:	Bas Ording
Customer Number:	61725
Filer:	Robert B. Beyers./Deborah Carney
Filer Authorized By:	Robert B. Beyers.
Attorney Docket Number:	P4304US1/63266-5054US
Receipt Date:	06-OCT-2008
Filing Date:	14-DEC-2007
Time Stamp:	15:38:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

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1	Information Disclosure Statement (IDS) Filed (SB/08)	63266-5054US_IDS.pdf	228720 6c0991124e7a6d61fcc42294eafbd9d5a5eaeb1f	no	5

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Information:					
4	Foreign Reference	WO2006003591.pdf	614035 21fb576f995599996ee77378f45d60d40ba17bfa	no	17
Warnings:					
Information:					
5	NPL Documents	ISRUS08_050292.pdf	1134778 f5e5e7df174638ee6b77e86989801e48d4b62e48	no	25
Warnings:					
Information:					
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

WO2006003591

Publication Title:

DISCONTINUOUS ZOOM

Abstract:

Abstract of WO2006003591

In a method and apparatus for zooming on a display device, instead of zooming just on the pixels in the display, zooming is effected on discernable objects comprising pixels in the displayed image. Initially, spaces between the discernable objects is reduced, and then the discernable objects are increased in size until the objects reach a minimum surface area, which is the minimum size, based on the size and resolution of the display, recognizable by a user. Zooming is then suspended until the user selects one of the objects. Zooming is then allowed to continue on only the selected object until the maximum zooming factor is reached.

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 January 2006 (12.01.2006)

PCT

(10) International Publication Number
WO 2006/003591 A2

(51) International Patent Classification[7]: G06F 3/033

(21) International Application Number:
PCT/IB2005/052108

(22) International Filing Date: 24 June 2005 (24.06.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/583,968 29 June 2004 (29.06.2004) US
60/646,087 21 January 2005 (21.01.2005) US

(71) Applicant *(for all designated States except US)*: **KONINKLIJKE PHILIPS ELECTRONICS, N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(71) Applicant *(for AE only)*: **U.S. PHILIPS CORPORATION** [US/US]; 1251 Avenue of the Americas, New York, NY 10020 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **HOLLEMANS, Gerard** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). **KLEINHOUT, Huib V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). **BUIL, Vincent P.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

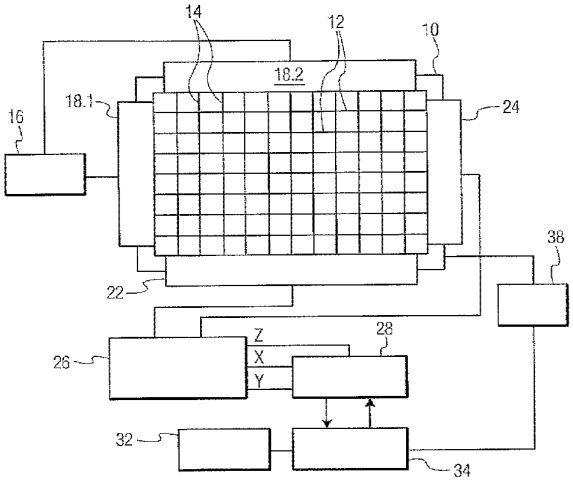
(74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS, N.V.**; c/o Edward W. Goodjman, P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH,

[Continued on next page]

(54) Title: DISCONTINUOUS ZOOM



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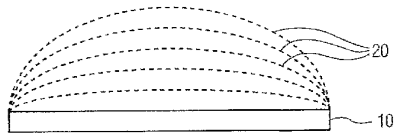

B

(57) Abstract: In a method and apparatus for zooming on a display device, instead of zooming just on the pixels in the display, zooming is effected on discernable objects comprising pixels in the displayed image. Initially, spaces between the discernable objects is reduced, and then the discernable objects are increased in size until the objects reach a minimum surface area, which is the minimum size, based on the size and resolution of the display, recognizable by a user. Zooming is then suspended until the user selects one of the objects. Zooming is then allowed to continue on only the selected object until the maximum zooming factor is reached.

WO 2006/003591 A2

APLNDC00004261

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

APLNDC00004262

DISCONTINUOUS ZOOM

Field Of The Invention

The subject invention relates to zooming, and more particularly, to zooming an image signal containing discernable objects on a display device.

Description Of The Related Art

Zooming is usually applied to enable a user to more easily see the details of items that are presented on a display screen of a display device. It is known from psychology that visual objects in close proximity of the object of attention can be ignored by the brain of a user, but do affect the processing of the object of attention negatively, i.e., they can be partly ignored, but remain distracting. Most zooming functions do not take this into consideration, and zoom continuously in such a way that any displayed pixel is zoomed in. This leads to enlargement of portions of the image having irrelevant information, e.g., spaces between objects on the display screen as well as the objects themselves.

However, in some video images, objects in the image can be discerned but the prior art zooming methods ignore these discernable objects and proceed to zoom on all of the pixels in the display.

It is an object of the invention, when presented with an image signal having discernable objects, to only zoom on the pixels in the discernable objects.

This object is achieved in a method for zooming a video image on a display device, said video image being discernable in a plurality of objects, and said display device having a minimum surface area for objects, said method comprising the steps of displaying a video image on a display screen of a display device, said video image having discernable objects each comprising a plurality of pixels; discerning the objects in said video image; zooming said video image by reducing the area of any spaces in the video image not included in said discernable objects, and increasing the sizes of said discerned objects until said discerned objects have said minimum surface area; discontinuing said zooming until a user selects one of said discerned objects; detecting the user's selection out of said discerned objects; and zooming only on the selected discerned object.

The above object is also achieved in an apparatus for zooming a video image on

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a display device, said video image being discernable in a plurality of objects, and said display device having a minimum surface area for objects, said apparatus comprising a video image processor for displaying a video image on a display screen of a display device, said video image having discernable objects each comprising a plurality of pixels; means for discerning the objects in said video image; means for zooming said video image by reducing the area of any spaces in the video image not included in said discernable objects, and increasing the sizes of said discerned objects until said discerned objects have said minimum surface area, and for generating a status signal; means for discontinuing said zooming upon receipt of said status signal; means for detecting the user's selection out of said discerned objects; and means for continuing zooming only on the selected discerned object.

Applicants have found that instead of zooming on all displayed pixels, zooming may be applied to only the pixels in visual objects, such as buttons, as is done in some applications. So far, this has been used to enlarge elements of user interfaces that are then more easily accessible for users to operate on. Applicants propose to apply the same principle to displayed text that is encoded in XML, or a derivative, such as HTML.

XML, and HTML, pages can be structured such that objects of text, e.g., the main body, an advertisement banner, the navigation section, can be identified. Even if these pages are not purposely structured so that these elements can be recognized, it is possible to do so with simple analysis of the document, e.g., extracting the tables from an HTML page.

Once the page can be divided into objects as well as pixels (of the page and of the objects), an input of the user on the zoom factor (i.e., a user request the zoom in or out) may now be translated into changes in what is being displayed. When the whole page fits the screen such that the individual objects are meaningfully selectable, i.e., the user is able to see what he/she is selecting, the user is then able to select the desired object, and zooming is continued based on the selected object.

Ordinarily, zooming is usually provided since the screen is too small for a user to operate on the individual elements without zooming, while an overview of the image is meaningful to determine a general direction of panning and/or zooming. For these cases, the discontinuous zooming of the subject invention is helpful. The zooming first works on the whole page up to a point where the user can select an object to zoom in, at which point zooming stops. Once the user has selected an object of interest, other objects are left out from

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the display and the zooming works on the selected object.

The zoom factor must be determined at which to require the user to make a selection. Since this depends on the size of the page and the absolute and relative sizes of the objects on the page, the zoom factor at which the user has to choose an object cannot be a fixed factor for all pages. For a given screen size, the average minimum surface area can be derived for an object to be recognized. Thus, in the zooming processing, all of the "white space", i.e., non-object space, is reduced, then the zooming process continues by zooming the objects until all objects that are being displayed have the minimum surface area as determined. At this point, zooming is suspended pending the user selecting on object to zoom in on.

In an embodiment of the method and apparatus of the invention, the increasing in size of each of the discerned objects stops when the size of the relevant discerned object reaches said minimum surface area. If the sizes of the displayed objects are too different, one object could fill the screen almost completely before another object has the minimum required surface area. As such, the subject invention stops increasing the size of an object when that object reaches the minimum surface area. This allows sufficient space for other smaller objects to be zoomed in order to reach the minimum surface area.

In another embodiment of the method and apparatus of the invention, the object selected by the user is highlighted. This provides a feedback to the user as to which object has been selected.

With the above and additional objects and advantages in mind as will hereinafter appear, the invention will be described with reference to the accompanying drawings, in which:

Fig. 1A is a block diagram of a display device having a capacitive sensor array incorporated therein;

Fig. 1B is a diagram showing the detection lines of the sensor array of Fig. 1A;

Fig. 2 is a diagram showing the detection zone extending from the surface of the display screen;

Figs. 3A-3D show various stages of zooming of objects on the display screen of the display device;

Fig. 4 shows a graph of the zoom factor versus the distance from the display screen; and

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Fig. 5 shows an illustration of a portable video device in which zooming is controlled by keys.

The subject invention makes use of a 3-D display, that is, a display that is capable of detecting the horizontal and vertical position of a pointer, stylus or a user's finger with respect to the surface of the display screen, as well as the distance of the pointer, stylus or user's finger from the surface of the display screen. There are various known types of 3-D displays using, for example, infrared sensing, capacitance sensing, etc. One type of a 3-D display is disclosed in U.S. Patent Application Publication No. US2002/0000977 A1, which is incorporated herein by reference.

As shown in Fig. 1A, a display screen 10 has superimposed thereon a grid of electrically conductive transparent conductors in which the horizontal conductors 12 are electrically isolated from the vertical conductors 14. A voltage source 16 connected to connection blocks 18.1 and 18.2 applies a voltage differential across the horizontal and vertical conductors 12 and 14. This arrangement develops a detection field 20 extending away from the surface of the display screen 10 as shown in Fig. 1B, with the horizontal and vertical conductors 12 and 14 acting as plates of a capacitor.

When, for example, a user's finger enters the detection field 20, the capacitance between the conductors 12 and 14 is affected and is detected by X-axis detector 22, connected to the vertical conductors 14 and the Y-axis detector 24, connected to the horizontal conductors 12. A detector signal processor 26 receives the output signals from the X and Y detectors 22 and 24 and generates X, Y coordinate signals and a Z distance signal. The X and Y coordinate signals and the Z distance signal are applied to a zoom controller 28.

In addition, as shown in Fig. 1A, an image signal source 32 supplies an image signal to an image signal processor 34, which also receives a zoom control signal from the zoom controller 28. The output signals from the image signal processor 34 is supplied to a display controller 38 which then applies video signals to the display screen 10.

As shown in Fig. 2, the zoom controller 28 establishes a zone A extending in the Z direction (dual-headed arrow 40) from the surface of the display screen 10. The zone A denotes a zone in which, when the user's finger 42 passes a threshold distance 44, the user's finger 42 is detected and zooming is initiated.

Fig. 3A shows a display screen 10 in which a video image contains discernable

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objects 50, 52, 54 and 56 of varying sizes separated by spaces 58. These objects are detected in the image signal processor 34. Once the zooming process commences (e.g., the user moves his/her finger 42 towards the display screen 10 past the threshold 44), the image signal processor 34, in response to zoom control signals from the zoom controller, reduces the size of the spaces 58 between the objects 50-56, as shown in Fig. 3B. Then, the image signal processor 34 increases the sizes (zooms) the objects 50-56 until they reach a minimum surface area (see Fig. 3C). This minimum surface area is predetermined by the size and resolution of the display screen 10 and represents a minimum size of an object at which the object may be discerned by a viewer. At this point, the image signal processor 34 signals the zoom controller 28 and zooming process is suspended (i.e., further movement of the user's finger toward the display screen 10 is ignored) until the user selects one of the objects. With the 3-D touch display, this may involve the user moving his/her finger in the X/Y direction and selecting the object by, for example, slightly retracting his/her finger. As shown in Fig. 3C, the image signal processor 34 may highlight the selected object 54. At this point, the zooming process is allowed to continue with the selected object 54 increasing in size while the unselected objects 50, 52 and 56 drop off the screen.

Fig. 4 shows a graph illustrating the zooming process in which the X axis is the distance from the display screen 10 and the Y axis is the zoom factor. Until the user's finger 42 passes the threshold 44, the zoom factor curve 60 assumes a predetermined minimum value. Once the user's finger 42 passes the threshold 44, zooming factor curve 60 begins to increase with the reduction in the spaces followed by the increase of the surface areas of the objects. At distance 62, when all of the objects have reached the minimum surface area, changes in the zooming factor curve 60 is suspended while allowing the user to select one of the objects. At that point as indicated by distance 64, zooming continues on the selected object up to the maximum zoom factor at distance 66.

In the case where the objects 50-56 greatly vary in size, during the process of increasing the size of the objects, the larger object(s) may reach and surpass the minimum surface area well before the smaller object(s). In order to prevent these larger objects from dominating the display screen 10 prior to the smaller objects attaining the minimum surface area, as soon as each object achieves the minimum surface area, zooming on that particular object is suspended while zooming continues on the smaller object(s).

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While the subject invention has been described as embodied in a 3-D touch display device, this is not necessarily the case. A portable display device 70 is shown in Fig. 5 and has a display screen 72. The portable display device 70 has a plurality of keys 74 enabling a user to control the various functions. Among the keys 74 are a "-" key 76 and a "+" key 78 which may be used to control zooming. In particular, zooming commences when the user presses and holds down the "+" key 78. Again, first the spaces are reduced and then the surface areas of the objects are increased until the objects have the minimum surface area. Zooming is then suspended even though the user may continue to press the "+" key 78. Using the keys 74, the user selects one of the objects, and then when the user presses and holds down the "+" key, zooming is continued on the selected object until the zooming reaches the maximum zooming factor.

Although this invention has been described with reference to particular embodiments, it will be appreciated that many variations will be resorted to without departing from the spirit and scope of this invention as set forth in the appended claims. The specification and drawings are accordingly to be regarded in an illustrative manner and are not intended to limit the scope of the appended claims.

In interpreting the appended claims, it should be understood that:

a) the word "comprising" does not exclude the presence of other elements or acts than those listed in a given claim;

b) the word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements;

c) any reference signs in the claims do not limit their scope;

d) several "means" may be represented by the same item or hardware or software implemented structure or function;

e) any of the disclosed elements may be comprised of hardware portions (e.g., including discrete and integrated electronic circuitry), software portions (e.g., computer programming), and any combination thereof;

f) hardware portions may be comprised of one or both of analog and digital portions;

g) any of the disclosed devices or portions thereof may be combined together or separated into further portions unless specifically stated otherwise; and

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h) no specific sequence of acts is intended to be required unless specifically indicated.

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CLAIMS:

1. A method for zooming a video image on a display device, said video image being discernable in a plurality of objects, and said display device having a minimum surface area for objects, said method comprising the steps of:

displaying (32, 34, 38) a video image on a display screen (10) of a display device, said video image having discernable objects (50, 52, 54, 56) each comprising a plurality of pixels;

discerning (34) the objects in said video image;

zooming (28, 34) said video image by reducing the area of any spaces (58) in the video image not included in said discernable objects (50, 52, 54, 56), and increasing the sizes of said discerned objects (50, 52, 54, 56) until said discerned objects have said minimum surface area;

discontinuing said zooming until a user selects one (54) of said discerned objects (50, 52, 54, 56);

detecting the user's selection (54) out of said discerned objects; and

zooming (28, 34) only on the selected discerned object (54).

2, The method as claimed in claim 1, wherein after said detecting step, said method further comprises the step of:

removing, from the video image, the discerned objects (50, 52, 56) other than said selected discerned object (54).

3. The method as claimed in claim 1, wherein in said first zooming (28, 34) step, the increasing in size of each of the discerned objects (50, 52, 54, 56) stops when the size of the relevant discerned object reaches said minimum surface area.

4. The method as claimed in claim 1, wherein said video image is encoded in XML or HTML object based format.

5. The method as claimed in claim 1, wherein said detecting step comprises

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highlighting a perimeter of said selected discerned object (54).

6. The method as claimed in claim 1, wherein said display device (10) is a 3-D virtual touch display device, and zooming is effected by detecting (22, 24, 26) the position and distance (Z) of a user's finger (42) on and from a display surface (10) of the display device.

7. An apparatus for zooming a video image on a display device, said video image being discernable in a plurality of objects, and said display device having a minimum surface area for objects, said apparatus comprising:

a video image processor (34) for displaying a video image on a display screen (10) of a display device, said video image having discernable objects (50, 52, 54, 56) each comprising a plurality of pixels;

means (34) for discerning the objects (50, 52, 54, 56) in said video image;

means (28, 34) for zooming said video image by reducing the area of any spaces (58) in the video image not included in said discernable objects (50, 52, 54, 56), and increasing the sizes of said discerned objects (50, 52, 54, 56) until said discerned objects have said minimum surface area, and for generating a status signal;

means for discontinuing said zooming upon receipt of said status signal;

means for detecting the user's selection (54) out of said discerned objects (50, 52, 54, 56); and

means for continuing zooming only on the selected discerned object (54).

8. The apparatus as claimed in claim 7, wherein said apparatus further comprises::

means for removing, from the video image, the discerned objects (50, 52, 56) other than said selected discerned object (54) in response to said detecting means detecting the user's selection..

9. The apparatus as claimed in claim 7, wherein said zooming means (28, 34) increases the size of each of the discerned objects (50, 52, 54, 56) until the size of the relevant discerned object reaches said minimum surface area.

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10. The apparatus as claimed in claim 7, wherein said video image is encoded in an XML or HTML object based format.

11. The apparatus as claimed in claim 7, wherein said detecting means highlights said selected discerned object (54).

12. The method as claimed in claim 7, wherein said display device (10) is a 3-D virtual touch display device, and said zooming means detects (22, 24, 26) the position and distance (Z) of a user's finger (42) on and from a display surface (10) of the display device.

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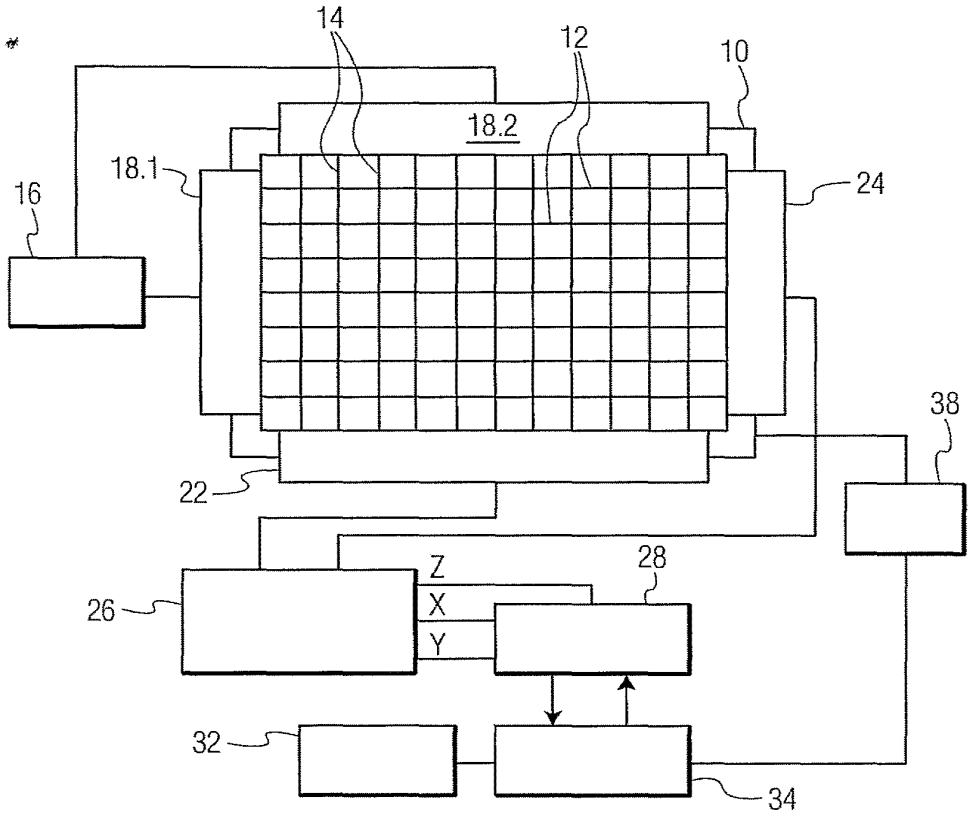

FIG. 1A

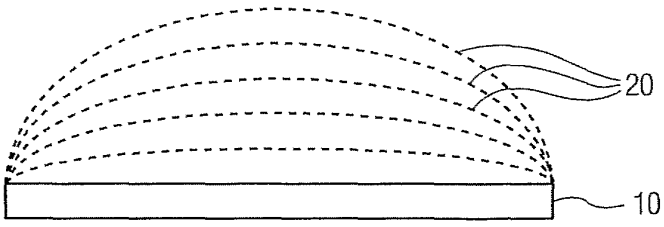

FIG. 1B

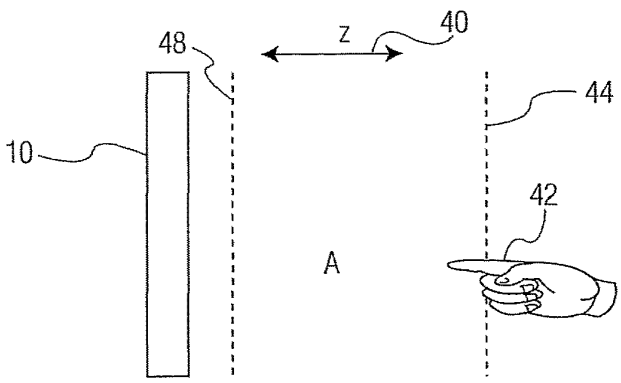

FIG. 2

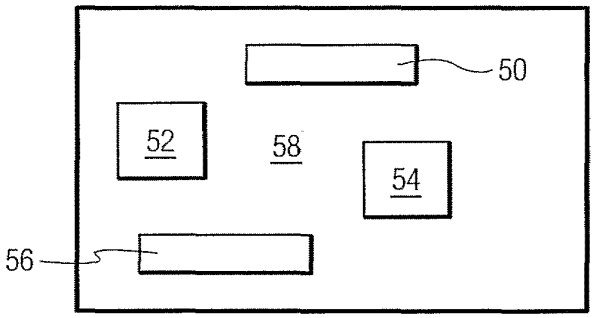

FIG. 3A

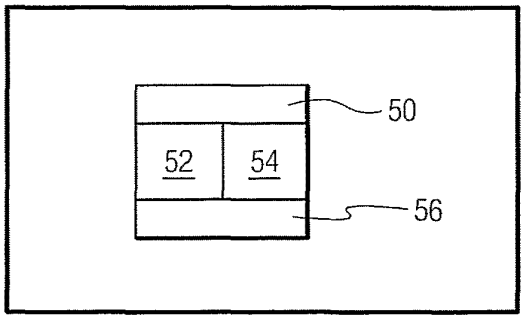

FIG. 3B

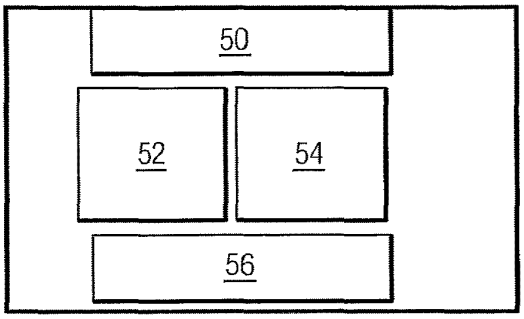

FIG. 3C

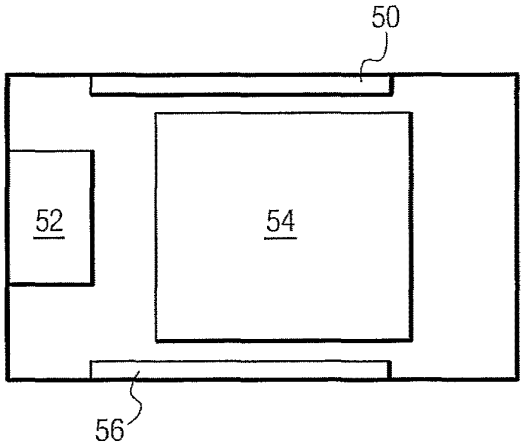

FIG. 3D

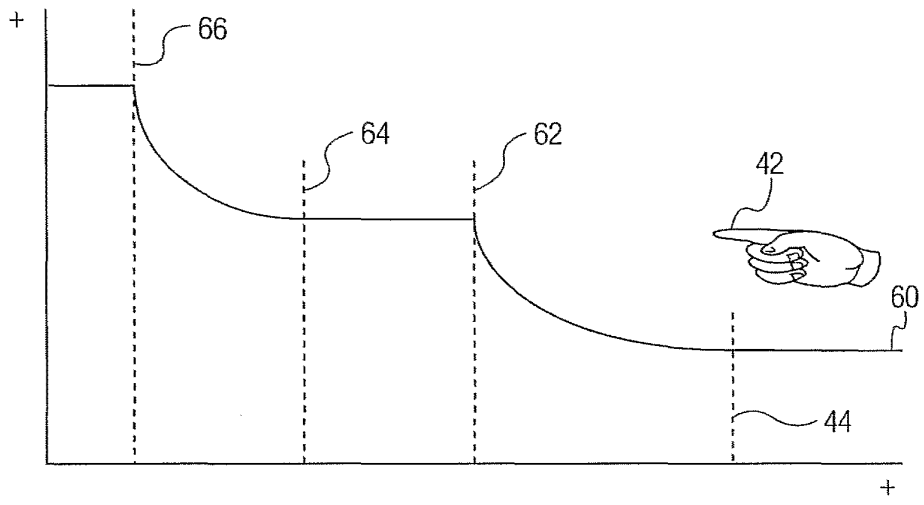

FIG. 4

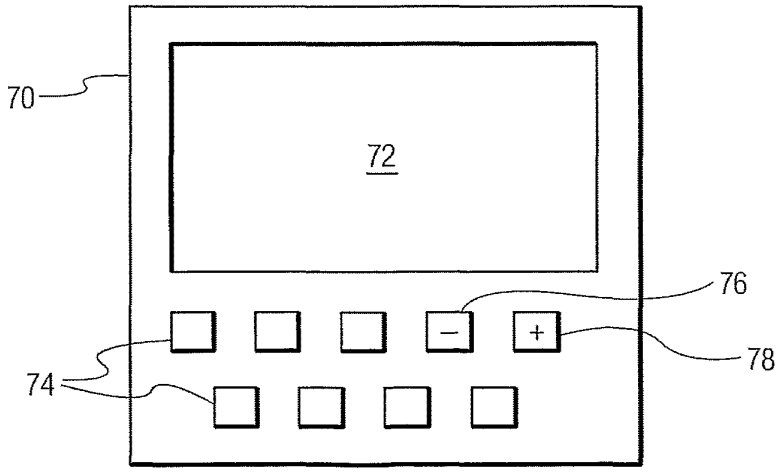

FIG. 5

EP0701220

Publication Title:

Method and apparatus for viewing electronic documents

Abstract:

Abstract of EP0701220

A reader for displaying an electronic document provided in a predetermined format and allowing articles of the document to be read in the direction of their content information flow. The reader includes a selector to select an article of the document to be read. A displayer displays a first portion of the article in a manner which promotes comfortable viewing, and a navigator permits the display of the next and remaining sequential portions of the article in content flow (or reverse content flow) order. Preferably, the displayer pans and zooms, as necessary, to position the article portion in an article viewing window. A method for viewing electronic documents on a digital computer includes the steps of storing in the memory of the digital computer an electronic document, selecting an article to be displayed on an output device of the digital computer in an article view, displaying at least a portion of the article in the article viewing mode on the output device, and using an input device of the digit 1034 al computer to cause a display of additional portions of the article to be displayed on the output device in the article viewing mode. These additional portions of the article are determined, at least in part, by predefined article sections and section links of the document so that the thread of the article can be followed in forward and reverse directions. <MATH>

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(54) Method and apparatus for viewing electronic documents

(57) A reader for displaying an electronic document provided in a predetermined format and allowing articles of the document to be read in the direction of their content information flow. The reader includes a selector to select an article of the document to be read. A displayer displays a first portion of the article in a manner which promotes comfortable viewing, and a navigator permits the display of the next and remaining sequential portions of the article in content flow (or reverse content flow) order. Preferably, the displayer pans and zooms, as necessary, to position the article portion in an article viewing window. A method for viewing electronic documents on a digital computer includes the steps of storing in the memory of the digital computer an electronic document, selecting an article to be displayed on an output device of the digital computer in an article view, displaying at least a portion of the article in the article viewing mode on the output device, and using an input device of the digital computer to cause a display of additional portions of the article to be displayed on the output device in the article viewing mode. These additional portions of the article are determined, at least in part, by predefined article sections and section links of the document so that the thread of the article can be followed in forward and reverse directions.

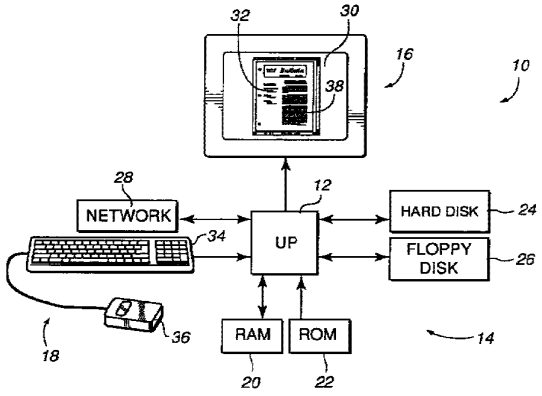

Fig. 1

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Description

Background of the Invention

Field of the Invention

This invention relates generally to the creation, distribution and display of electronic documents and more particularly to the viewing of electronic documents.

Description of the Related Art

In this "information era", it has become increasingly common to create, transmit, and display documents in electronic form. Electronic documents have a number of advantages over paper documents including their ease of transmission, their compact storage, and their ability to be edited and/or electronically manipulated.

An electronic document typically has information content (such as text, graphics, and pictures) and formatting information which directs how the content is to be displayed. With recent advances in multimedia technology, documents can now also include sound, full motion video, and other multimedia content.

An electronic document is provided by an author, distributor or publisher (hereafter "publisher") who often desires that the document be viewed with the appearance with which it was created. This, however, creates a problem in that electronic documents are typically widely distributed and, therefore, can be viewed on a great variety of hardware and software platforms. For example, the video monitors being used to view the document can vary in size, resolution, etc. Furthermore, the various software platforms such as DOS, Microsoft Windows™, and Macintosh™ all have their own display idiosyncrasies. Also, each user or "reader" of the electronic document will have his or her own personal viewing preferences, which should be accommodated, if possible.

A solution proposed for this problem is to provide the content information of an electronic document without a predetermined final format. The content information then can be dynamically formatted (including the creation of line breaks, page breaks, etc.) as it is read by the user. Examples of this solution include the Standard Generalized Mark-Up Language (SGML) and the Office Document Architecture (ODA), both of which emerged through government/military standardization efforts.

The aforementioned proposal has never gained wide-spread acceptance. One reason is that formatting complex documents "on the fly" can be slow and can, in practice, produce results that may be aesthetically unpleasant. Another is that when publishers distribute documents, they intend that the documents have a particular appearance for its readers. Solutions which involve dynamic document formatting suffer from the undesired result that the publisher can't control the final appearance of the document. This may be adequate for some content information (such as technical proposals or informal memos), but for the bulk of business and artistic communication, presentation may be a critical factor.

A partial solution to this problem is to provide a document in a predetermined format where the appearance of the document as viewed by a reader is as it was intended by the publisher. One such predetermined format is the Portable Document Format™ (PDF™) developed by Adobe Systems, Inc. of Mountain View, California. An example of software for creating and reading PDF documents is the Acrobat™ software, also of Adobe Systems, Inc. The Adobe Acrobat software is based on Adobe's PostScript® technology which describes formatted pages of a document in a device-independent fashion. However, PostScript technology is not well suited to the aforementioned dynamic reformatting process.

Electronic documents often include one or more articles. For example, a newsletter may include a main article and several secondary articles. Not infrequently, the articles are broken into various sections which may be scattered throughout the document. For example, a main article might start on page one of a newsletter, and conclude on pages three and four of the newsletter. It is therefore apparent that documents transmitted in a predetermined format (such as PDF) may include article sections that are physically separated within the document. This can make the reading of a particular article difficult. While prior software, such as the aforementioned Adobe Acrobat™ software, may include a rich set of pan and zoom options, it can still be difficult to read an article in content flow order to follow the "thread" of the article. Other software, including publishing software such as Personal Press™ of Adobe Systems, Inc. permits columns of an article to be "chained" together, but does not aid a reader in reading the article.

Summary of the Invention

The present invention permits an article of a electronic document to be read in content flow order. A reader can therefore follow the "thread" of the article in a convenient, easily comprehended fashion. As the reader navigates through the article, the appropriate portions of the article are automatically panned and zoomed into a reading area of a display window to enhance the readability of those portions of the article.

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More particularly, an electronic document viewer of the present invention includes a digital computer system and an electronic document stored in the memory of the computer system. The document includes both article section information and section link information. A computer implemented process determines a desired view mode from a group of pre-defined view modes that include a normal view and an article view. When in the normal view mode, the document viewer displays at least a portion of the document on a computer screen that has the formatting and appearance intended by the publisher of the document. When in the article view mode, at least a portion of a selected article is displayed on the computer screen in an enhanced article view which facilitates in the comfortable reading of the document. Also, when in the article view, the reader can navigate through the article in forward and reverse content flow order by using the article section information and the section link information of the electronic document.

An electronic document system of the present invention includes a document generator and a document reader. The document generator creates a document including one or more articles, each of which has one or more article sections. The document also includes information concerning section links between consecutive sections within a particular article. The document reader can preferably display the document in at least the aforementioned normal view mode and article view mode. When in the article view mode, the document reader makes use of article section information and link information to display portions of the article in an article reading area or window in such a manner that the entire article can be read regardless of the physical arrangement of any article section within the document.

A method for displaying an article of a document on a screen of a computer system in accordance with the present invention includes the steps of: (a) selecting an article for display from within a document stored in the memory of a computer system; (b) determining an initial view pointer which points to an initial portion of the article to be viewed; (c) displaying, as indicated by the view pointer, at least the portion of the article within an article view area of the screen, in a manner to enhance its readability; (d) changing the view pointer; and (e) repeating steps c and d to view other portions of the article. The article can be selected by a variety of modes including selecting an article from a list of articles displayed on the screen, or selecting a visible portion of an article from a document being displayed in the normal view. Preferably, the displaying step causes the selected portion of the article to be automatically sized within the article view area to enhance its readability. This is often referred to as a "zoom." Also, the selected portion is preferably automatically fitted to the window in an operation known as a "pan."

An advantage of the present invention is that an electronic document can be viewed with the appearance of the originally created document. Specific articles within the document can be viewed in an article viewing mode in forward or reverse content flow order. Furthermore, selected portions of the article are automatically panned and zoomed to fit a viewing area or window to enhance the readability of the article.

These and other advantages of the present invention will become apparent to those skilled in the art upon a reading of the following descriptions of the invention and a study of the several figures of the drawing.

Brief Description of the Drawings

Fig. 1 is a block diagram of an electronic document viewer in accordance with the present invention;

Fig. 2 is a flow diagram illustrating a process for creating and viewing a document in accordance with the present invention;

Fig. 3 is a flow diagram illustrating the "Create a Document" step 44 of Fig. 2;

Figs. 3a-3f are illustrations used to illustrate, by way of example, the process of Fig. 3;

Fig. 4 is a flow diagram of the "Display And/Or Navigate Article View" step 50 of Fig. 2;

Figs. 4a-4e are illustrations used to illustrate, by way of example, the process of Fig. 4;

Fig. 5 is an illustration of a circular linking structure for article sections in accordance with the present invention;

Fig. 6 illustrates the "Reset Pointer" step 114 of Fig. 4;

Fig 7 is a flow diagram the "Set Pointer" step 148 of Fig. 6; and

Fig. 8 is a flow diagram of the "Set Pointer" step 150 of Fig. 6.

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Detailed Description of the Preferred Embodiments

An electronic document viewer 10 in accordance with the present invention includes a digital processor 12, memory 14, a visual output device such as computer monitor 16, and an input device 18. Certain memory devices 14, computer monitor 16, and input devices 18 are referred to as "peripherals" because they perform peripheral functions for the digital processor 12. Typically, these peripherals are coupled to the microprocessor 12 by electronic interfaces including input/output I/O ports, direct memory access (DMA) circuitry, registers, etc. which have not been included in the block diagram of Fig. 1 because such interfaces are well known to those skilled in the art.

The digital processor 12 is preferably a single chip microprocessor or central processing unit (CPU), such as an 80486™ or Pentium™ processor available from Intel Corporation of Santa Clara, California, a 68040 or PowerPC™ microprocessor available from Motorola, a SPARC microprocessor available from Sun Microsystems of Mountain View, California, etc. The purpose of the microprocessor 12 is to provide the core digital processing for the electronic document viewer 10 of the present invention, and includes various arithmetic, logic, and control functions well known to those skilled in the art.

Memory 14 of the digital computer system 10 includes number of types of memory storage devices which can provide memory storage locations accessible by the digital processor. Therefore, as used herein, "memory" includes RAM memory 20, ROM memory 22, hard disk memory 24, floppy disk memory 26, and any other memory storage location accessible by the digital processor 12 either directly, through an intermediary, or by a peripheral. For example, additional memory may be provided in memory registers, flip-flops, latches, in VRAM associated with the monitor 16, memory locations on a network 28, cache memory, etc. The purposes of memory 14 include providing temporary or "scratch pad" memory, (e.g. RAM 20), semi-permanently stored memory (e.g. hard disk 24 and floppy disk 26), and permanently stored memory (such as ROM 22).

The monitor 16 is coupled to the microprocessor and includes a screen 30 upon which an image 32 can be displayed. Typically, the monitor 16 is a raster-type device (such as a video monitor or a liquid-crystal display panel) having a matrix of picture elements or "pixels" which can be selectably activated to create the image 32. The monitor 16 is a primary method for displaying a document (such as portrayed by the image 32) of the present invention, although other output devices such as printers can also be used.

Input device 18 in the present embodiment includes a keyboard 34 and an electro-mechanical or optical mouse 36. The input device 18 can be used to input information which is acted upon by the digital processor 12 to control a cursor 38 or other pointer on the screen 30 of monitor 16. Other pointer mechanisms such as trackballs, electronic pens, input tablets, etc. are considered to be equivalents of the mouse 36. The interaction of the input device 18 with a document displayed on the monitor 16 will be discussed in greater detail subsequently.

In Fig. 2, a process 40 for creating and viewing documents begins at 42 and continues in a step 44 with the creation of a document including article sections and section links. Next, in a decision step 46, it is determined in which view the document is to be opened. This can be determined by a default (e.g. always open in "normal view"), by opening the document with the same view in which it was closed, by asking the reader, or by determining a proper opening view determined by the publisher of the document. If the view mode is determined to be a normal view, a step 48 is used to display and/or navigate in the normal view, after which process control is returned to step 46. If the view mode is determine to be an article view, a step 50 displays and/or navigates the article in article view. Again, process control is return to step 46 after the completion of step 50. Finally, if other views are desired, those views are displayed and/or navigated in this "other" view in a step 52, after which process control is again returned to decision step 46 to allow the user to view the document in a different view mode. The process 40 is terminated by an appropriate exit command in response to a user input or, optionally, under automated control of the method 40.

In Fig. 3, the step 44 of Fig. 2 "Create a Document" is described in greater detail. The process of step 44 begins at 54 and, in a step 56, a source document is created. Next, in a step 58, the source document is preferably converted into a Portable Document Format (PDF) document. A decision step 60 then permits a user to edit the document reading information. If the author or publisher wishes to edit the article thread, a step 62 is performed to edit the article sections and/or the section links. Process control is then returned to step 60. Alternatively, other edits not germane to the discussion of the present invention are also possible, which can be processed in a step 64, after which process control is once again returned to decision step 60. If the publisher has completed the editing process, the PDF document 66 is then output in a step 68, and the process of step 44 concludes at 68. The PDF document output by step 68 can be stored, transmitted, or otherwise distributed in a number of fashions well known to those skilled in the art. For example, the PDF document can be stored in the RAM memory of a computer, on a computer hard disk, on a floppy disk, on a CD-ROM, can be transmitted over a network or via modem, etc.

The process of step 44 will be discussed by way of example with reference to the illustrations of Figs. 3a-3f. In Fig. 3a, a document 70 is displayed within a window 72 on a computer screen 74 of a computer monitor. In this instance, the document 70 is the first page of a newsletter which has been created using Aldus Personal Press 2.0 from Adobe Systems, Inc. The Aldus Personal Press 2.0 software which created the document 70 is but one example a type of software which can create a document including articles, such as an article 75. Other software packages include word

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processors (such as Microsoft Word™ of Microsoft Corporation of Redmond, Washington, WordPerfect™ of Word Perfect Corporation of Orem, Utah, etc.), page layout programs (such as PageMaker™ of Adobe Systems, Inc.), desk top publishing programs, etc.

Once a source document has been created by step 56, it is converted into a Portable Document Format (PDF) document by step 58. Such a PDF document is shown in Fig. 3b. More particularly, a PDF document 76 is shown within a window 78 on a computer screen 80. It should be noted that the PDF document 76 has the formatting and appearance of the originally created document 74 of Fig. 3a after the document 74 has been printed. In fact, in the present invention, the PDF article 76 is created by a printer driver accessed by the software which created the original document 70. In other words, the Aldus Personal Press 2.0 software utilizes a PDF printer driver to "print" to disk the PDF document 76. This process of creating a PDF document 76 from an original document 70 is known, and is practiced by the aforementioned Adobe Acrobat™ software program, among others.

The process of step 62 "Edit Article Sections And/Or Section Links" will be discussed with reference to Figs. 3c-3f. As noted in Fig. 3c, the document 76 in window 78 includes a number of items including a masthead 82, a contents section 84, and a portion of an article 86. These "items" or "objects" are viewed as the publisher intended to, i.e. the content, arrangement, format, and appearance of the document 76 reflects the desired presentation by publisher.

Assume that the document 76 includes two pages, and that the article 86 is provided in three columns on those two pages. The present invention allows the article 86 to be read in forward or reverse content flow directions to facilitate in the efficient and comfortable reading of the article.

At this point it would be useful to define some of the terms being used in the specifications. Throughout the specification, the expression "document," "electronic document," "document content information," and the like are used somewhat interchangeably to denote a collection of information (such as text and graphical elements) and potentially including multimedia content (such as sound or video) as well as control elements such as hyperlinks or stored control programs or scripts. The term "article" is used to denote a logically related and ordered portion of the information in the document. When referring to "content flow," it is meant herein the logical ordering of information within an article irrespective with the physical ordering of information in a particular layout of the document and irrespective of the physical ordering of information in any digital representation of the document. Throughout the specification the expression "layout" and "format" are used somewhat interchangeably to denote the process of determining a particular physical relationship and appearance for document content information. For example, layout and format information determine line breaks, hyphenation, and justification for text, and determine size and relative positioning of graphical elements. The process of "laying-out" or "formatting" generally includes dividing some or all of the document information into sets of pages of a particular size. When used as nouns, "layout" and "format" denote an output of the layout and format processes, e.g. for some document a particular physical arrangement of some or all of its constituent information. As used herein, "column" is used to denote a portion of a page containing part or all of the information in an article within a particular layout of a document. A column is frequently, but not necessarily rectangular and, therefore, can be said to be bounded by a rectangle or "bounding box." When referring to a column, the term "origin" is used to denote the initial part of information within a column, and the term "width" is used to denote the physical width of a column, in reading order. The specific geometric interpretation of these terms may be system, article content, layout dependent, and written language dependent. For example, some certain languages are read from right to left or bottom to top. However, as discussed herein, the present invention is preferably used in conjunction with Roman alphabetic text where the reading order is left to right and top to bottom. In this context, the origin of a column is therefore the geometric top left of its rectangle and the width of a column is the left-to-right width of its rectangle. An "article section" is a part of an article that is coupled to another article section by an "article thread", which is an imaginary thread or line along the content flow of an article. An article section can be either shorter, longer, or the same height as a window in which it is displayed. An "article portion" is a part of an article that is displayed within a window. Therefore, an "article portion" can be either shorter, longer, or the same length as an article section. Typically, however, article sections are longer than the window in which they are displayed and, therefore, longer than the article portions.

With continuing reference to Fig. 3c, an article thread is developed with an appropriate tool. In this instance, the tool is accessed from a pull-down menu (not shown) under the label "Tools" which has an article tool selection for creating article sections and links. The selection of the article tool of the pull-down menu creates an cursor 88 on the screen 80 which can be used to create a bounding box 90. More particularly, a pointing mechanism (such as mouse 36) can be used to initially position the cursor 88 at a position 88a and to then "drag" the cursor to its final position at 88 to create the bounding box 90 shown in broken lines. This action allows a user to manually create a first article section 92 as shown in Fig. 3d. In the present invention, the article section 92 created by the aforementioned process includes a header 94 including information about the article and article section. In this instance, the article 94 indicates "1-1" which indicates that this is article number one, and section number one. The cursor 88 is then used to create additional article sections 96 and 98 having headers 100 and 102, respectively (see Fig. 3e). The header 100 indicates that article section 96 is the second article section of article number one, and article header 102 indicates that article section 98 is the third article section of article number one.

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If the document 76 includes more than one article, the article tools from the tools pull-down menu (not shown) can be accessed again to turn off the article section selection mode and then it can be thereafter selected again to repeat the article selection process for additional articles. In fact, within practical limits, any number of articles can be provided with any number of article sections. It should also be noted that the article sections do not need to be full columns but, rather can be portions of the column, for example, each paragraph of a column can be a section.

In the present invention, as the article sections are sequentially selected, an article "link" is created within the document 76 to link the sequence article sections together. Therefore, in the present invention, it is important for the creator of the document to select the article sections in content flow order. For example, if article section 98 were to be selected before article section 96, the content flow order would proceed from article section 92 to article section 98 and then article section 96. Appropriate editors can be provided to edit the links to thereby modify the article flow.

In should also be noted that, in this preferred embodiment, the linkages between the article sections are preferably circular. That is, the first article section is preferably linked to the last article section such that forward scrolling from the last article section will access the first article section, and such that a rearward scrolling from the first article section will access the last article section. Alternatively, the links can be open-ended or non-circular such that the first article section is not directly linked to the last article section.

In the described embodiment, the article sections are manually selected and the sections links are automatically provided. Alternatively, the article sections can be selected automatically and the linkages can be made manually. For example, the process of the present invention can recognize columns of text as articles and automatically provide a bounding box for all recognized article sections. A publisher can then use an input device to select which of the article sections should be linked and in which order. In yet another embodiment of the present invention, the article sections and the article links can be designated manually, and in a fully automated embodiment of the present invention, the article sections and links can be provided automatically based upon recognition technology and heuristics provided by the process. However, this fully automated embodiment will likely require a fair amount of editing to correct errors made by erroneous assumptions by the process.

While the prior art does disclose tools for manually selecting columns and manually "chaining" columns together (e.g. for newsletter publishing programs), it does not disclose the automatic creation and/or linking of article sections, nor does it disclose a circular linking process wherein a first and a last article section of an article are linked together.

After the article sections have been selected and linked, a window 104 as illustrated in Fig. 3f is provided for the entry of article properties. More specifically, window 104 allows the title, subject, author, and key words pertaining to the article to be entered into the viewing system. The entries into the window 104 may be automatic or manual. For example, the title could be automatically provided by inserting the first paragraph (i.e. the title) of the article. However, it is more likely that the title, subject, author, and key words are manually entered such as through keyboard 34. As will be discussed in more detail subsequently, the article properties can be used to help find and select a desired article for viewing.

In Fig. 4, the process of step 50 of Fig. 2 "Display And/Or Navigate Article View" is shown in greater detail. The process of step 50 begins at 104 and, in a step 105, the "original" view parameters are saved to permit the optional return to the same view that the user just exited. For example, users that were in a normal view prior to entering the article view, may wish to return to the same point in the normal view after completing their reading in the article view. It is for this purpose that the original view parameters are saved in step 105.

Next, in a step 107, a pointer position is determined and a visual indicator is set to the pointer position. In the present invention, the pointer is used to point to the beginning of an article portion that is displayed within a window. With typical text which is read left-to-right, top-to-bottom, this means that the pointer is pointing to the line of an article portion which will be displayed at the top of the window. The visual indicator, in contrast, points to the location in the article portion displayed in the window that the reader is most likely going to read next. The visual indicator is provided so that readers do not lose their place when a new article portion is displayed in the window. Therefore, the visual indicator minimizes the problem of having readers searching for the next line of text to read in an article after a new article portion is displayed in the window.

The initial pointer position can be determined by a number of methods. For example, the initial pointer position can be set to the top of the article section that was selected by a cursor at the time that a mouse button was clicked. Alternatively, an option-click can set the initial pointer to the top of the article, or the pointer could always be set to the top of an article by default.

Next, in a step 106, information is retrieved concerning the current article section as determined by the pointer into the article. As mentioned above and as will be discussed in greater detail subsequently, the pointer is used to point to the top of the article portion be viewed during the article view mode. Next, in a step 108, a portion of the article section is sized to the window to enhance readability up to a maximum zoom amount. This step 108 therefore performs both a "pan" and "zoom" function by moving the desired the portion of the article into an article viewing area of a window and then increasing the size of the portion of the article to make it more readable.

In addition, step 108 provides the visual indicator. As mentioned previously, the visual indicator indicates the position or close to the position of the next line to be read by the user. An example of a visual indicator is found in Figs. 4c-4e. In this instance, the visual indicator is a small triangle or arrow-head which is positioned just outside the window 78 and

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points to the next line to be read. In Fig. 4c, the top of the article is displayed and, therefore, the visual indicator is pointing to the first line within the window 78. Note, however, in Fig. 4d that the visual indicator 131 is pointing to a point within the article portion rather than to the top of the article portion. This is because the next line to be read within the article portion displayed in Fig. 4d begins with the words "terms of a means...", which follow the last sentence of the article portion displayed in Fig. 4a which ends with the words "... an invention may be claimed in..." The visual indicator may be removed after a short period of time (e.g. about a second), as the user continues to read. Alternatively, the visual indicator may be left in place until a new article portion is displayed within the window.

It should be noted that there are a variety of ways of providing a "visual indicator." For example, the next line to be read could be momentarily highlighted in reverse video. Alternatively, the next line to be read could be displayed normally, and the remainder of the article portion could be shown in half-tone for a short period of time. It should also be noted that the visual indicator may not exactly point to the next line of text to be read. This is because the article is stored in a graphic-oriented (not line oriented) format. There may, therefore, be a graphic at the next "reading" position. Alternatively, the font size may be smaller or larger than average, changing the line spacing. The "next line" is therefore an approximation which is preferably calculated using an "average" line height, such as sixteen pixels. In consequence, the visual indicator may point slightly above or slightly below the actual line to be read.

With continuing reference to Fig. 4, a decision step 110 determines whether the user wishes to exit from the article viewing mode. If not, the process of step 50 looks for some type of scroll command in a decision step 112. If there is no scroll command, the process of step 50 enters a loop waiting for an exit, scroll, or some other type of command (not shown).

In the present embodiment, two types of scrolls are supported. One type of scroll is the normal page scroll which allows a reader to scroll around in the current page. This is typically controlled by the computer's operating system or presentation manager. The other type of scroll is an article scroll which causes a forward or reverse, quantized scrolling of a portion of an article along an article thread defined by a content flow of the article. If the scroll detected at step 112 is an article scroll, a step 114 is used to reset the pointer and process control is returned to step 106 to display a new portion of the article. It should be noted that this new portion of the article is automatically panned and zoomed to fit within the article view area of the window, as with the previous article section, to enhance readability.

If the step 112 detects a page scroll, a scroll command is generated and the user is allowed to scroll within the page. This page scroll is typically accomplished by the use of the standard horizontal and vertical scroll bars provided in Macintosh Windows, Microsoft Windows, etc. Next, a step 118 determines whether the act of scrolling has caused the user to leave the current page. If not, a step 120 determines whether scrolling is completed. The scrolling is not completed, steps 116 and 118 are repeated until scrolling is completed, at which time process control returns to step 110.

There are several ways for exiting the article view mode in accordance with the present invention. One is an explicit command to exit as detected by decision step 110. The other is the act of leaving the page during a page scroll as detected by step 118. There are, of course, other ways to exit, such as a use of a hot key, etc. In any event, when it is desired by the user to leave the article view mode, process control is turned over to decision step 121 which determines whether the original view should be restored. As explained previously with reference to step 105, the original view parameters are stored so that users may optionally return to the same view that they had previously exited. Step 121 can determine whether to restore the original view by default, or based upon certain heuristics, or by asking the user, or by looking for a command sequence from the user (e.g. pressing a certain function key or command sequence on the keyboard). If the original view is to be restored, the original view parameters are restored in step 123. In either event (i.e. whether or not the original view is to be restored) the view mode is then set to a normal view in a step 122. The process of step 50 is then completed at 124.

The process of step 50 of Fig. 4 will be described by way of an example with reference to Figs. 4a-4e. In Fig. 4a, the document 76 is displayed within window 78 on computer screen 80 in a "normal view" including a number of article and non-article items such as masthead 82, content list 84, and article 86. A first method of the present invention for leaving a normal view mode and entering an article view mode as detected by decision step 46 of Fig. 2 is to select a "hand" icon from the horizontal tool bar at the top of screen 80 to create a hand cursor 126 on the document 76. The hand cursor 126 includes an arrow 128 which indicates direction for article scrolling, i.e. either forward (in the direction of content flow) or reverse (in the reverse direction of content flow). By "clicking" a button on mouse 36, the hand cursor 126 will select the article 86 for the entry into the article view mode.

An alternative method for entering the article view mode is illustrated in Fig. 4b. In this method, an article window 130 lists all of the articles in the document. This article window derives the titles from the aforementioned article properties, as entered into the window 104 of Fig. 3f. In this instance, there is only one article in the document that can be selected but, typically, there will be a list of a number of articles which can be selected by means of an appropriate pointing mechanism such as a mouse 36. In any event, either of the methods of Fig. 4a or Fig. 4b can be used to select an article to view in an article mode. Of course, other selection mechanisms are also possible. For example, a "hyperlink" from another application program could be used to launch the article reading mode. With a hyperlink, a button or other icon can be selected which can activate the viewer of the present invention, set the article viewing mode, and set the

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pointer to an appropriate point in an article. As well known by those skilled in the art, hyperlinks therefore can operate much like "macros" to perform a series of sometimes conditional steps to achieve a desired result.

After an article has been selected for viewing in the article view mode, steps 106 and 108 of Fig. 4 occur. In other words, information concerning the current article section as determined by a pointer is retrieved, and then a portion of the article section is scaled to the window with a maximum zoom for enhanced readability (see Figure 4c). In this instance, the article viewing area is the window 78 which previously displayed the document in the normal view. However, as noted, an article portion 132 has been scaled to about the size of this window 78 to enhance the readability of that portion. More specifically, window 78 has a width W and a length L. Typically, as a default, an internally stored pointer P points to the top of the first section of the article when the article has been selected by title, or to the top of the article section that was selected by the hand cursor 126. A process 108 then "pans" and "zooms" the document so that the article section starting at the pointer P is scaled in the horizontal direction to fit about the width W of the window 78. This scaling factor will determine the length of the article portion that will be displayed within the length L of the window 78. However, it has been found that there is a maximum amount of magnification or "zoom" that is comfortable to some readers. Therefore, it is possible that there is a maximum "zoom" (such as a 200% magnification) that will be allowed by the step 108. In such an event, the width of the article portion 32 will be somewhat less than the width W of the window 78 but, as a beneficial side effect, more of the length of the article portion 132 will be displayed within the window 78.

More specifically, the process 108 preferably first sets the current zoom to the maximum zoom indicated by the reader. Then, process 108 determines if the article width is greater than the window width at that zoom level. If it is not, the article portion is preferably centered within the window. If the article width is greater than the window width at the maximum zoom level, the current zoom level is adjusted as follows:

current zoom <= maximum zoom * (window width/article width)

Therefore, the zoom is scaled back by the ratio of the window width to the article width so that the article portion will fit the window.

If the hand cursor 126 is activated, the next view in the direction of the arrow 128 will be displayed. In other words, the activation of the user input device (such as mouse 36) will cause an article scroll of a portion of an article in a desired direction respective to the thread or content flow of the article.

In Fig. 4d, the next consecutive portion of the article is shown within window 78. In other words, decision step 112 detects the activation or "clicking" of the mouse at the position indicated by cursor 126 of Fig. 4c and determines that an article scroll is being commanded. Step 114 then resets the pointer P to a position P1 in the article and steps 106 and 108 cause a pan and zoom to display a second portion 134 of the article and window 78. It should be noted that this portion 134 includes the bottom region of the article section 1-1.

Fig. 4e illustrates what happens after the mouse is once again "clicked" when the hand cursor is at the bottom portion 134 of article section 1-1 as seen in Fig. 4d. The decision step 112 again determines that an article scroll command has been made and the pointer is reset from point P_1 in the article to the point P_2. This is accomplished because, due to the article links described previously, the bottom of the first article section 1-1 is considered to be consecutive (in a logical or content flow sense) with the top of the second article section 1-2. In other words, the article sections are considered to be consecutive due to their section links regardless of their physical location within the printed or display document and regardless of their storage locations and memory. Once again, steps 106 and 108 retrieve the appropriate information and then pan and scale the document to present portion 136 of the article within the window 78.

It should be noted that the scaling of the portions 132 (Fig. 4c) and 134 (Fig. 4d) is about 110%. However, as seen in Fig. 4e, the scaling of portion 136 is approximately 121%. This automated scaling for enhanced viewability relieves the user of the necessity of manually panning and zooming to make the article readable.

It should also be noted that the hand cursor 126 in Fig. 4e has an arrow 128a which points in an upward direction. In this instance, clicking the mouse with the cursor 126 and arrow 128a as shown will cause an upward article scroll such that the article portion 136 is replaced with the article portion of Fig. 4d. Therefore, it is clear that the thread of the article can be followed in either direction.

Fig. 5 illustrates in graphical form the three article sections 1-1, 1-2, and 1-3 of an article A1. The links are indicated by the arrows 138, 140 and 142. Link 138 is between the bottom of the article section 1-1 and the top of the article section 1-2, link 140 is between the bottom of article section 1-2 and the top of article section 1-3, and link 142 is between the bottom of article section 1-3 and the top of article section 1-1. Therefore, the section links preferably form an ordering with a circular link structure. In essence, section link 138 makes the bottom of article section 1-1 consecutive with the top of article section 1-2 and section link 140 makes the bottom of article section 1-2 consecutive with the top of article section 1-3. Section link 142 (which is optional) makes the bottom of section 1-3 consecutive with the top of article section 1-1. Therefore any article scrolling which goes beyond a top or bottom of one of the article sections will create an article scroll to the next consecutive article section.

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The combination of the article sections 1-1, 1-2, and 1-3 along with section links 138 and 140 (and optionally section link 142) creates an article thread T. If the article thread is followed in the forward direction, i.e. from article section 1-1 to article sections 1-2 and 1-3, the thread is in the direction of article content information flow. However, a user can also navigate in the reverse direction along thread T, i.e. in the reverse direction of content information flow.

The article thread T can be implemented in a variety of fashion, as will be appreciated by those skilled in the art. In the present embodiment of the invention, the article threads are implemented as "objects" within a computer implemented process. The creation and use of objects are well known to those skilled in the art.

PDF documents created by the present embodiment of the invention include zero or more article thread objects. Each thread will have a title, and a list of thread elements (referred to as "beads"), which correspond to article sections. If a document includes any threads, they are stored in an array as the value of the "Threads" key in a Catalog object. As used herein, an "array" is an ordered list of elements which can be accessed by an array index. Each thread and each thread bead is defined as a dictionary. As used herein, a "dictionary" is a set whose elements can be accessed by name (i.e. a set of key-value pairs). A description of the PDF™ format version 1.0, including arrays and dictionaries, can be found in The Portable Document Format Reference Manual, Adobe Systems, Inc., Addison-Wesley, 1993, which is incorporated herein by reference. The key-value pairs for thread and thread bead dictionaries are found below in Tables 1 and 2, respectively.

Table 1

(Key-Value Pairs in a Thread Dictionary)
Title String: (optional) The text name of the thread. The characters in this string are encoded using a predefined encoding PDFDocEncoding
ThreadInfo dictionary: (optional) Contains key-value pairs describing thread attributes, such as Date, Author, Keywords, etc.
First dictionary: (required) This specifies which bead is the first element in the thread

Table 2

(Key-Value Pairs in a Bead Dictionary)
Thread dictionary: (required for first bead in thread) Specifies the thread of which this bead is the first element.
Prev dictionary: (required) Specifies the previous bead of this thread. For the first bead of a thread, Prev specifies the last bead of the thread
Next dictionary: (required) Specifies the next bead of this thread. For the last bead of the thread, Next specifies the first bead of the thread.
Page dictionary: (required) Specifies the page upon which this bead appears.
Rect array: (required) Rectangle (bounding box) specifying this bead (article section)

In Fig. 6, the "Reset Pointer" step 114 of Fig. 4 is shown in greater detail. The process of step 114 begins at 144 and, in a step 146, the scroll direction is determined. Scroll direction can be selected by the user in a number of well-known fashions. For example, if the mouse button is clicked with without pressing "shift" or some other "command" key, the scroll direction may be assumed to be down. If the mouse button is clicked while simultaneously pressing the shift key or some other command key, the scroll direction may be assumed to be up.

If the scroll direction is "down" the user desires to navigate through the article in the direction of content flow. This is accomplished by setting the pointer to the top of the next article portion as shown in step 148. If the scroll direction is "up", the user wishes to view the article in reverse content flow direction. This might occur, for example, if users wish to review something that they had just read. In this instance, a step 150 set the pointer into the previous article portion. The process of step 144 then ends at 152.

In Fig. 7, step 148 of Fig. 6, i.e. the downward article scroll, is illustrated in greater detail. The process 148 begins at 154 and, in a step 156 it is determined whether the end of the article section in within the current window. If not, a step 158 sets the visual indicator to the bottom of the window plus an offset. The offset is, as previously mentioned, about one line spacing. In the present embodiment, the offset is assumed to be about 16 pixels. Next, in a step 160, it is determined whether the next article portion is less than a full window in height. If it is, a step 162 sets the pointer to

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the bottom of the article section minus the window height. An example of this situation is seen in Fig. 4d. If step 160 determines that the next portion is not less than the window height, the pointer is set to the top of the next portion minus the offset. The process 148 is completed as indicated at 166 after the completion of steps 162 or 164.

If step 156 determines that the end of the article section is within the window, a step 168 determines whether this is the last section in the article. If yes, a step 170 determines whether the article sections are circularly linked, i.e. if the end of the last article section is linked to the beginning of the first article section and vice versa. If not, an error message (such as a beep) is generated in step 172, and the process 148 terminates at 166. If step 168 determines that it is not the last section in the article, or if step 170 determines that the article sections are circularly linked, then a step 174 sets the pointer and the visual indicator to the top of the next article section not currently fully visible in the window.

Step 174 therefore anticipates the situation where the article section heights are shorter than the window height, thereby allowing multiple article sections to be displayed within a window simultaneously, although only the first article section would be associated with the pointer and the visual indicator. In such an instance, the next logical article section to be viewed is the next article section not fully visible in the screen. If the article section is longer than the window height, the pointer and the visual indicator are set to the top of the next article section. The process 148 is then complete at 166.

In Fig. 8, step 150 of Fig. 8 is detailed. More specifically, an article up-scroll begins at 176 and, in a step 178, it is determined whether the beginning of an article section is within the display window. If not, a step 180 determines if the article portion preceding the current article portion is less than a window in height. If so, the pointer is set to the top of the current article section. If step 180 determines that the previous portion is not less than the window height, a step 184 sets the pointer to the current pointer position (i.e. the top of the current window) minus the window height. After the completion of either step 182 or 184, the visual indicator is set to the pointer, and the process 150 ends at 188.

If step 178 determines that the beginning of the current article section is within the window, then a step 190 determines whether the current article section is the first section in the article. If so, a step 192 determines whether the article sections are circularly linked, as described above. If not, an error message (e.g. a beep) is made by step 194 and the process completes at 188. If step 190 determines that the current article section is not the first article section, or if step 192 determines that the article sections are circularly linked, a step 196 sets the pointer to the bottom of the previous section that is not fully visible in the window minus one window height. This step 196 is quite analogous to the previously described step 174. Essentially, this step 196 takes care of both the situation where the article sections are shorter than the window height and longer than the window height. Step 186 then sets the visual indicator to the pointer position, and the process is completed at 188.

While this invention has been described in terms of several preferred embodiments, it is contemplated that alternatives, modifications, permutations and equivalents thereof will become apparent to those skilled in the art upon a reading of the specification and study of the drawings. It is therefore intended that the following appended claims include all such alternatives, modifications, permutations and equivalents as fall within the true spirit and scope of the present invention.

Claims

1. An electronic document viewer comprising:

   a digital computer system including a digital processor, memory which provides memory storage locations accessible by said digital processor, a visual output device to provide a visual output derived, at least in part, from said digital processor, and an input device to provide an input that can be acted upon by said digital processor;

   a document stored in said memory and including at least one article, said document including article section information and section link information describing an ordering of said article sections of an article such that said article sections can be accessed in a consecutive fashion;

   means implemented on said digital computer system for determining one of a plurality of view modes including at least a normal view mode and an article view mode;

   normal view means implemented on said digital computer system for displaying at least a portion of said document on said visual output device in a normal view that does not require said article section information and article section link information; and

   article view means implemented on said digital computer system for displaying at least a portion of a selected article on said visual output device in an article view, and for permitting the sequential viewing of consecutive article sections of said selected article based upon said section link information.

2. An electronic document viewer as recited in claim 1 wherein said document further includes at least one additional item, wherein said additional item may be viewed in said normal view mode, but is not viewed in said article view mode.

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3. An electronic document viewer as recited in claim 2 wherein said normal view means displays at least a portion of said document in a window on said output device, and is responsive to said input device to permit other portions of said document to be viewed within said window.

4. An electronic document viewer as recited in claim 1 wherein said document includes a plurality of articles, each of which comprises a plurality of article sections and associated section links.

5. An electronic document viewer as recited in claim 1 wherein said article view means displays at least a portion of said selected article in a window on said output device, and is responsive to said input device to permit other portions of said article to be viewed within said window.

6. An electronic document viewer as recited in claim 5 wherein said portion of said selected article is automatically sized to said window by said article view means to enhance the readability of said portion.

7. An electronic document viewer as recited in claim 6 further comprising a visual indicator to indicate a starting point for reading in said portion.

8. An electronic document viewer as recited in claim 6 wherein said portion is automatically sized by adjusting the size of said article such that a width of said article is sized towards a width of said window.

9. An electronic document viewer as recited in claim 8 wherein said portion is automatically sized such that any increase in size of said portion is limited to a maximum increase.

10. An electronic document viewer as recited in claim 6 wherein a length of said portion that is displayed in said window is determined by said automatic sizing.

11. An electronic document viewer as recited in claim 10 wherein said additional portions of said selected article are displayed consecutively with said portion of said article that is displayed in said window.

12. An electronic document viewer as recited in claim 11 wherein a first article section is linked to a last article section of an article such that said first article section is displayed consecutively with a second article section and said last article section, and said last article section is displayed consecutively with a penultimate article section and said first article section.

13. An electronic document viewer as recited in claim 1 further comprising article view exit means implemented on said digital computer system for returning to said normal view upon an exit from said article view.

14. An electronic document viewer as recited in claim 13 wherein said article view exit means restores about the same normal view image that was displayed just prior to entering said article view.

15. A method for viewing electronic documents on a digital computer comprising the steps of:

storing in a memory of a digital computer an electronic document including at least one article having article sections and section links between article sections such that said article sections can be accessed in a consecutive fashion regardless of a physical positioning of an article section within said document;

selecting an article to be displayed on an output device of said digital computer in an article viewing mode;

displaying with said output device at least a portion of said article; and

using an input device of said digital computer to cause the display of additional portions of said article with said output device, where said additional portions can be determined, at least in part, by said article sections and said section links.

16. A method as recited in claim 15 wherein said step of selecting an article comprises selecting an article from a list of articles with said input device.

17. A method as recited in claim 15 wherein said step of selecting an article comprises the use of a hyperlink or macro.

18. A method as recited in claim 15 wherein said step of selecting an article comprises selecting an article from a view of said document that includes said article.

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19. A method as recited in claim 18 wherein said step of selecting an article comprises pressing a button associated with a pointing system, and wherein said article portion will begin at one of the top of the article section so selected or at the top of the article so selected.

20. A method as recited in claim 15 wherein said step of displaying includes displaying at least said portion of said article within a window on said output device of said digital computer.

21. A method as recited in claim 15 wherein said displaying step further includes displaying a visual pointer indicating the reading position within said article portion.

22. A method as recited in claim 20 wherein said step of displaying further causes said portion to be automatically sized to said window to enhance the readability of said portion.

23. A method as recited in claim 22 wherein said portion is automatically sized by adjusting the size of said article such that a width of said article is sized towards a width of said window.

24. A method as recited in claim 23 wherein said portion is automatically sized such that any increase in size of said portion is limited to a maximum increase.

25. A method as recited in claim 24 wherein a length of said portion that is displayed in said window is determined by said automatic sizing.

26. A method as recited in claim 25 wherein additional portions of said selected article are displayed consecutively with said portion of said article that is displayed in said window.

27. A method as recited in claim 26 wherein a first article section is linked to a last article section for an article such that said first article section is displayed consecutively with a second article section and said last article section, and said last article section is displayed consecutively with a penultimate article section and said first article section.

28. An electronic document system comprising:

a document generator for creating a document including at least one article having a plurality of article sections, said document including article section information and section link information that describes links between related article sections of an article; and

a document reader for displaying said document in a plurality of view modes including at least a normal view mode and an article view mode, where said normal view mode does not require the use of said article section information and section link information, and where said article view mode makes use of said article section information and said link information to display at least portions of said article, such that the entirety of said article can be viewed in a consecutive fashion regardless of the physical arrangement of any article section within said document.

29. An electronic document system as recited in claim 28 wherein said document generator comprises:

a visual display to display at least a portion of said document; and

a pointer mechanism for selecting article sections within said display of at least said portion of said document.

30. An electronic document system as recited in claim 29 wherein after a newly selected article section is selected by said pointer mechanism it is automatically linked to a previously selected article section.

31. An electronic document system as recited in claim 29 wherein said pointer mechanism is used to manually link and unlink article sections.

32. A method for displaying an article of a document on a screen of a computer system comprising the steps of:

(a) selecting an article to display on a screen of a computer system from within a document stored in memory of said computer system;

(b) determining an initial view pointer which points to an initial portion within said article;

(c) displaying, as indicated by said view pointer, at least a portion of said article within an article view area of said screen, said portion of said article being sized within said article view area to enhance its readability;

(d) changing said view pointer; and

(e) repeating steps c and d to view consecutive portions within said article.

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33. A method as recited in claim 32 wherein step (c) further includes displaying a visual indicator of the current reading position within said portion of said article.

34. A method as recited in claim 32 wherein said step of selecting an article includes selecting an article from a list of articles displayed on said screen.

35. A method as recited in claim 32 wherein said step of selecting an article includes selecting an image of said article displayed on said screen along with other portions of said document.

36. A method as recited in claim 32 wherein said step of selecting an article comprises at least one of activating a hyperlink or a macro.

37. A method as recited in claim 32 wherein said initial view pointer points to a top portion of said article.

38. A method as recited in claim 32 wherein said displaying step causes said portion to be automatically sized to said article view area to enhance the readability of said portion.

39. A method as recited in claim 38 wherein said portion is automatically sized by adjusting the size of said article such that a width of said article is sized towards a width of said article view area.

40. A method as recited in claim 39 wherein said portion is automatically sized such that any increase in size of said portion is limited to a maximum increase.

41. A method as recited in claim 40 wherein a length of said portion that is displayed in said article view area is determined by said automatic sizing.

42. A method as recited in claim 32 wherein said step of changing said view pointer comprises setting said view pointer to a next consecutive portion of said article to be viewed.

43. A method as recited in claim 42 wherein said next consecutive portion is forward in said article.

44. A method as recited in claim 42 wherein said next consecutive portion is backward in said article.

45. A reader for arranging a document provided in a predetermined format and including an article having content flow information, said reader comprising:

a selector to select an article of said document to be read;

a displayer to display a first portion of said article in a manner for easy viewing and comprehension; and

a navigator which, after said first portion of said article has been displayed, permits the display of the next and remaining sequential portions of said article in content flow order.

46. A reader as recited in claim 45 wherein said displayer provides at least one of a pan and a zoom of said first, next, and remaining portions of said article, as required for easy viewing and comprehension.

47. A reader as recited in claim 45 further comprising a visual indicator for indicating a reading position in a portion of said article being displayed.

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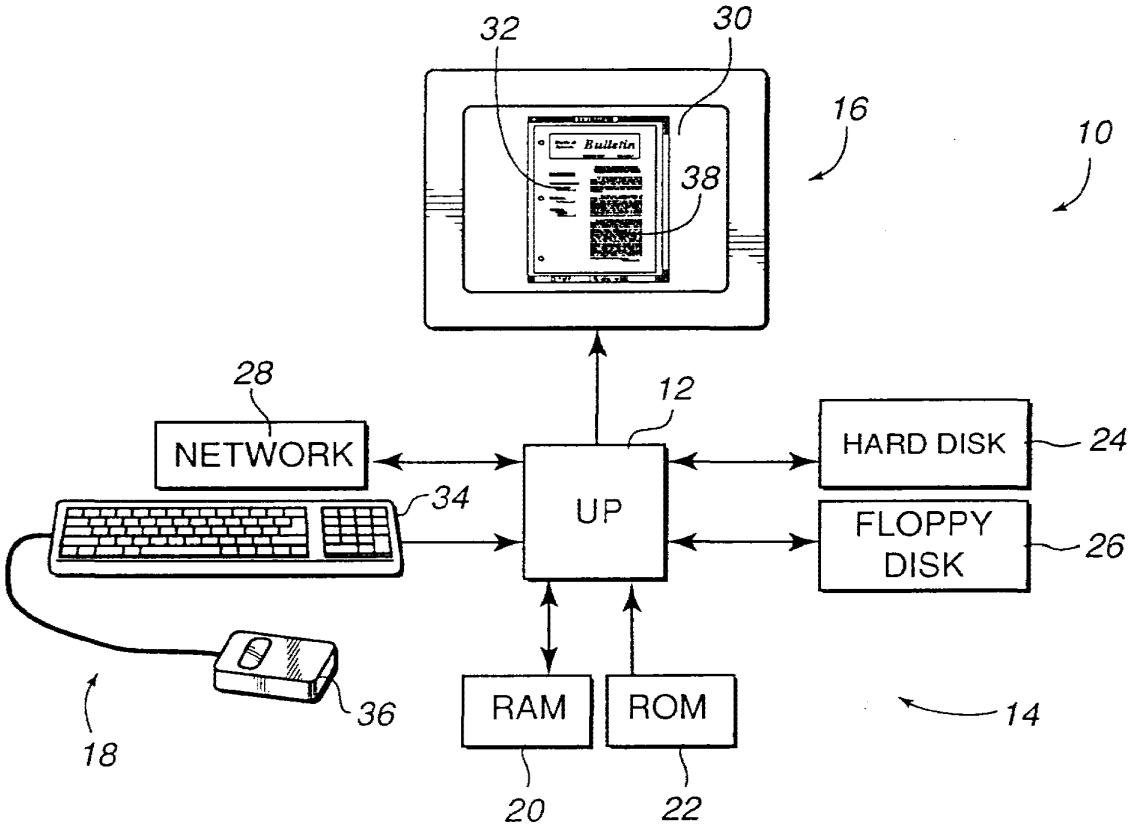

Fig. 1

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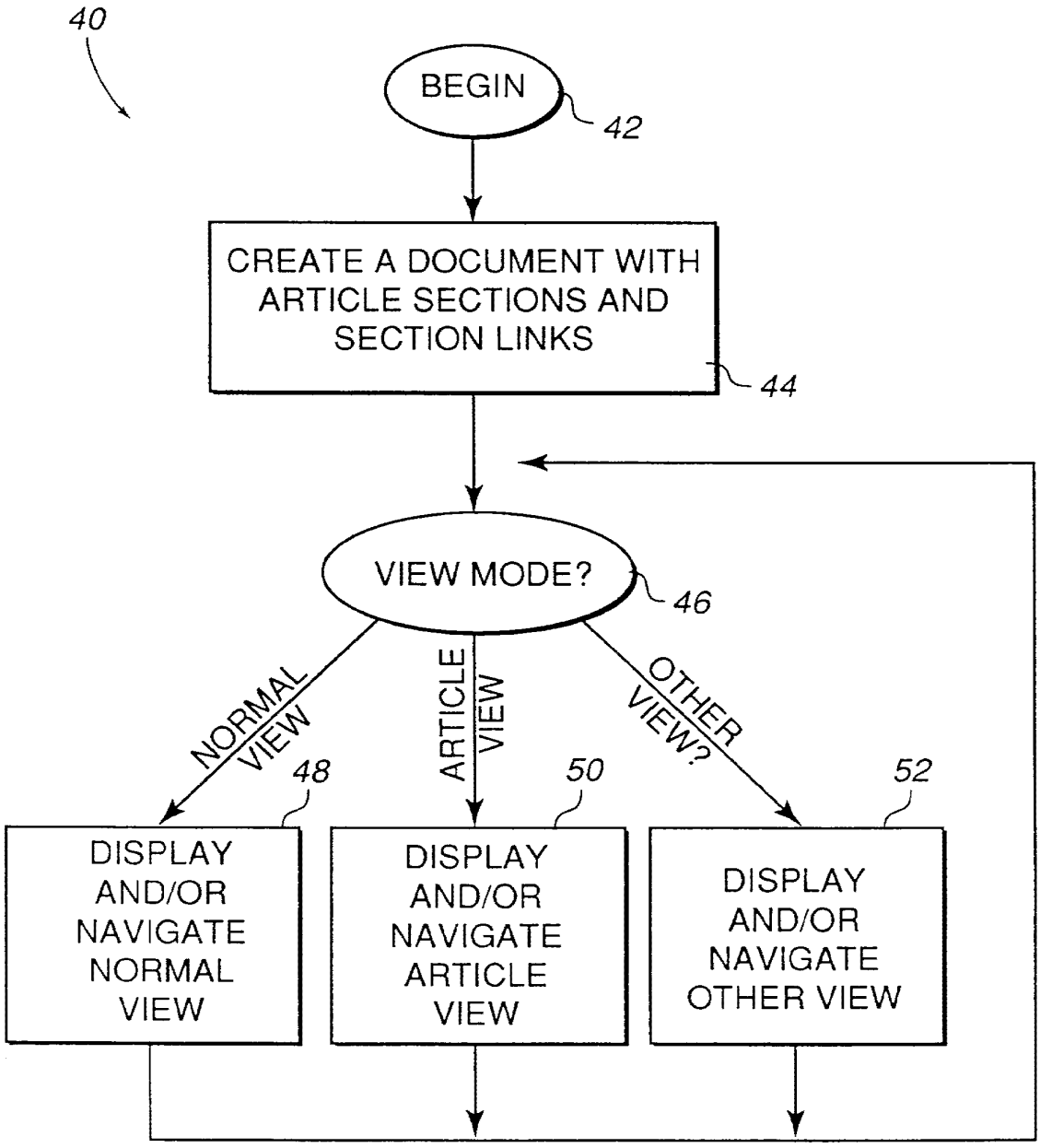

Fig. 2

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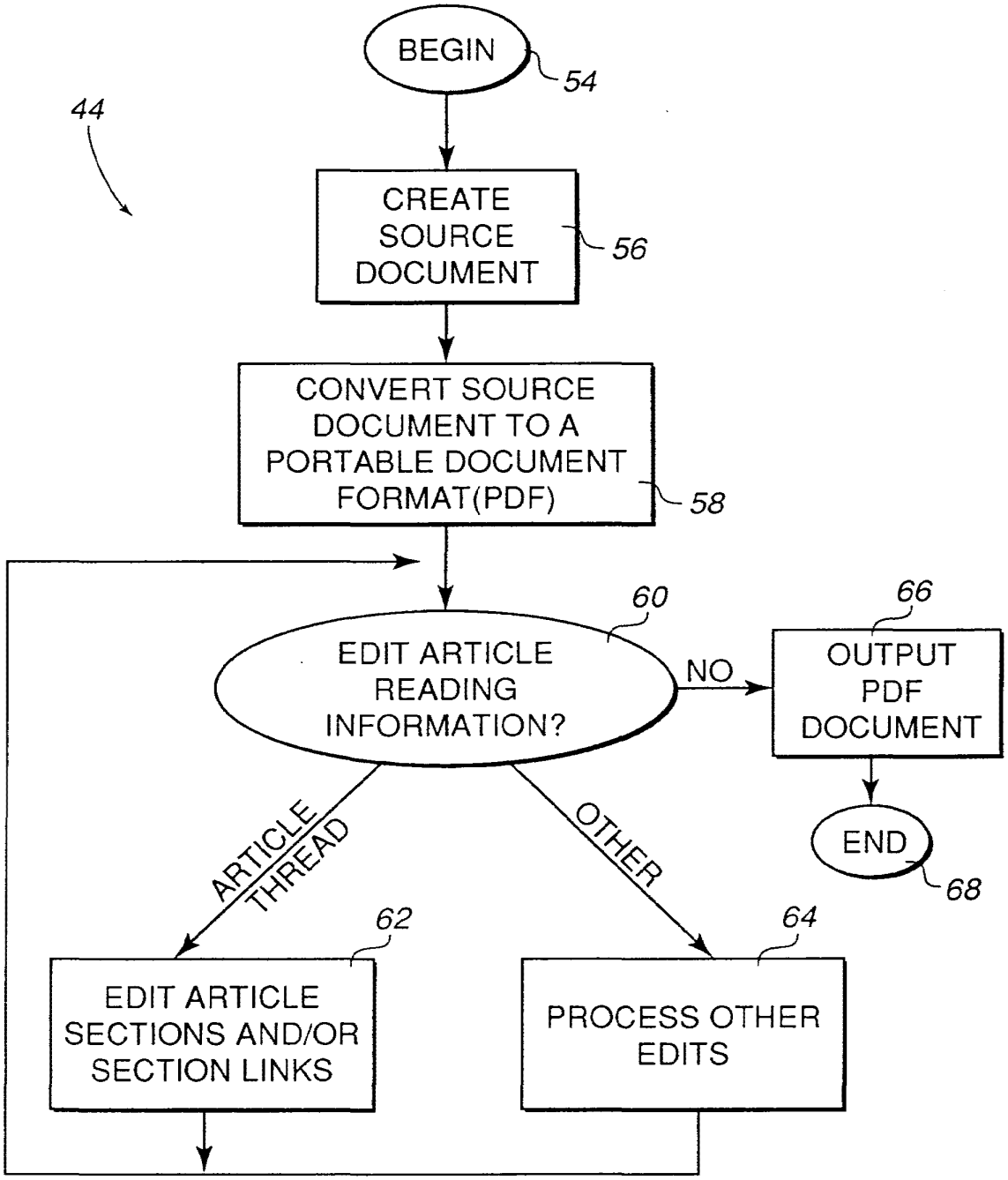

Fig. 3

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Fig. 3a

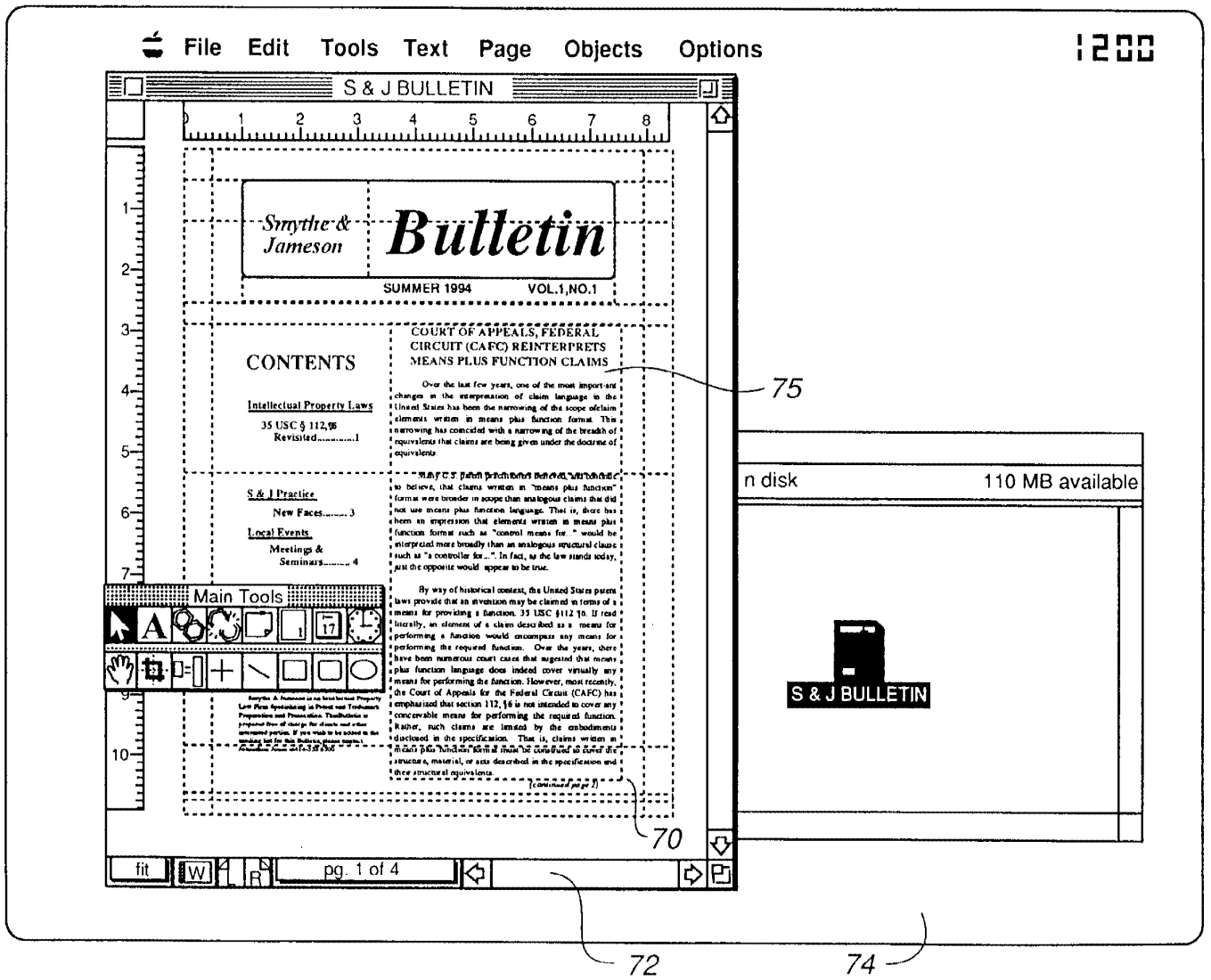

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Fig. 3b

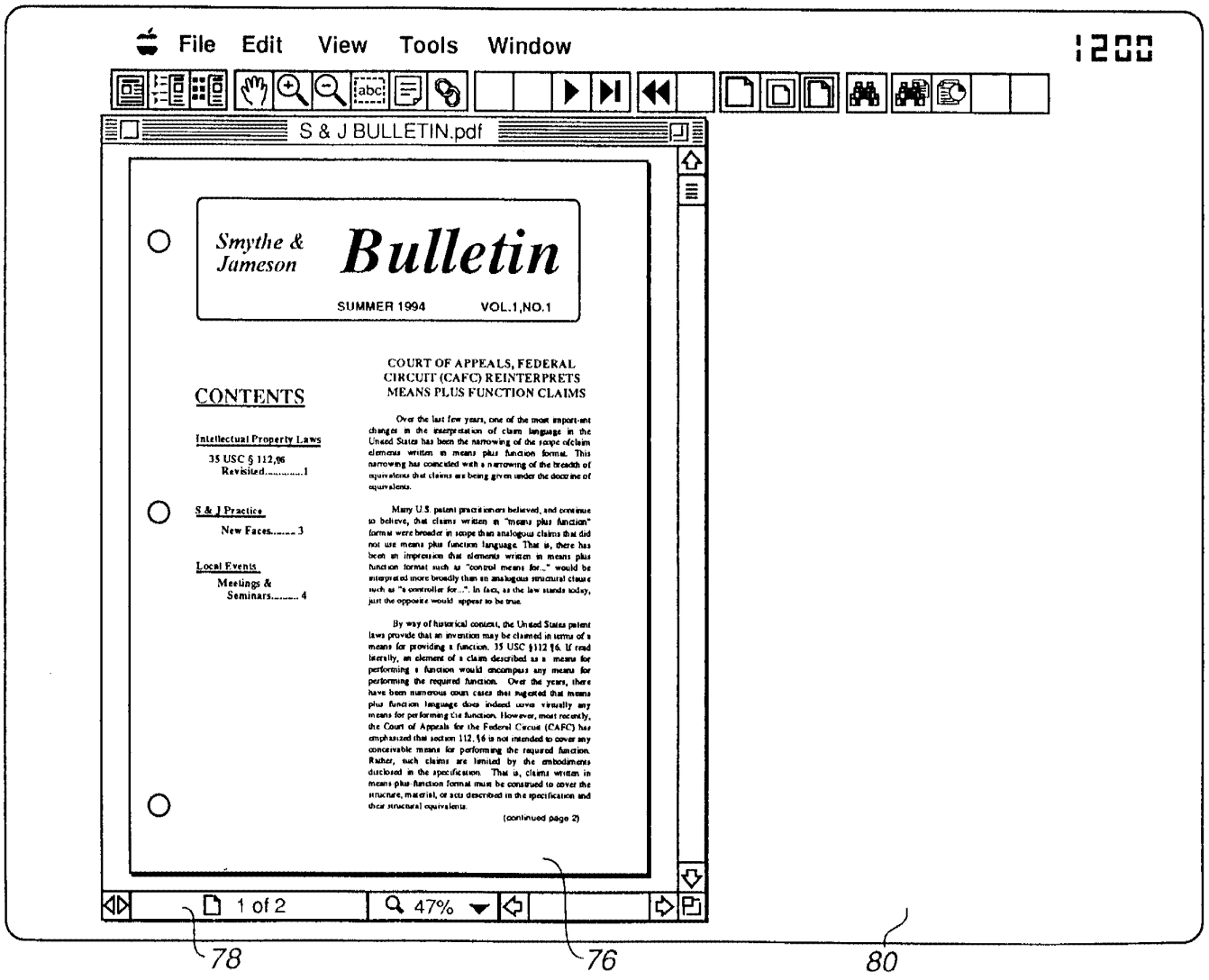

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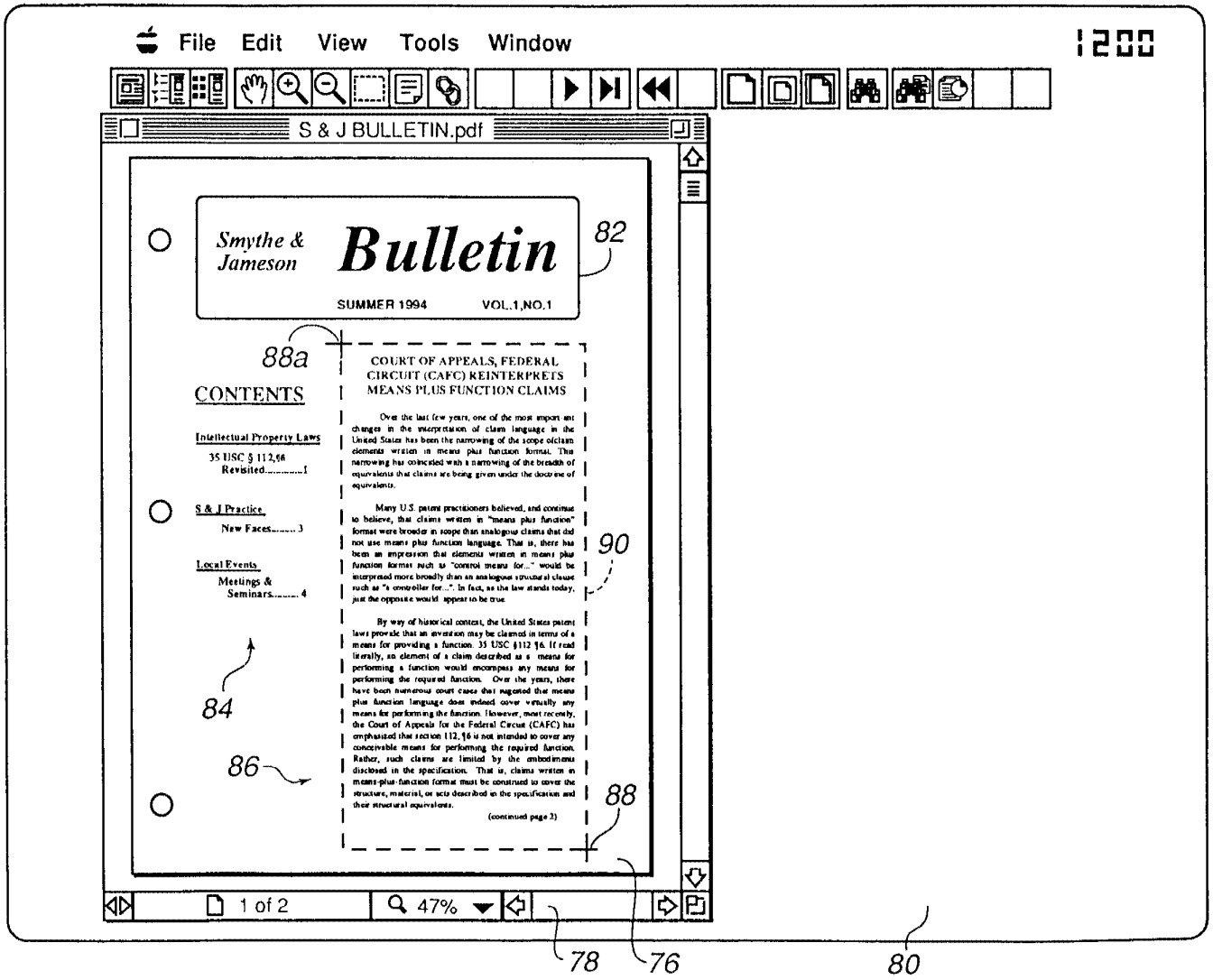
Fig. 3c



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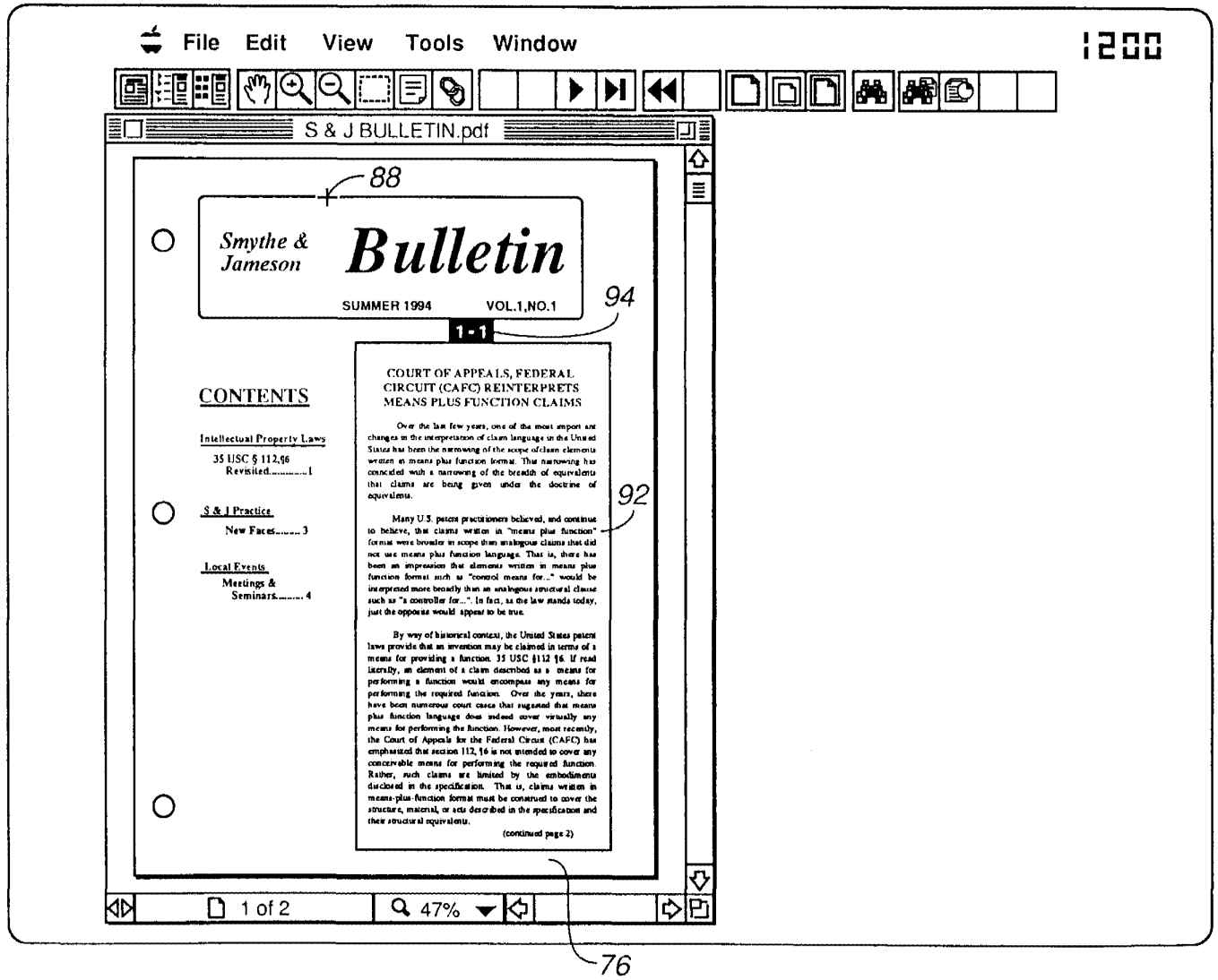

Fig. 3d

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