US008046712B2

(12) **United States Patent**
Landman et al.

(10) **Patent No.: US 8,046,712 B2**
(45) **Date of Patent: Oct. 25, 2011**

(54) **MANAGEMENT OF MULTIPLE WINDOW PANELS WITH A GRAPHICAL USER INTERFACE**

(75) Inventors: **Philip Landman**, Davie, FL (US); **Joaquin de Soto**, Coral Gables, FL (US)

(73) Assignee: **ACD Systems International Inc.**, Victoria (CA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 860 days.

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(22) Filed: **Jun. 29, 2004**
(Under 37 CFR 1.47)

(65) **Prior Publication Data**

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(51) **Int. Cl.**
G06F 3/048 (2006.01)

(52) **U.S. Cl.** **715/788**; 715/767; 715/777; 715/779; 715/781

(58) **Field of Classification Search** 715/767, 715/777, 779, 788, 781, 790
See application file for complete search history.

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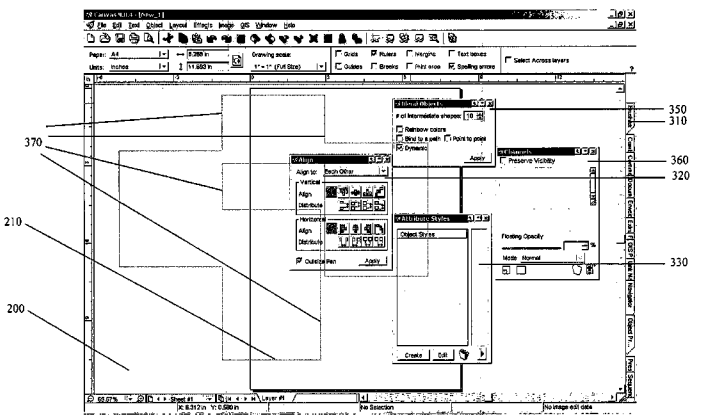
Primary Examiner — Kieu Vu
Assistant Examiner — Nicholas Ulrich
(74) *Attorney, Agent, or Firm* — Blakely, Sokoloff, Taylor & Zafman LLP

(57) **ABSTRACT**

A method in a user interface, according to one embodiment, allows for the docking of window panels within a software application. A palette in the user interface can, in this embodiment, have three states: (i) the palette is open within a window panel; (ii) the palette is docked as a tab; and (iii) the palette is open in a area connected to the tab. User actions through the user interface can control transitions among these three states. Other methods are described, and systems and computer readable storage media are also described.

13 Claims, 35 Drawing Sheets



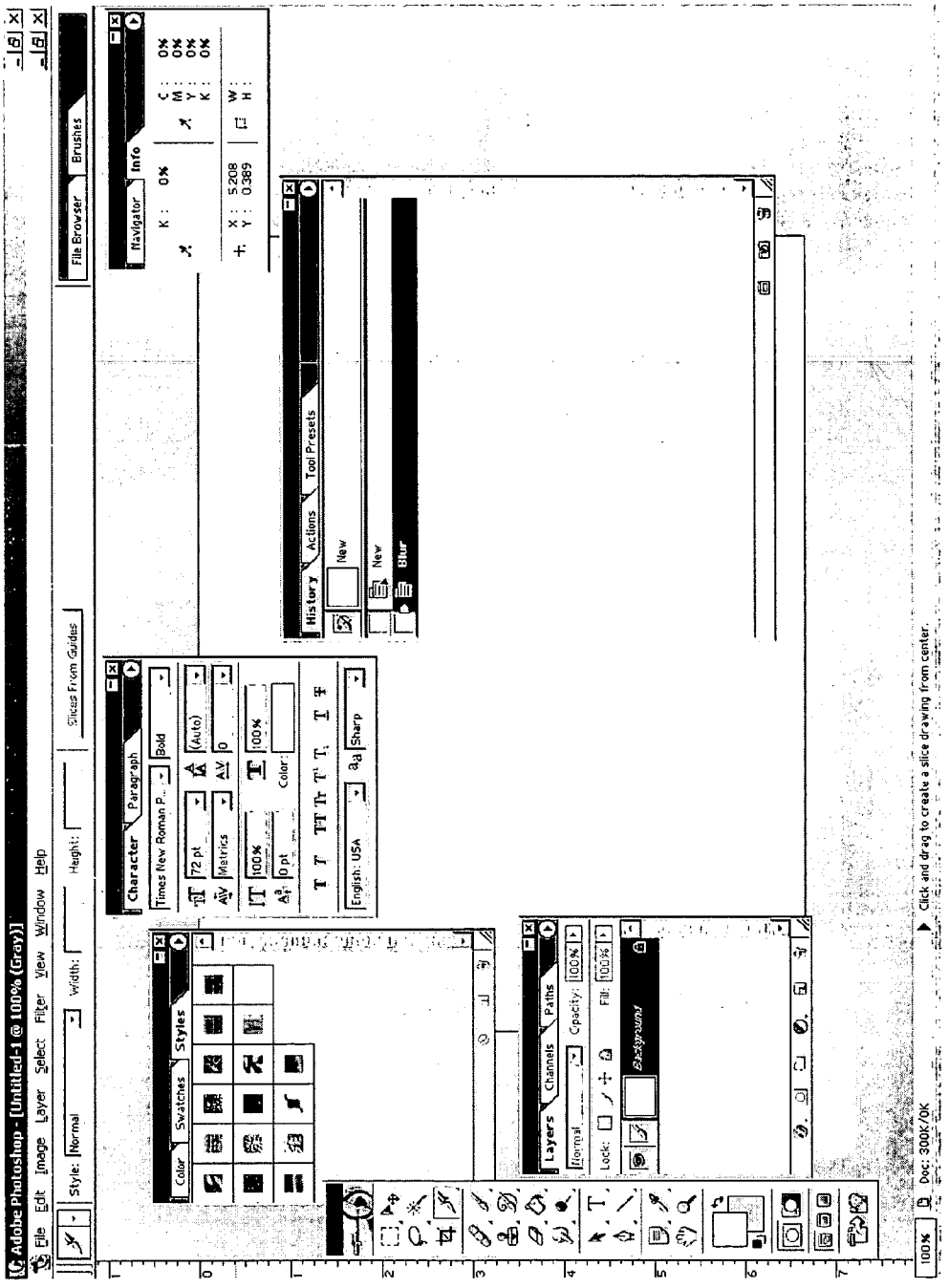


FIG. 1A (PRIOR ART)

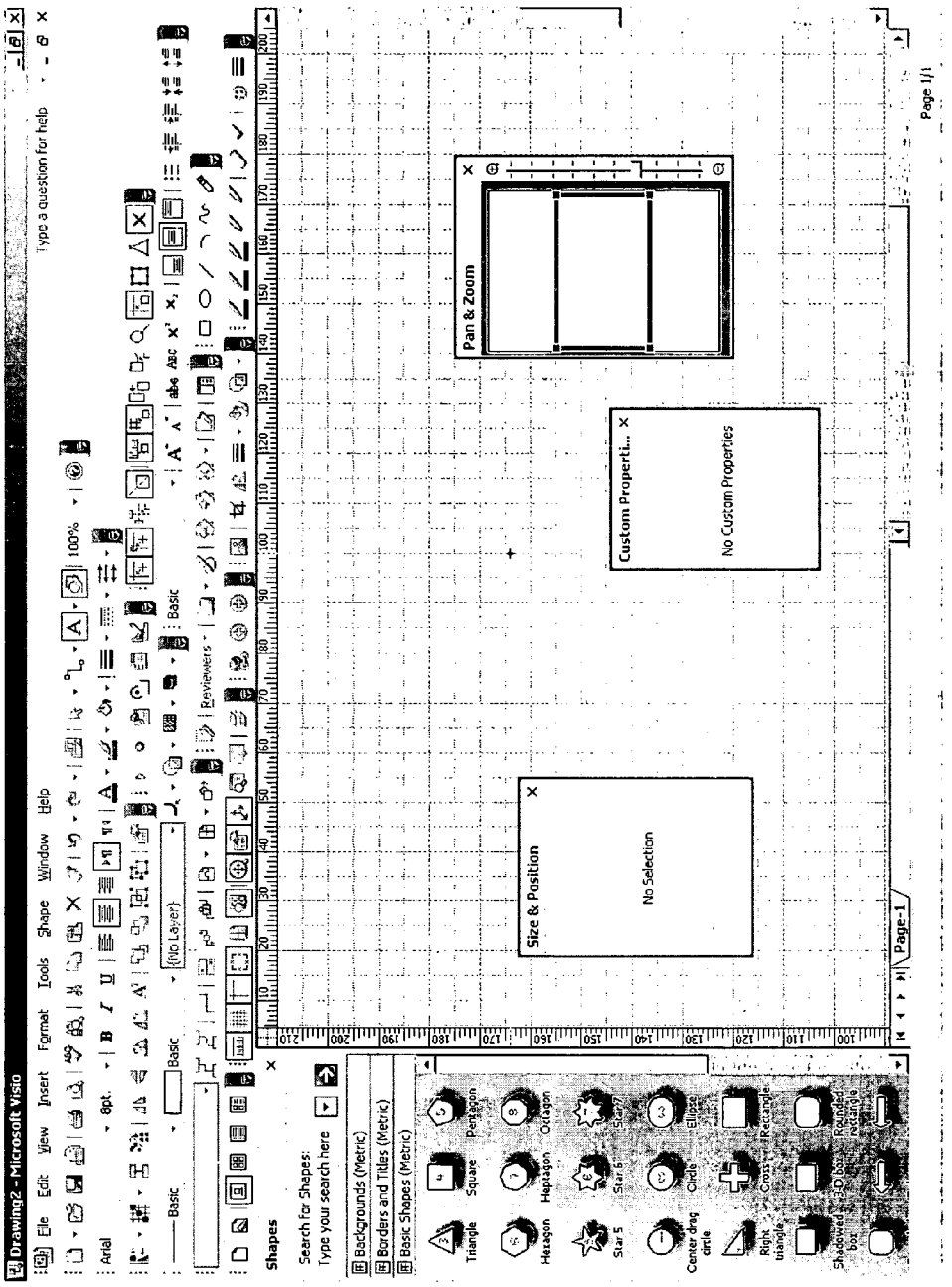
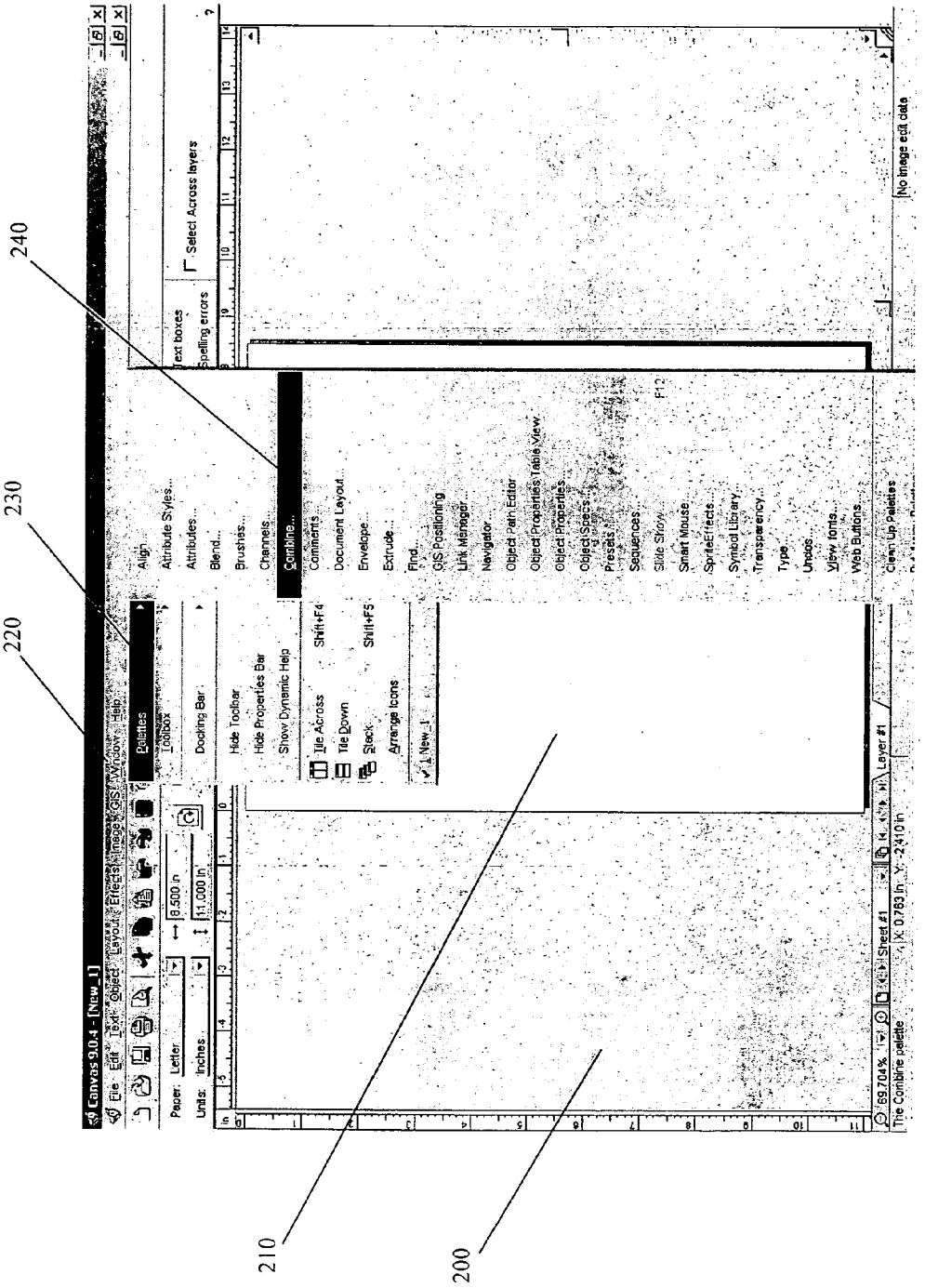


FIG. 1B (PRIOR ART)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230
220
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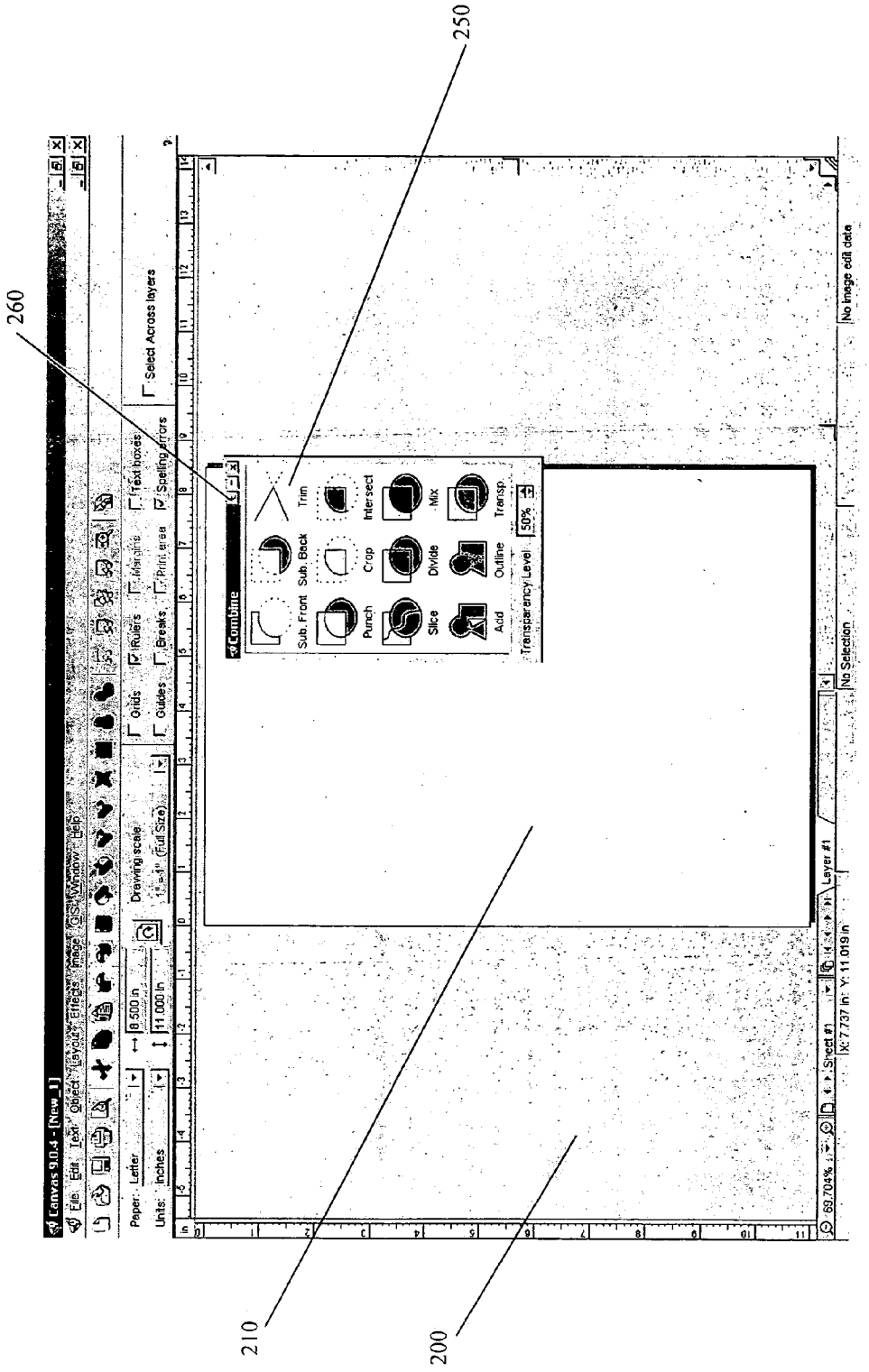
Palettes
Combine...
Shift+F4
Shift+F5
Hide Toolbar
Hide Properties Bar
Show Dynamic Help
Tile Across
Tile Down
Stack
Arrange Icons
Docking Bar
Attributes...
Blend...
Brushes...
Channels...
Comments
Document Layout
Envelope...
Extrude...
Find...
GIS Positioning
Link Manager
Navigator
Object Path Editor
Object Properties Table View
Object Properties...
Object Styles...
Presets...
Sequences
Slide Show
Smart Mouse...
SpriteEffects...
Symbol Library
Transparency...
Type...
Undos...
View fonts...
Web Buttons
Clean Up Palettes
Text boxes
Spelling errors
Select Across layers
No image edit data

FIG. 2A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Sub. Front
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50%
Select Across layers
No Image edit data
No Selection

FIG. 2B

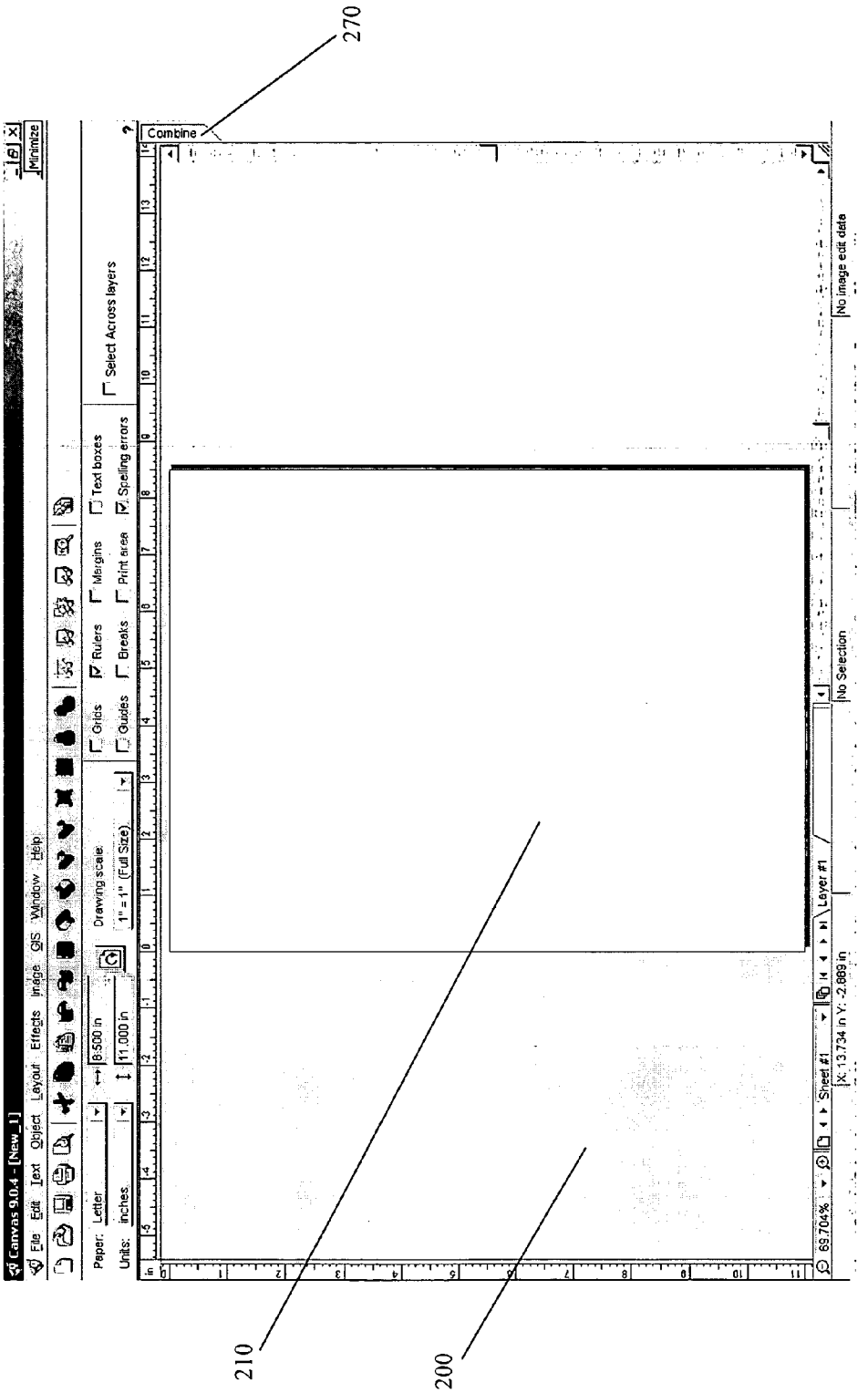
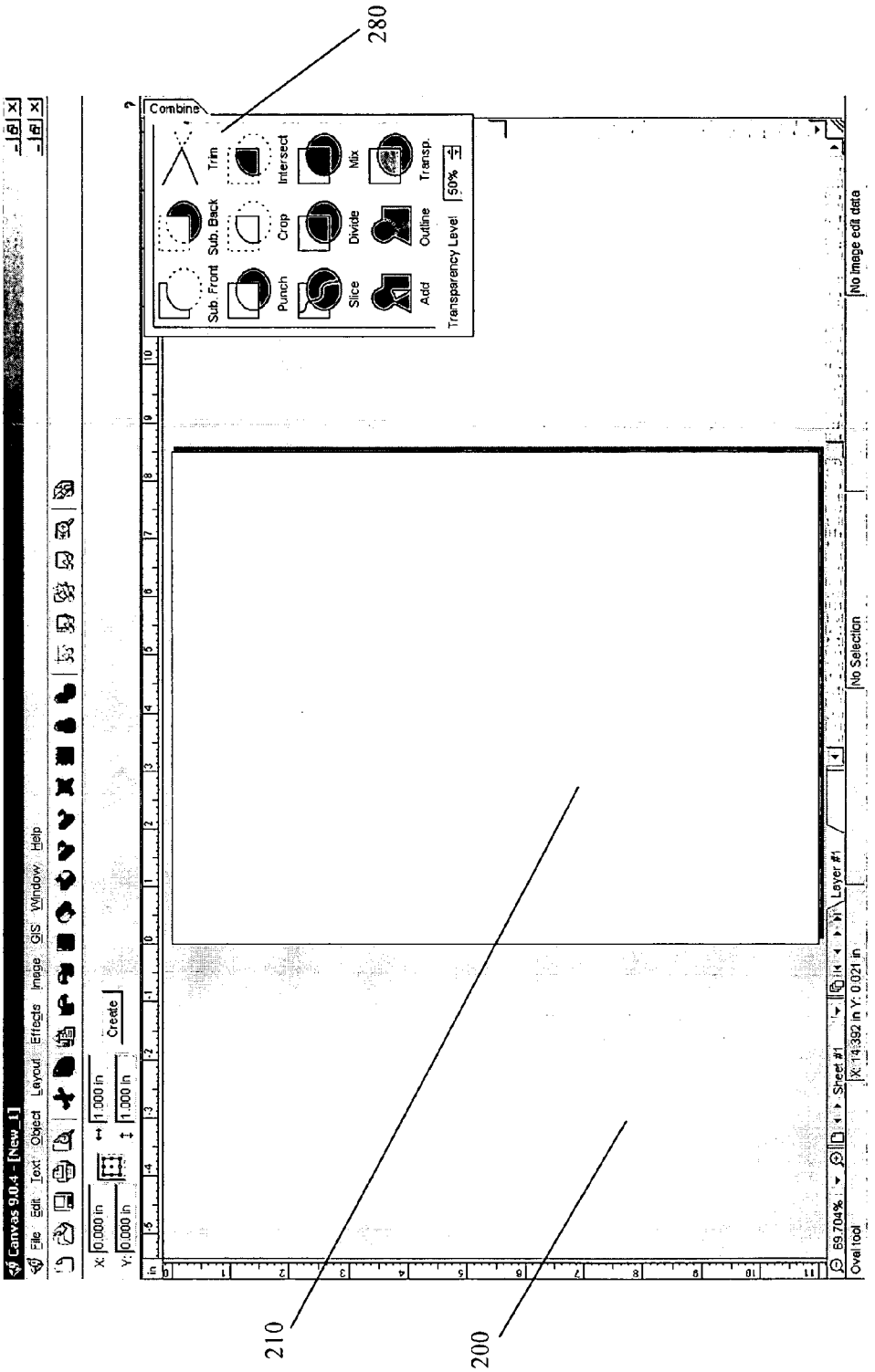


FIG. 2C


280
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Canvas 9.0.4 - [New_1]
File Edit Text Object Layout Effects Image GIS Window Help
Combine
Trim
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Transp.
Sub. Back
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Divide
Outline
Sub. Front
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Slice
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Create
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No Selection
Layer #1
Sheet #1
Oval tool

FIG. 2D

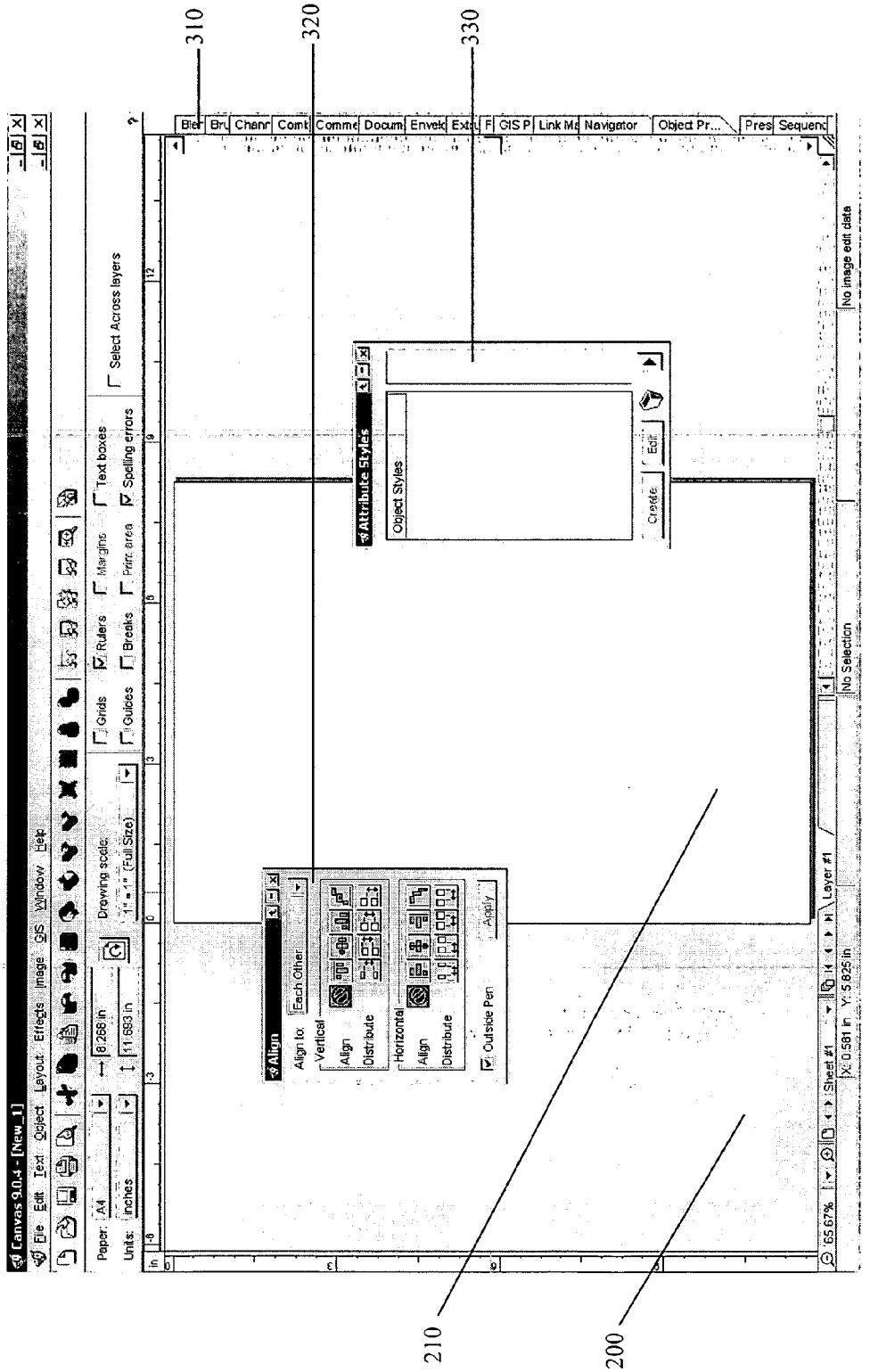
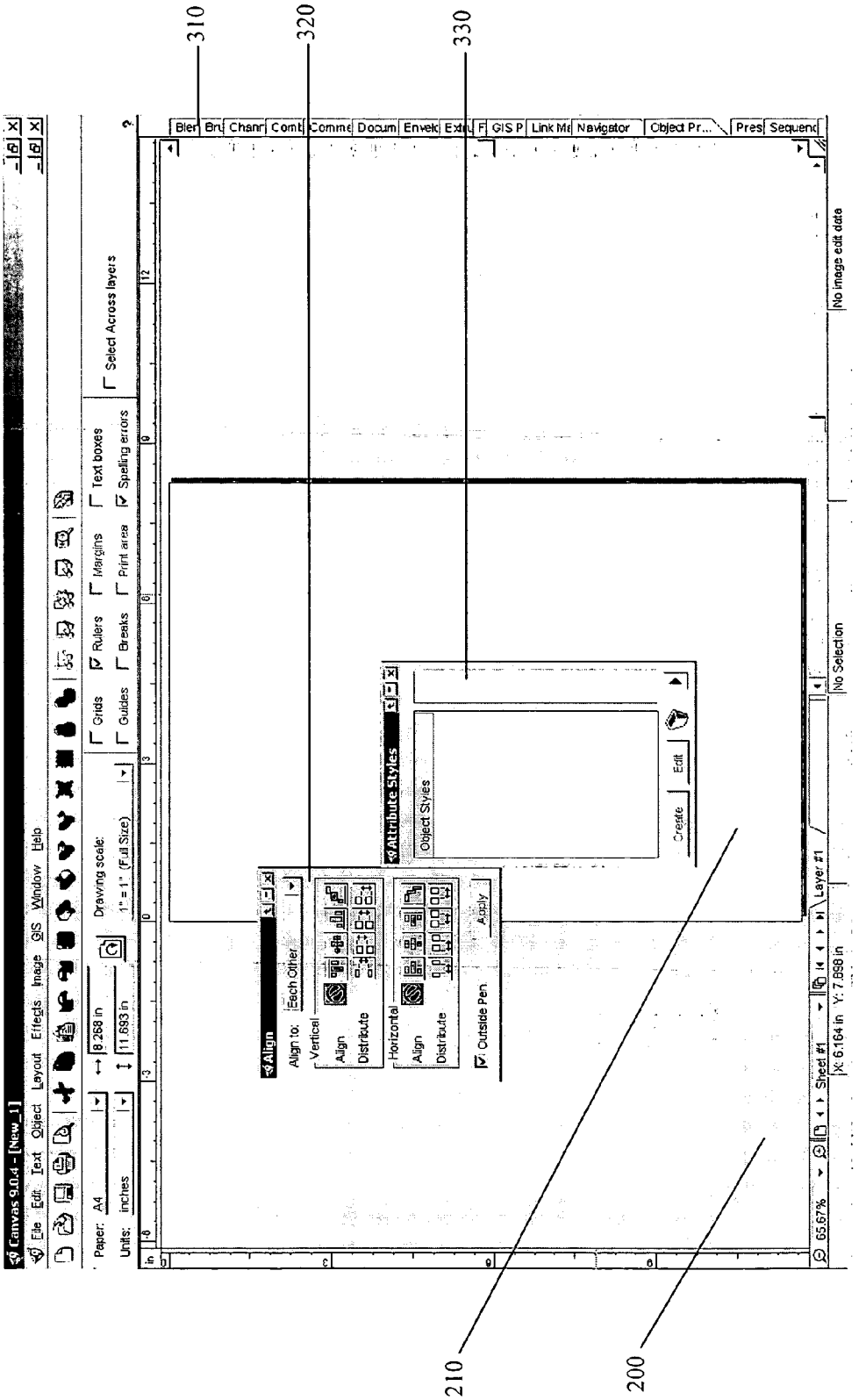


FIG. 3A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File Edit Text Object Layout Effects Image GIS Window Help
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8.268 in
11.693 in
Drawing scale:
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Guides
Rulers
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Spelling errors
Select Across layers
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FIG. 3B

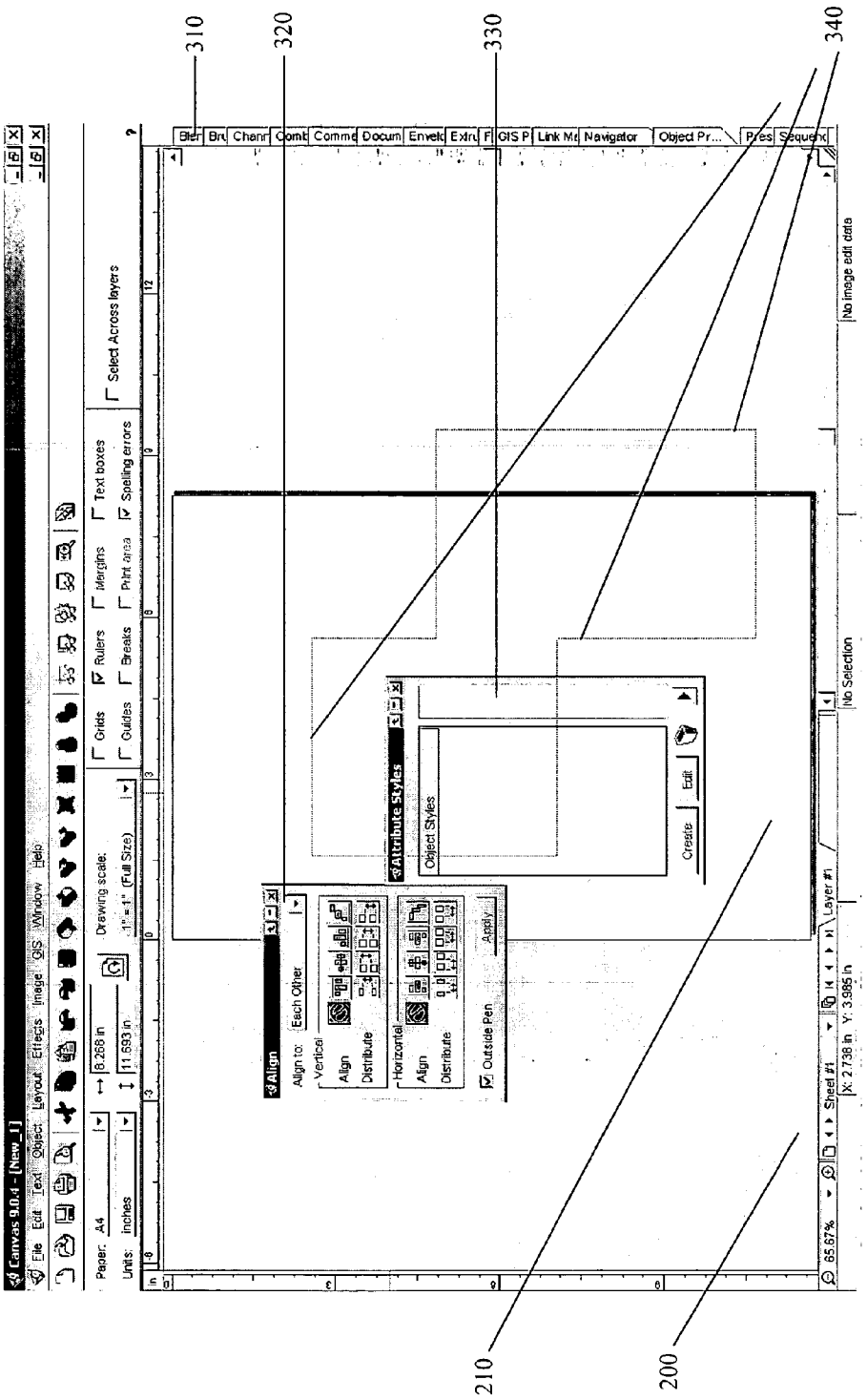
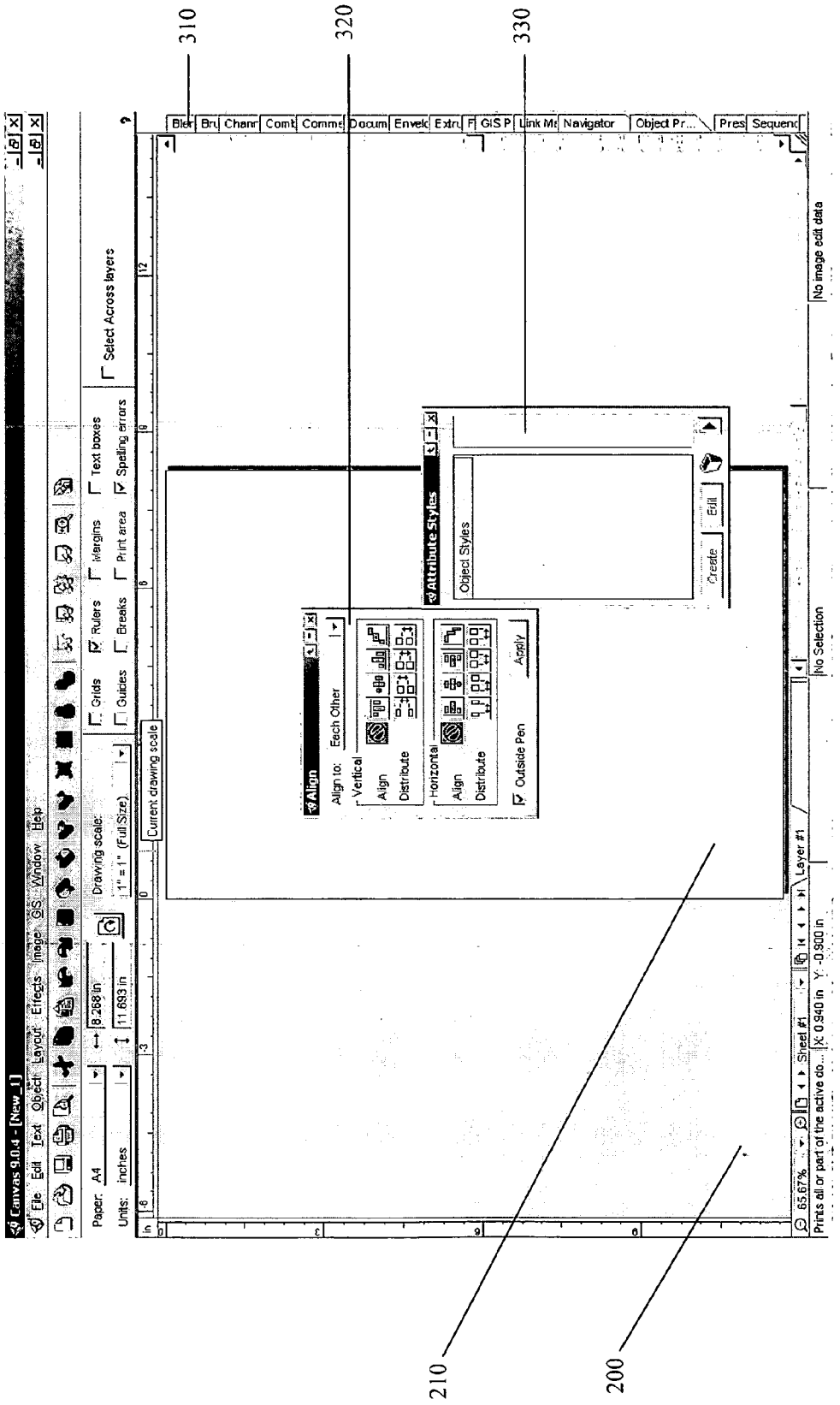


FIG. 3C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File Edit Text Object Layout Effects Image GIS Window Help
Paper: A4
Units: inches
Drawing scale:
1" = 1" (Full Size)
Current drawing scale
Grids
Guides
Rulers
Breaks
Margins
Print area
Text boxes
Spelling errors
Select Across layers
Align
Align to: Each Other
Vertical
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FIG. 3D

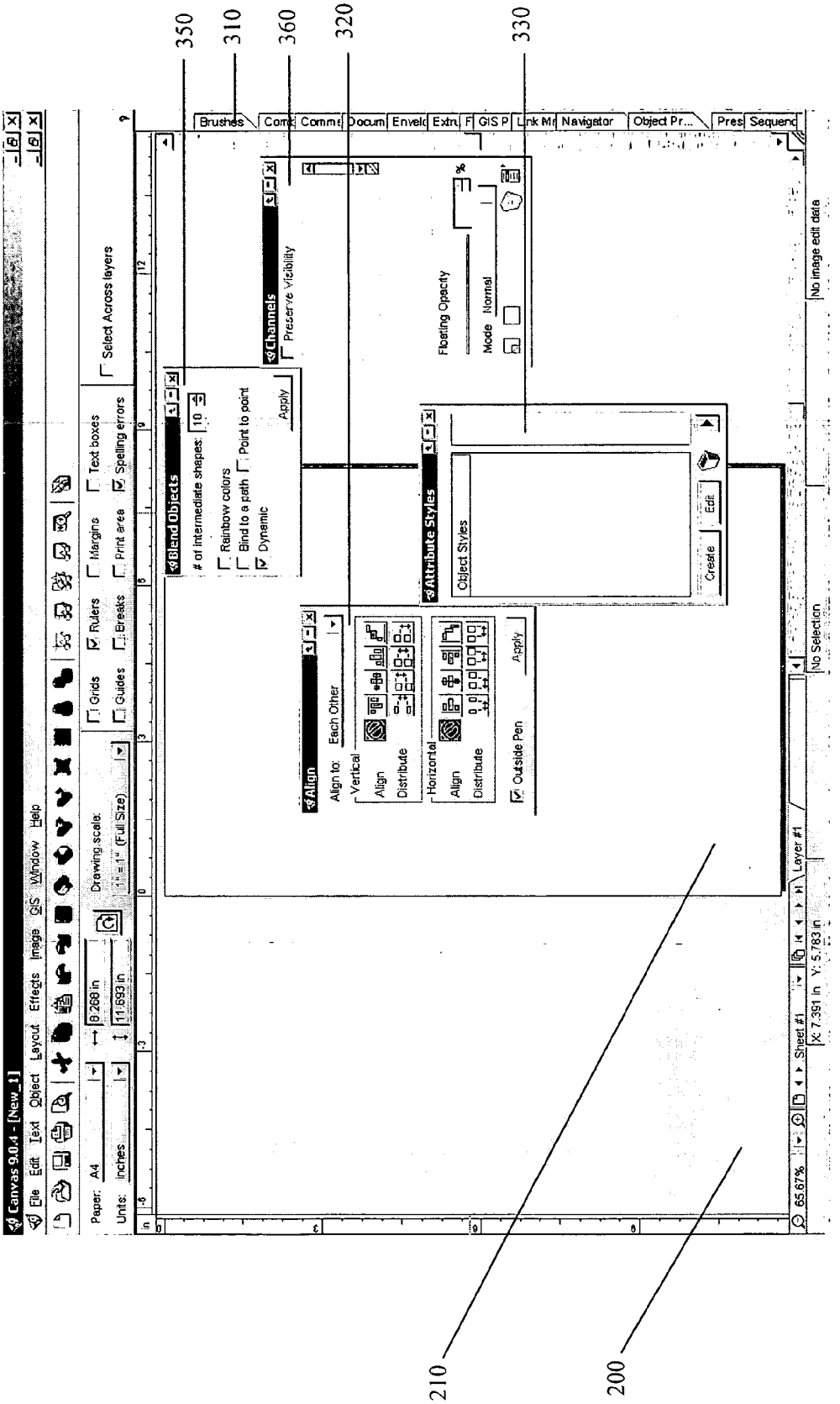
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FIG. 3E

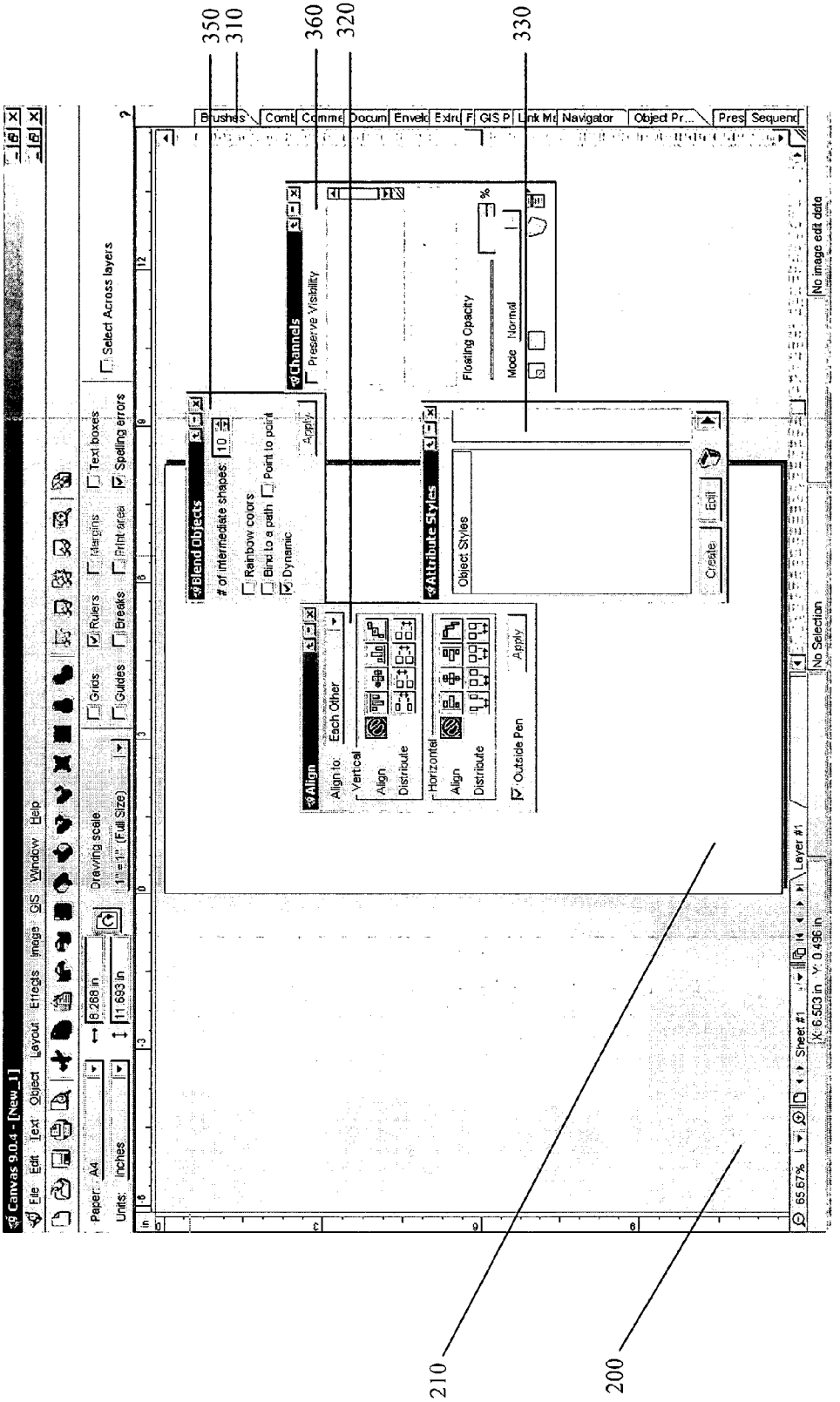
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FIG. 3F

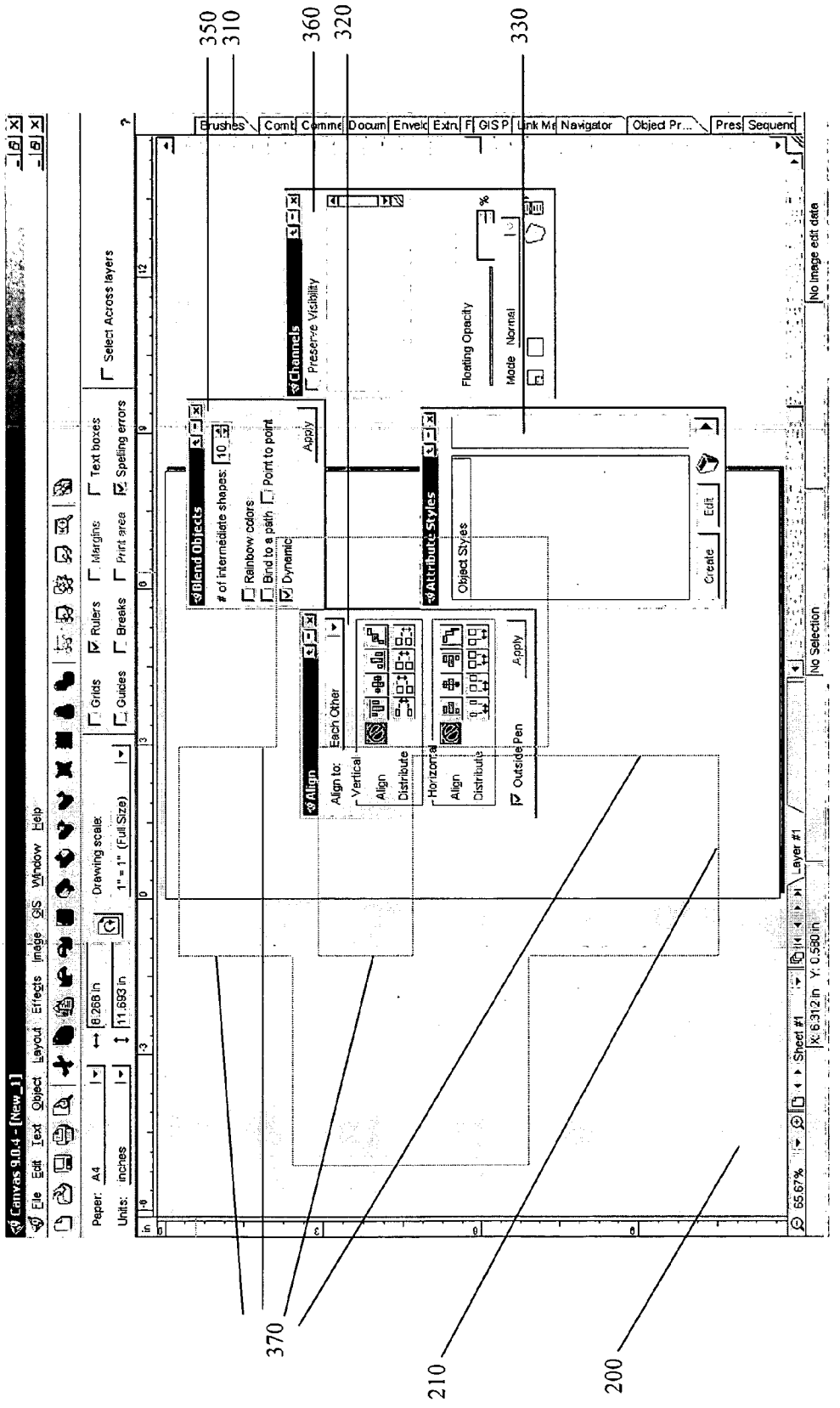

FIG. 3G

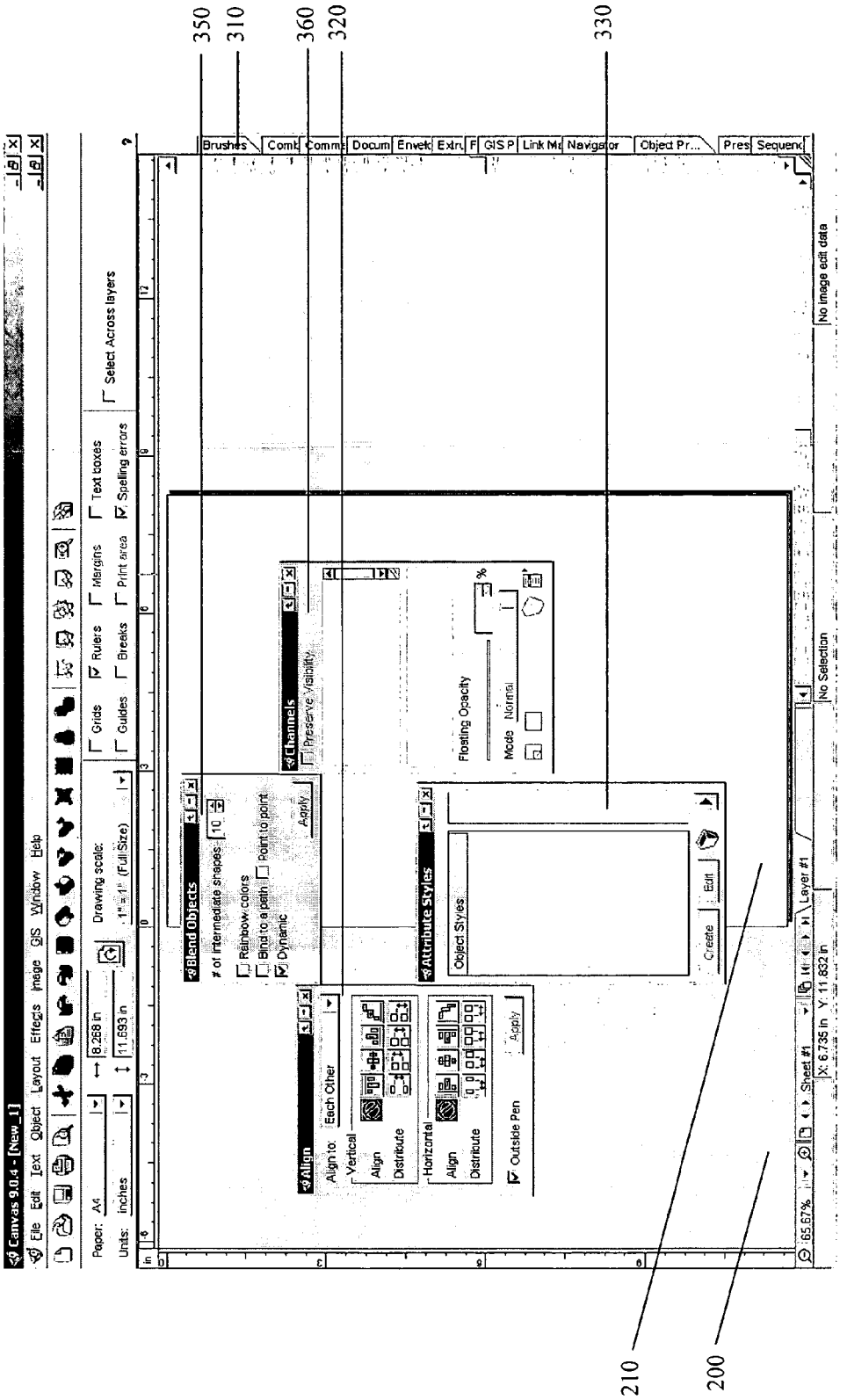
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FIG. 3H

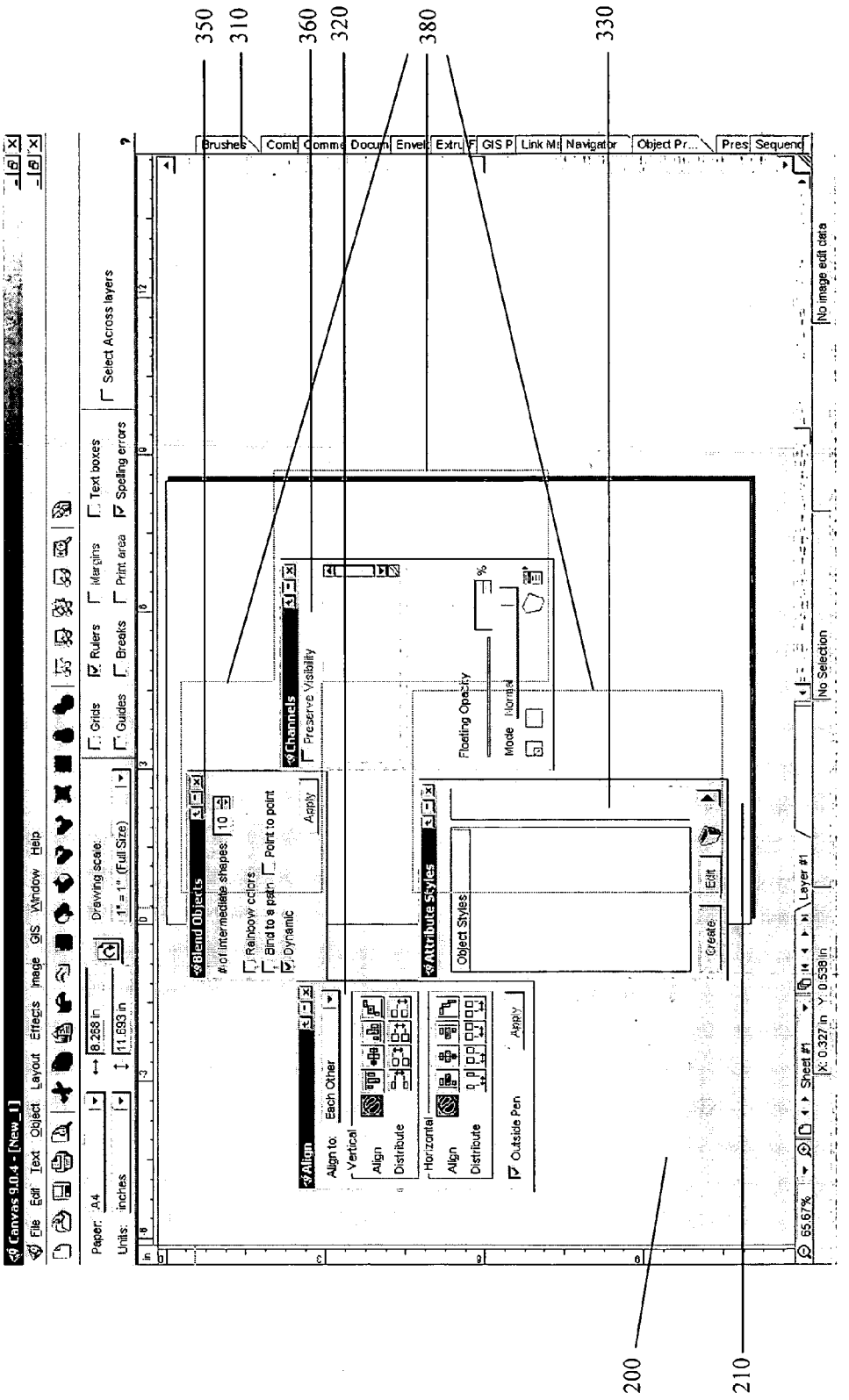
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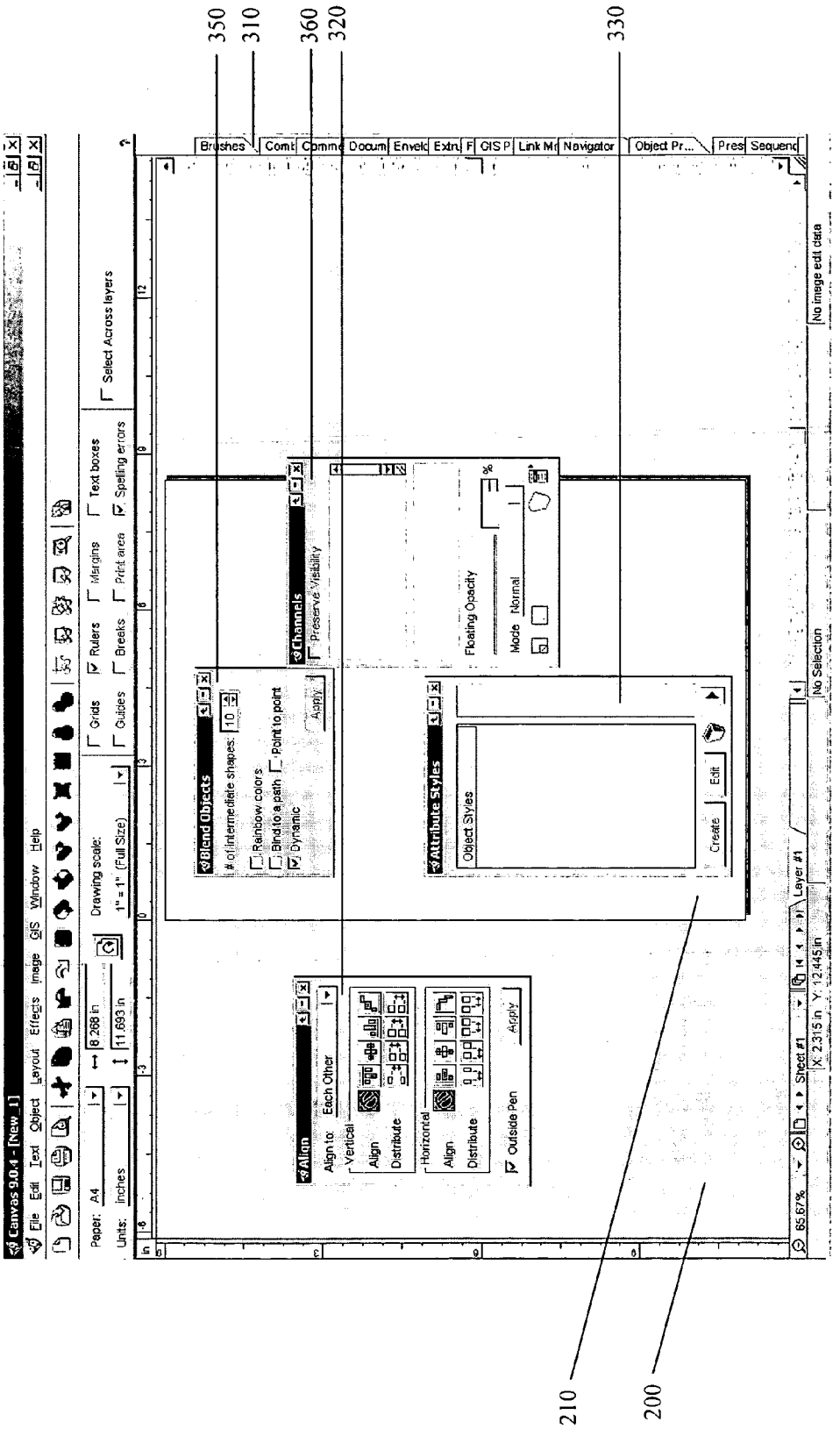
FIG. 3I



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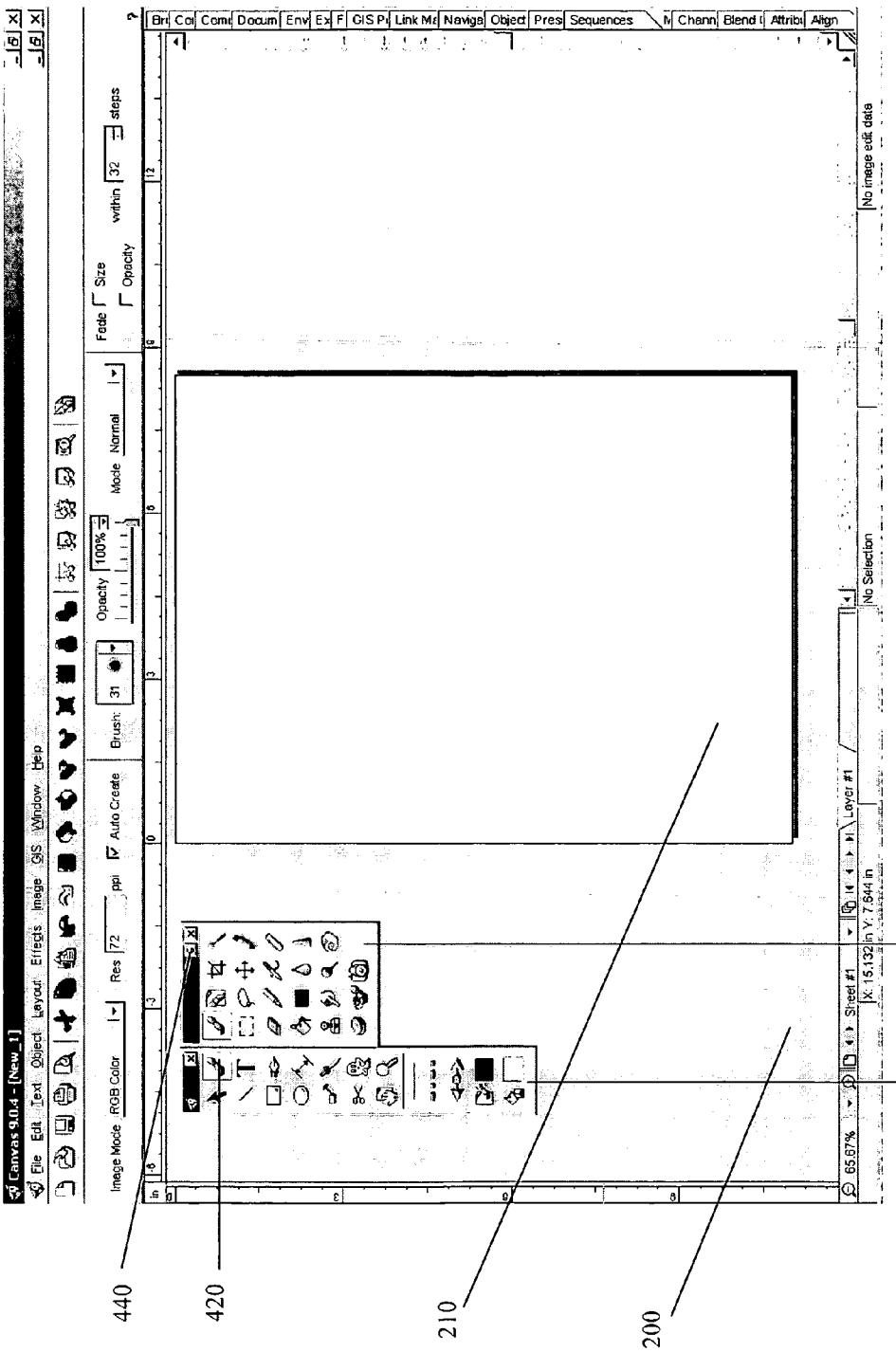

FIG. 4A

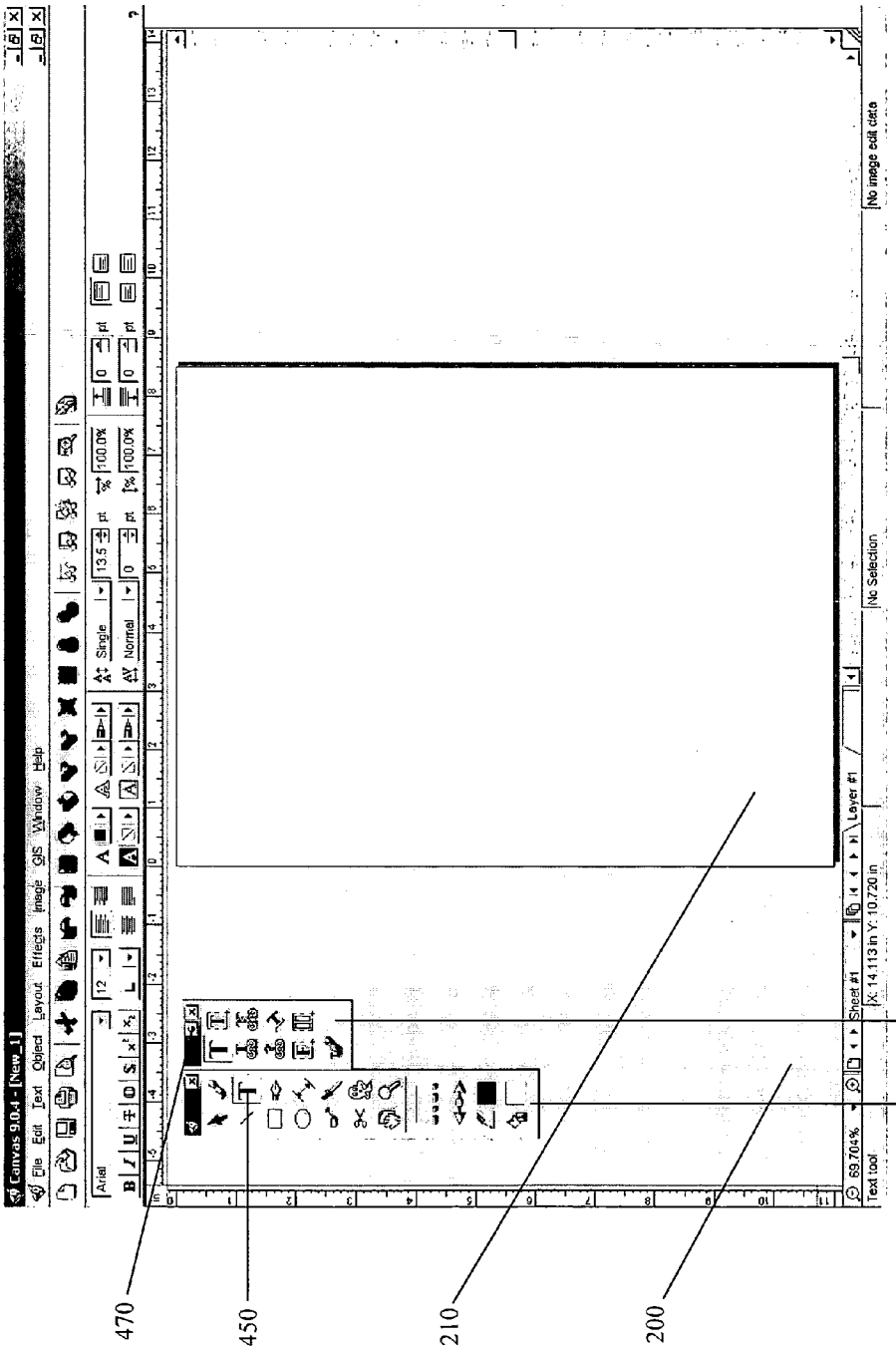

FIG. 4B

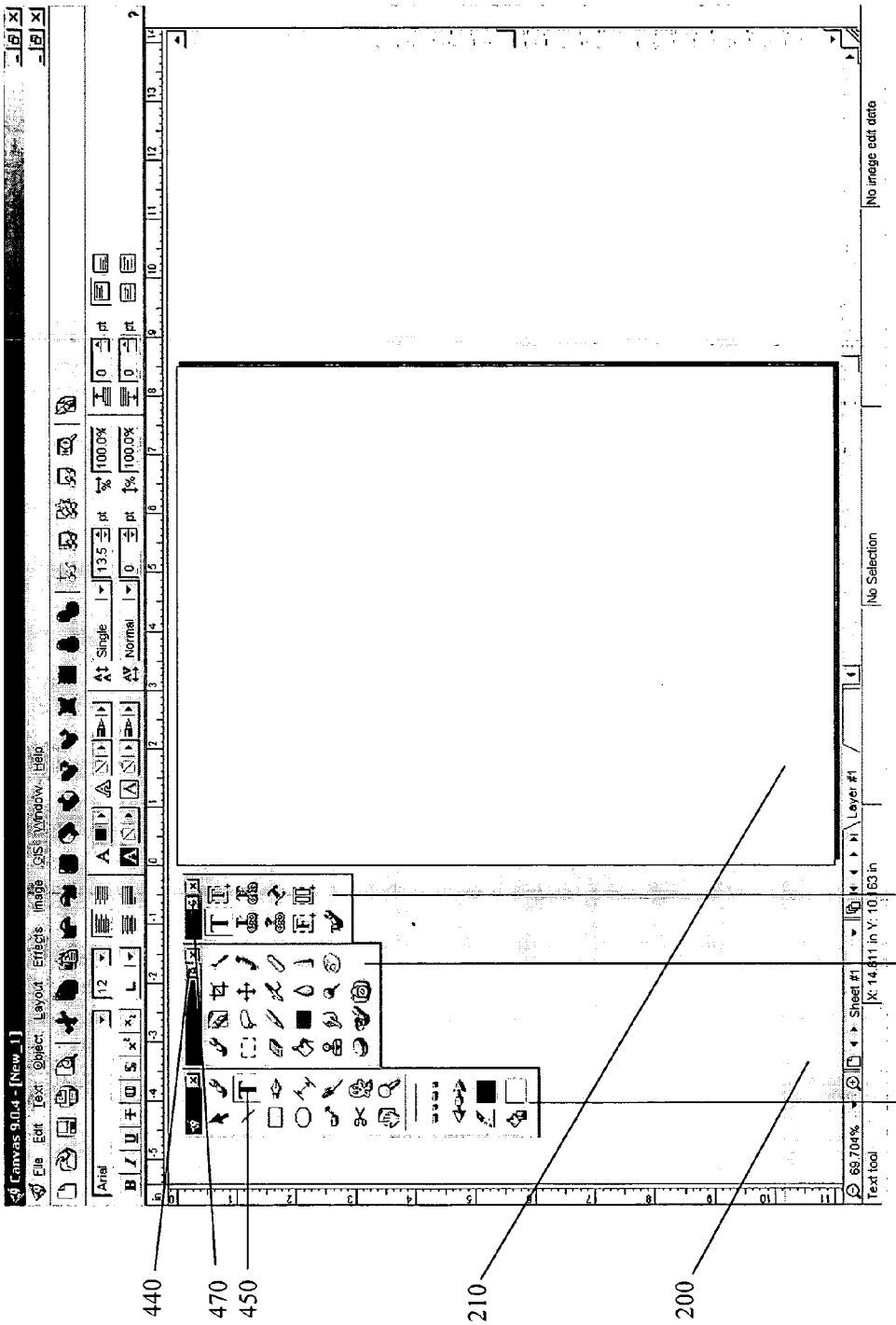

FIG. 4C

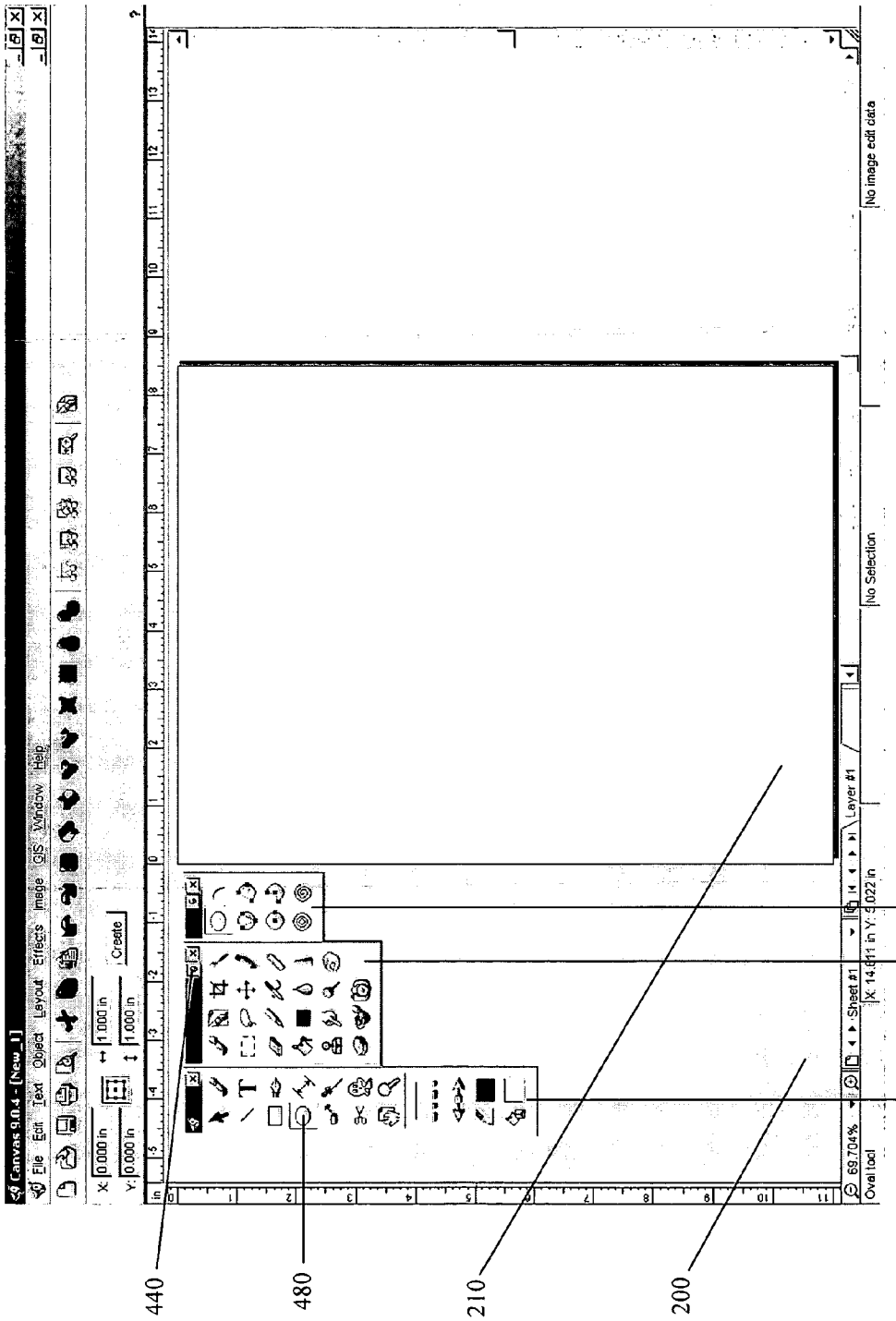

FIG. 4D

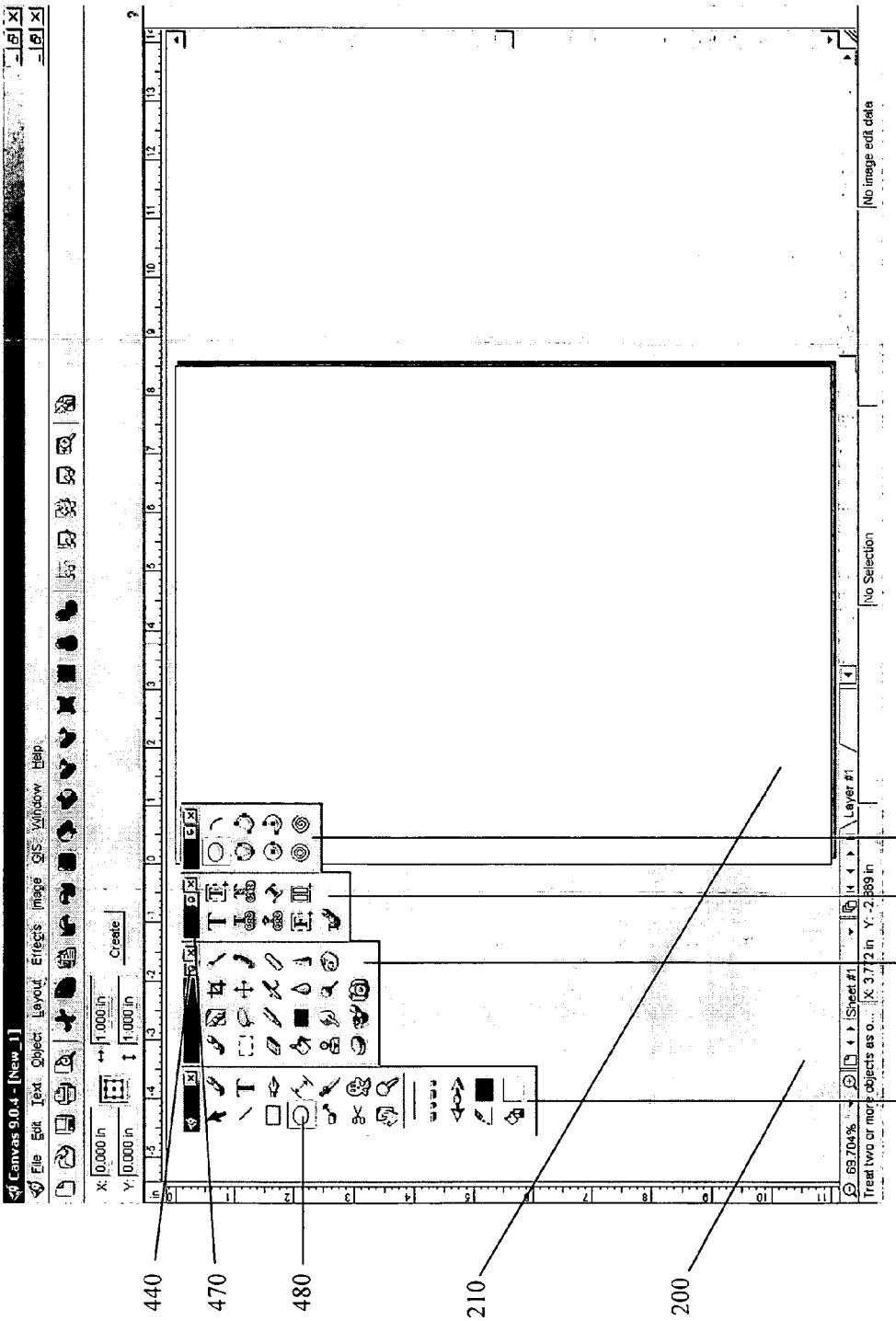

FIG. 4E

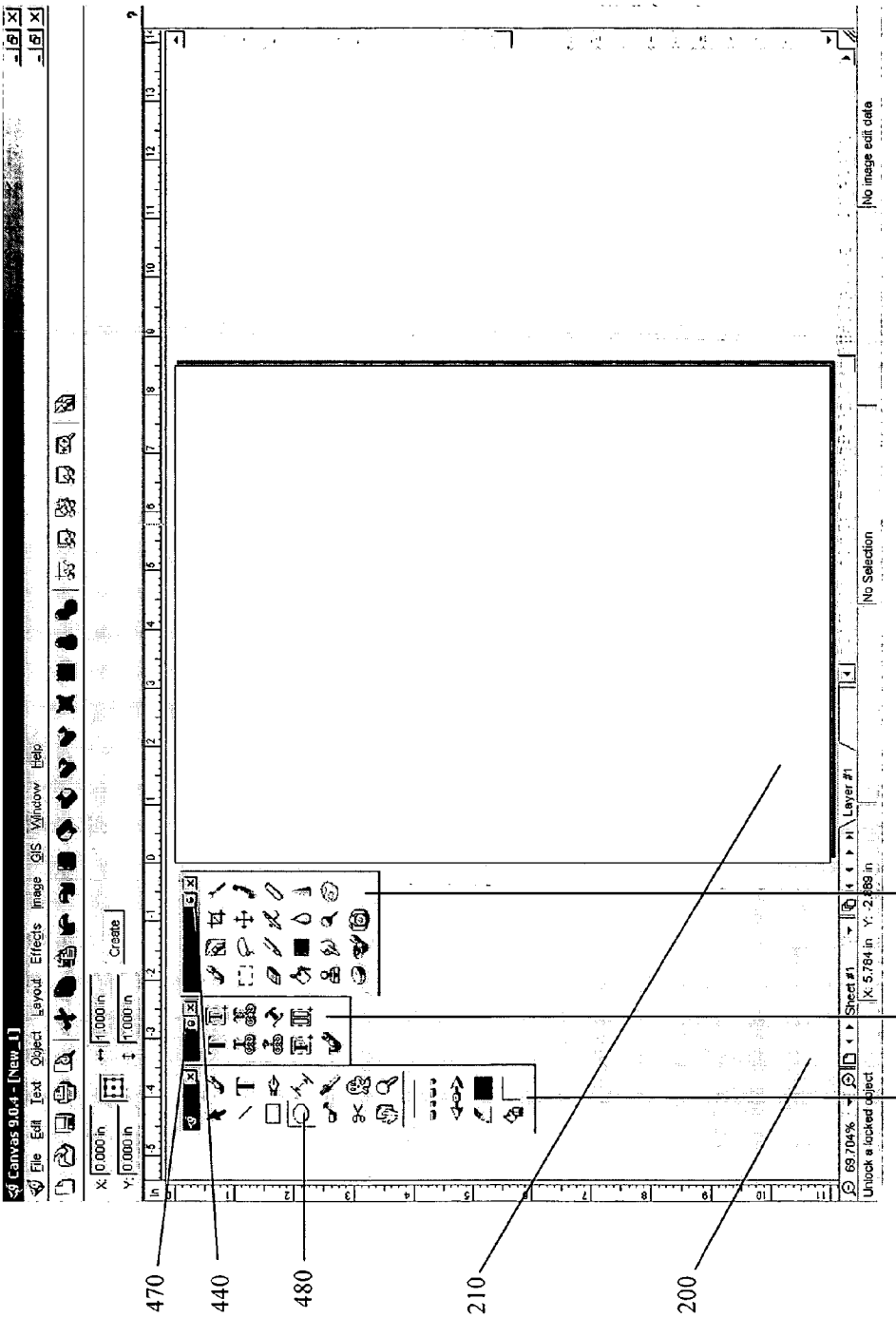

FIG. 4F

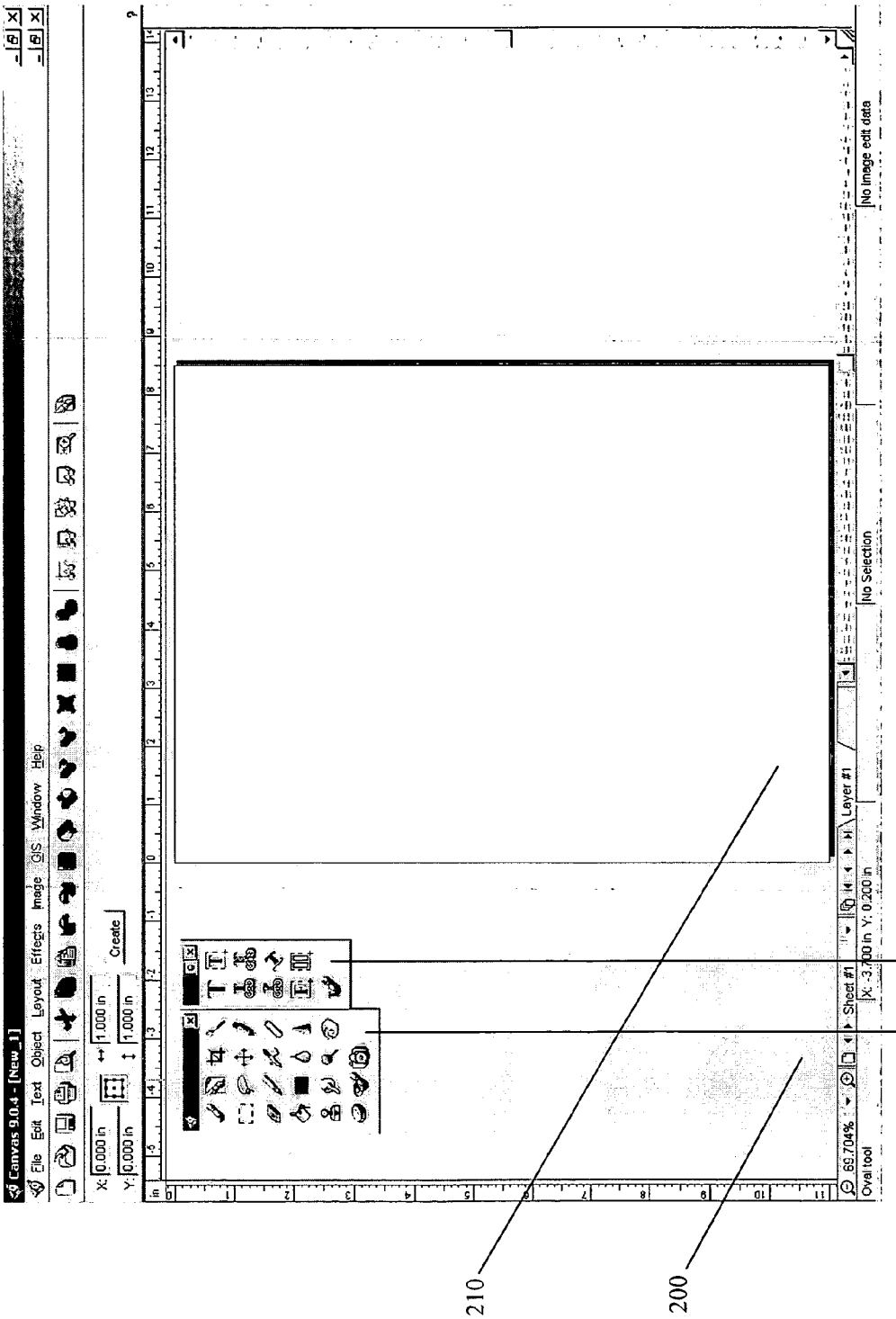
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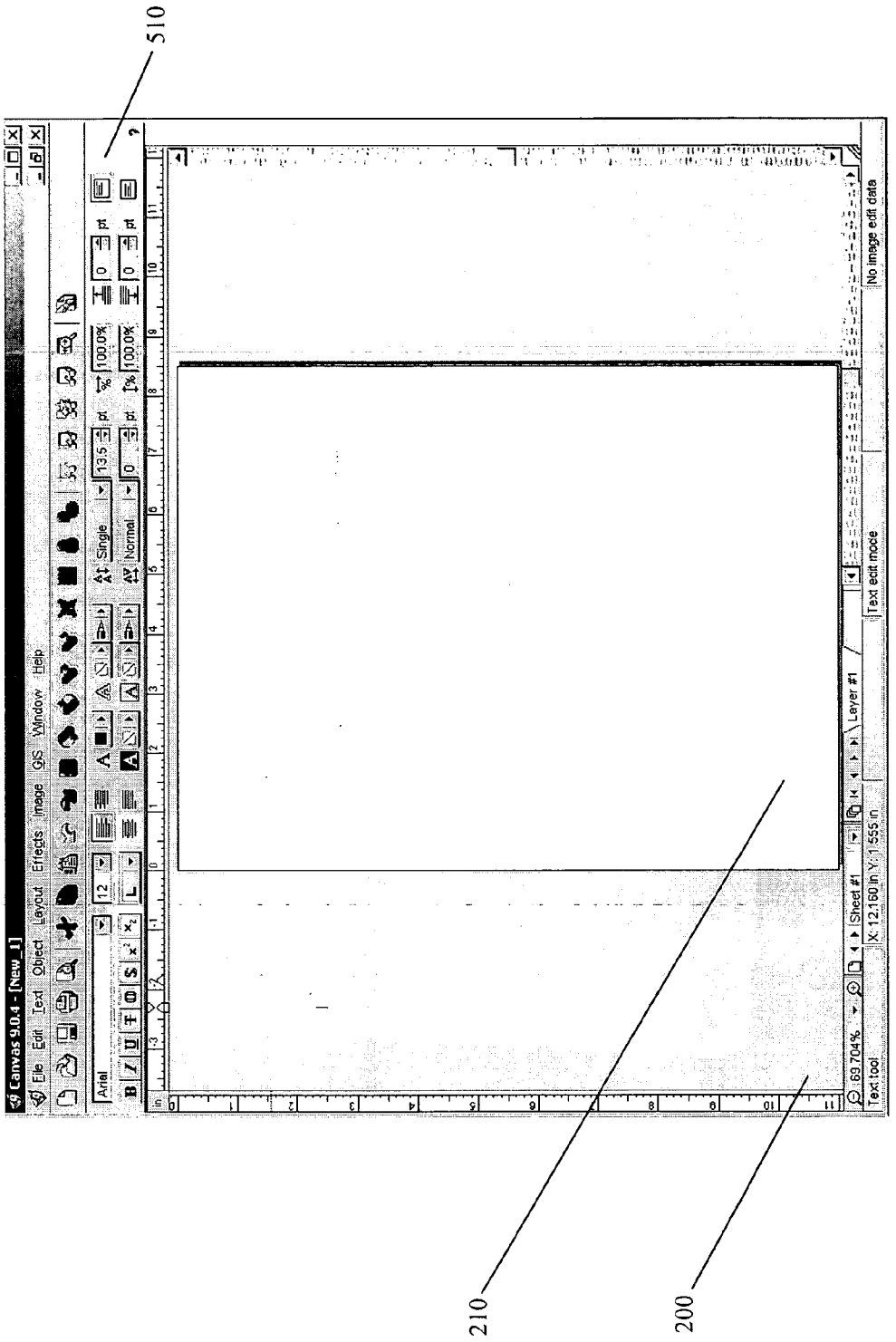
FIG. 4G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Sheet #1
Text tool
Text edit mode
No image edit data

FIG. 5A

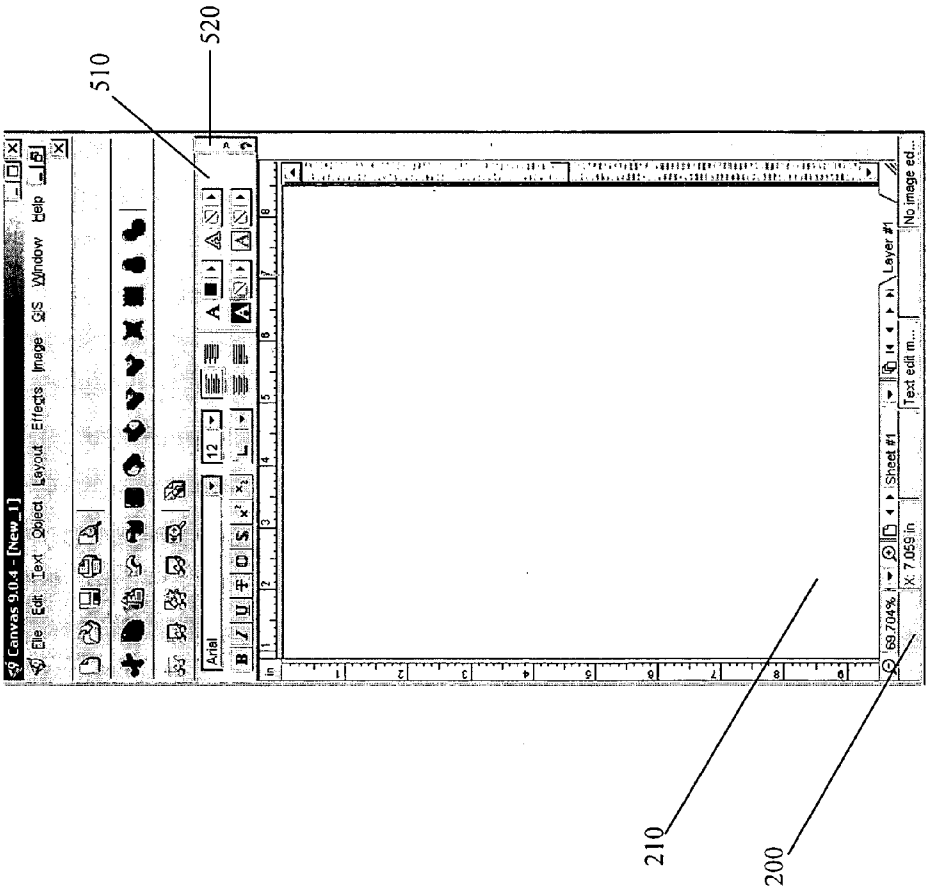

FIG. 5B

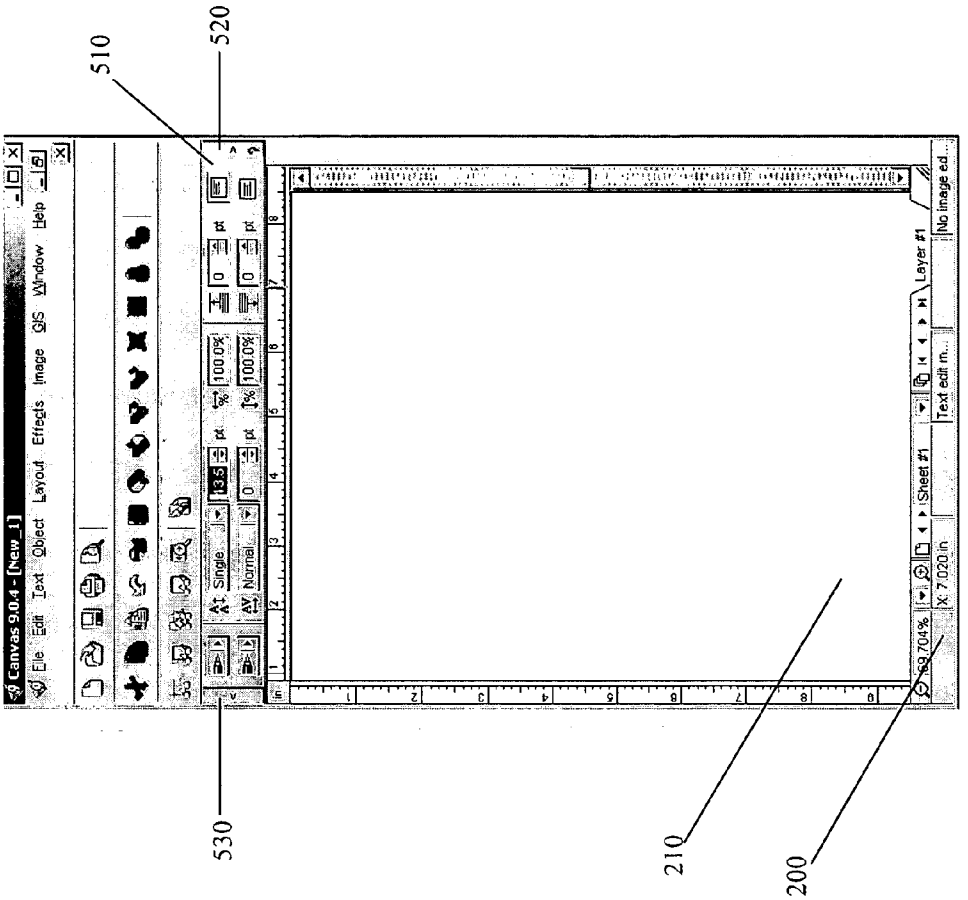
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FIG. 5C

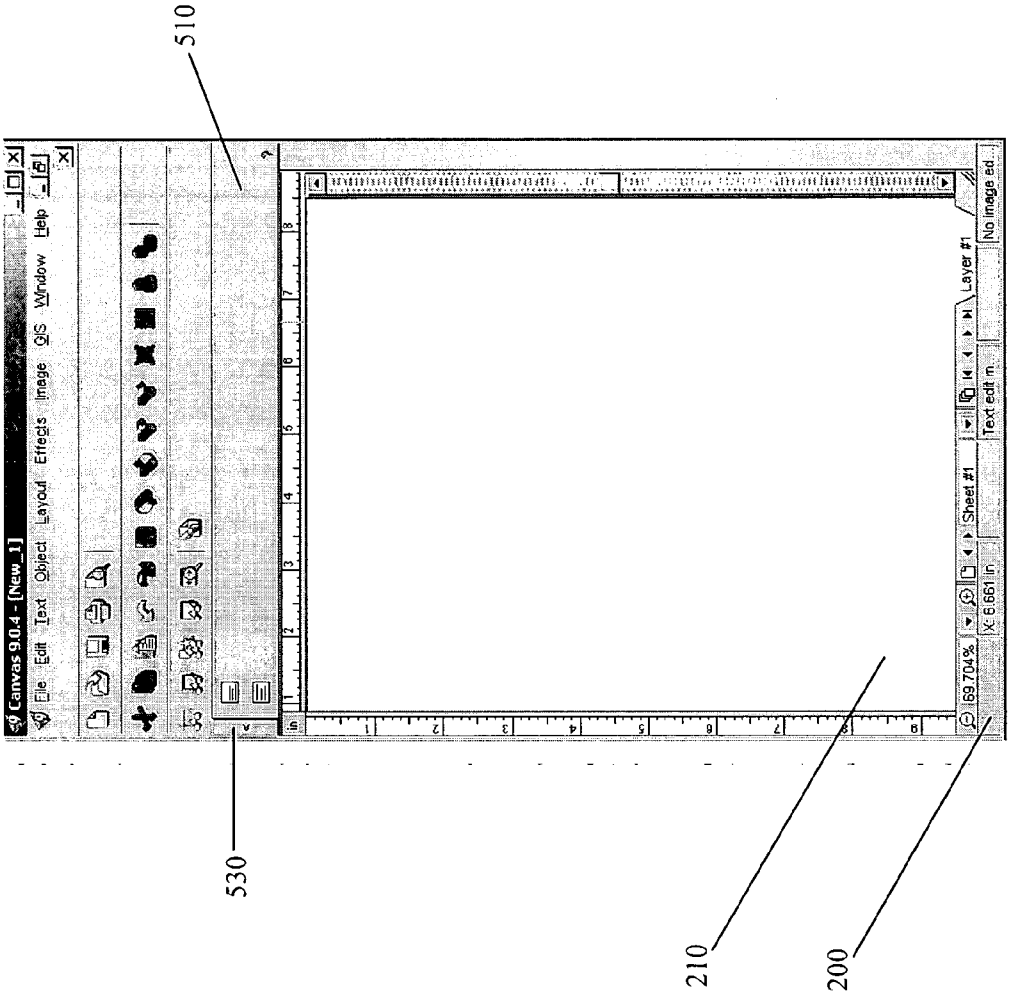
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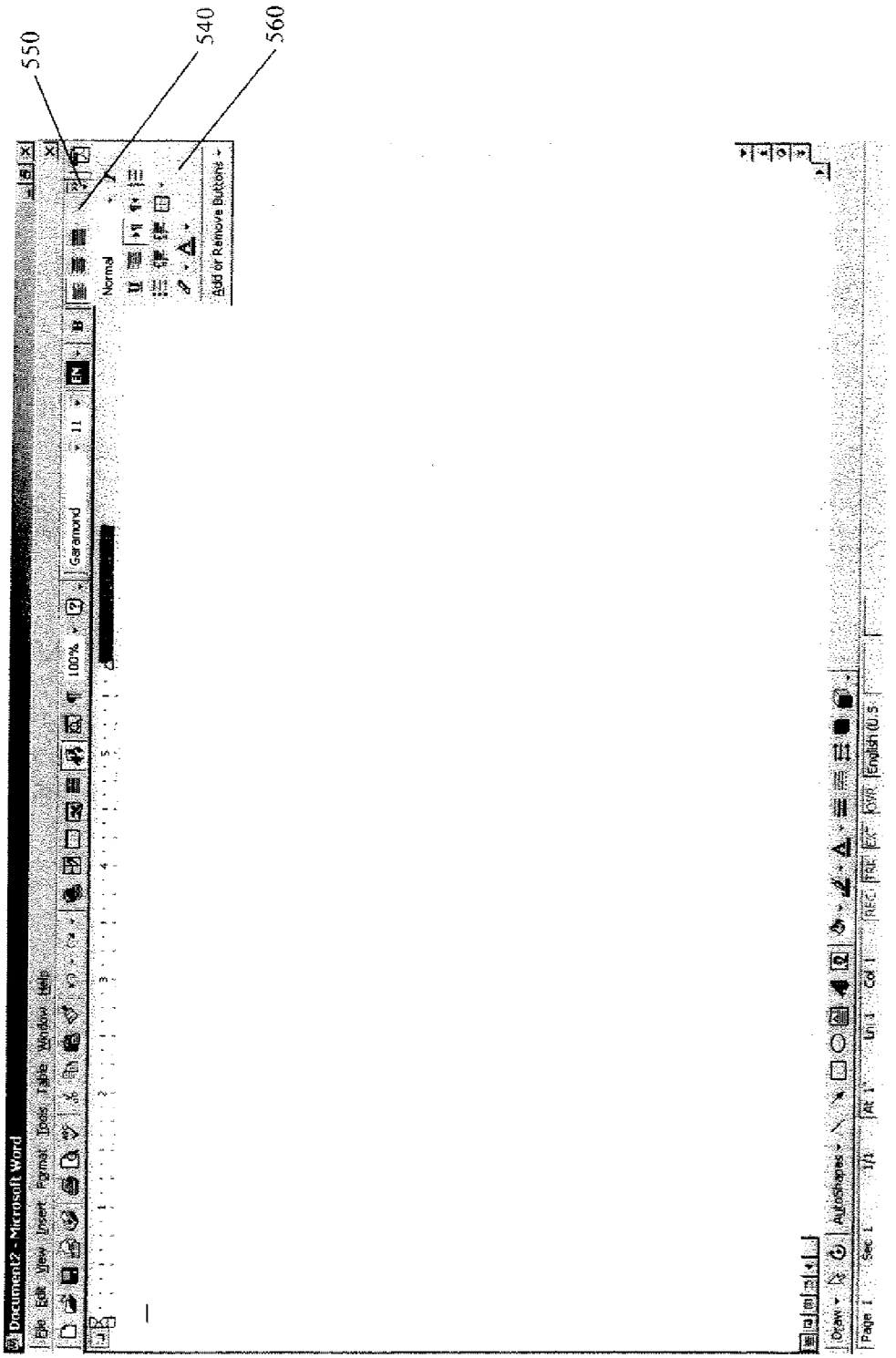
FIG. 5D



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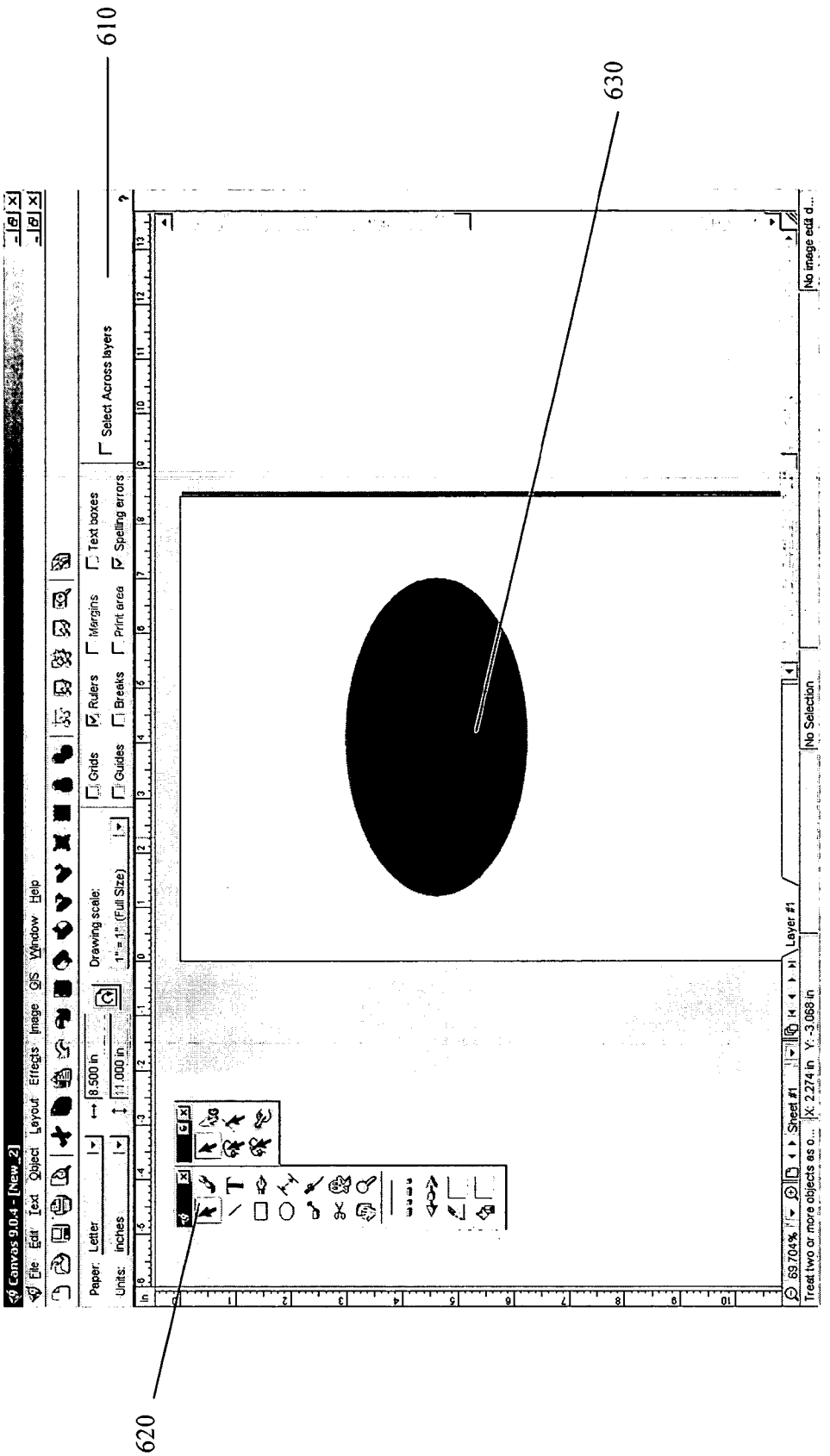
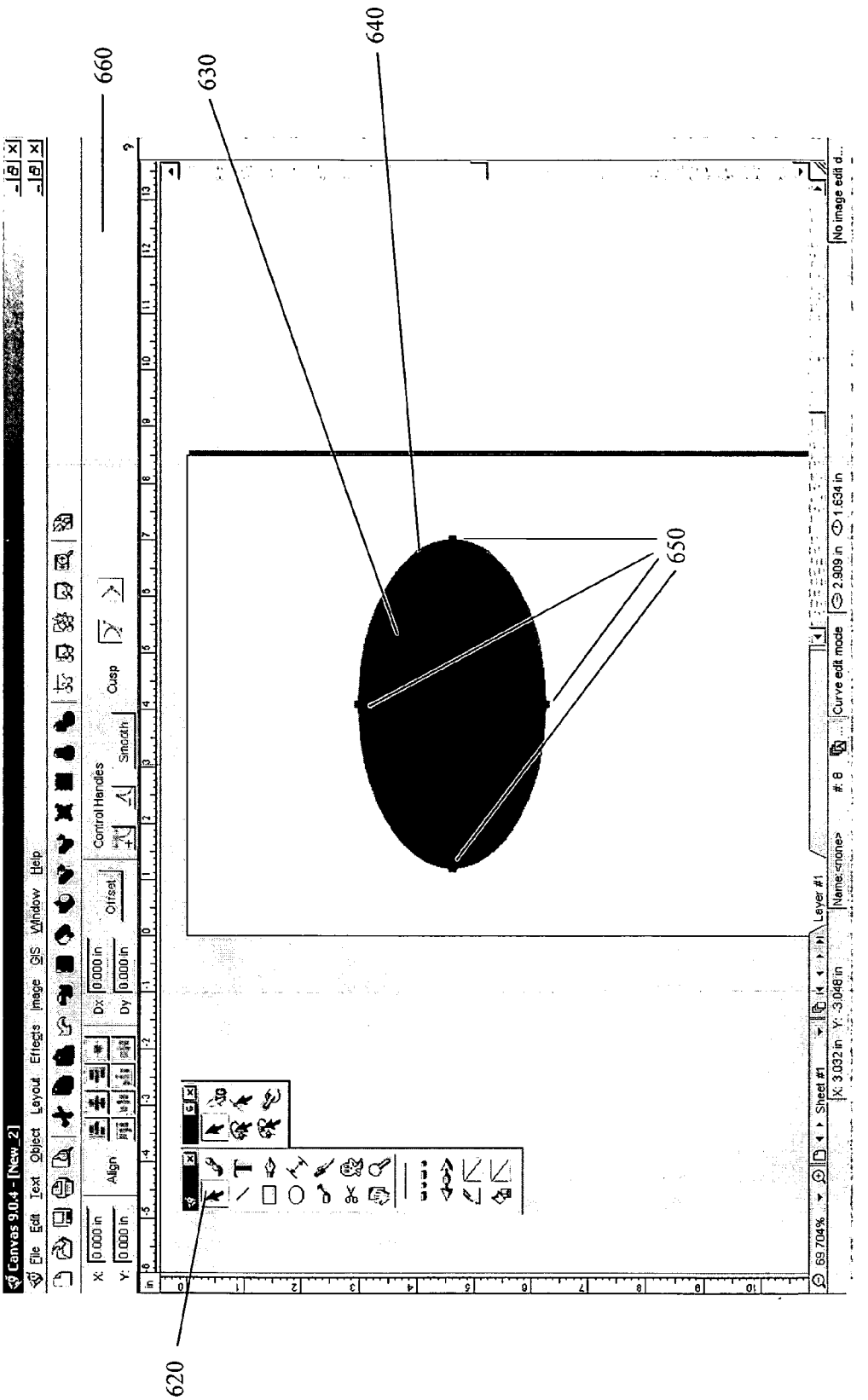


FIG. 6A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620
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Smooth
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FIG. 6B

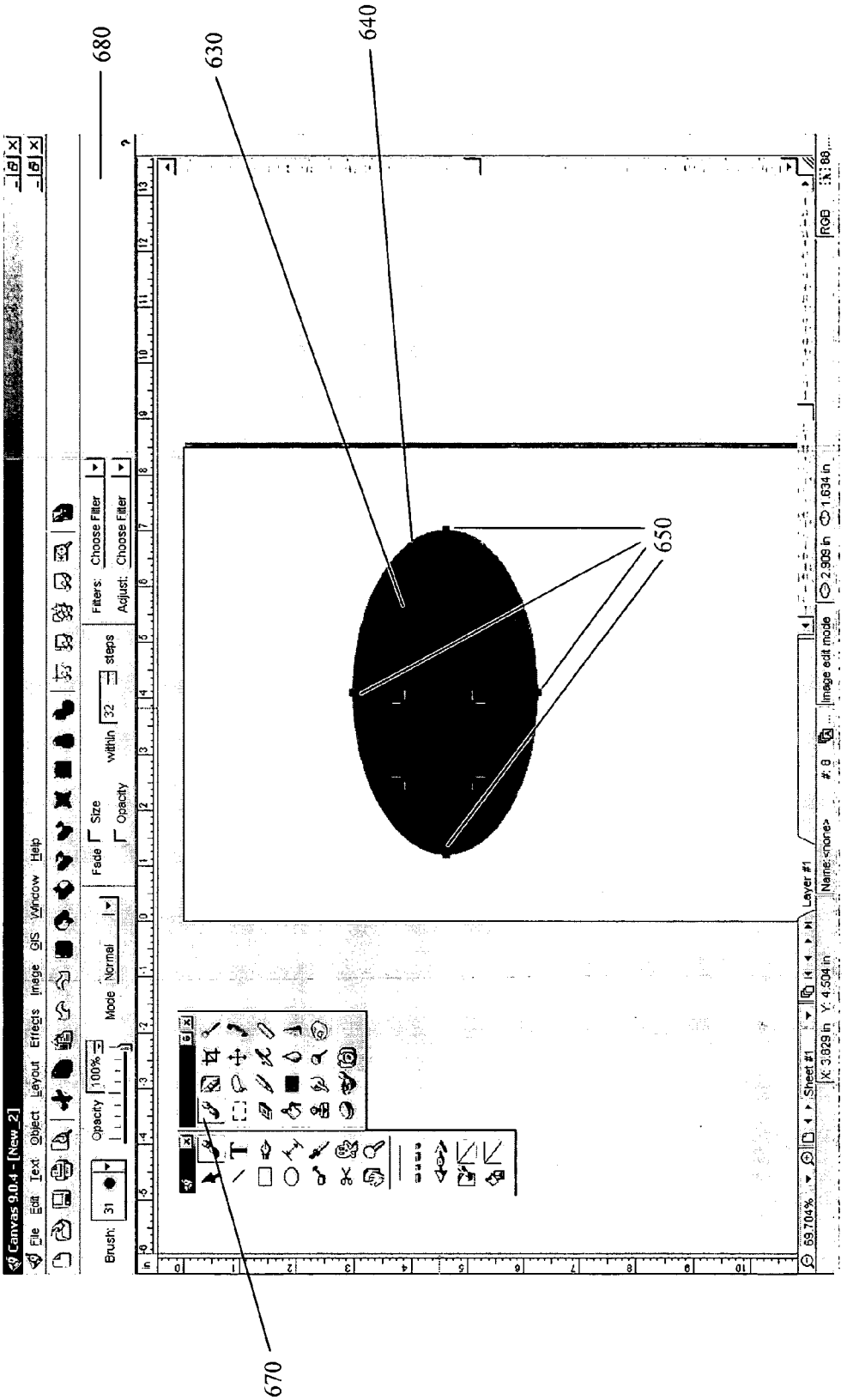
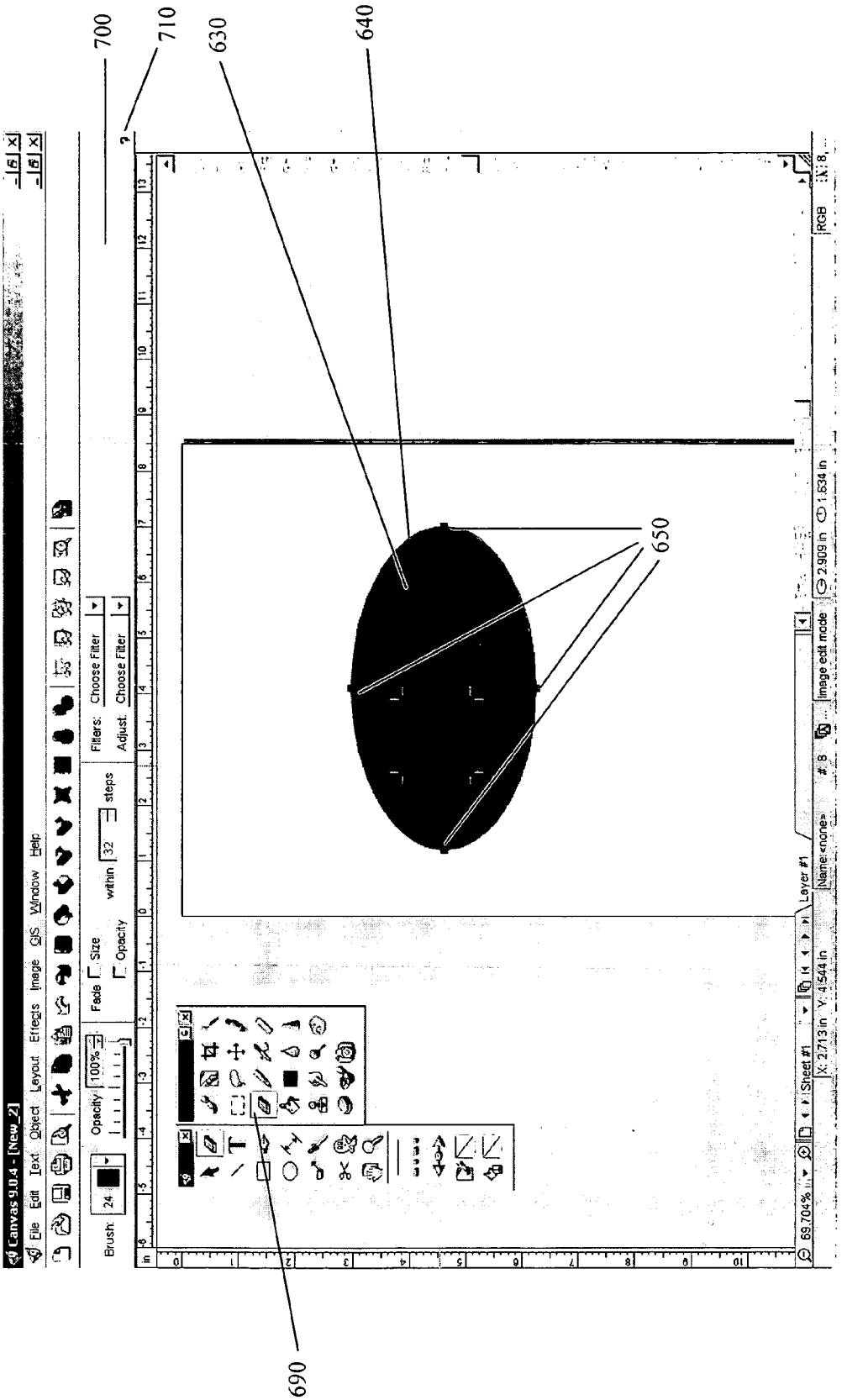


FIG. 6C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Canvas 9.0.4 - [New_2]
File Edit Text Object Layout Effects Image QIS Window Help
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Opacity
Fade
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Opacity
within
steps
Filters:
Choose Filter
Adjust:
Choose Filter
Layer #1
Name:<none>
image edit mode
RGB

FIG. 6D

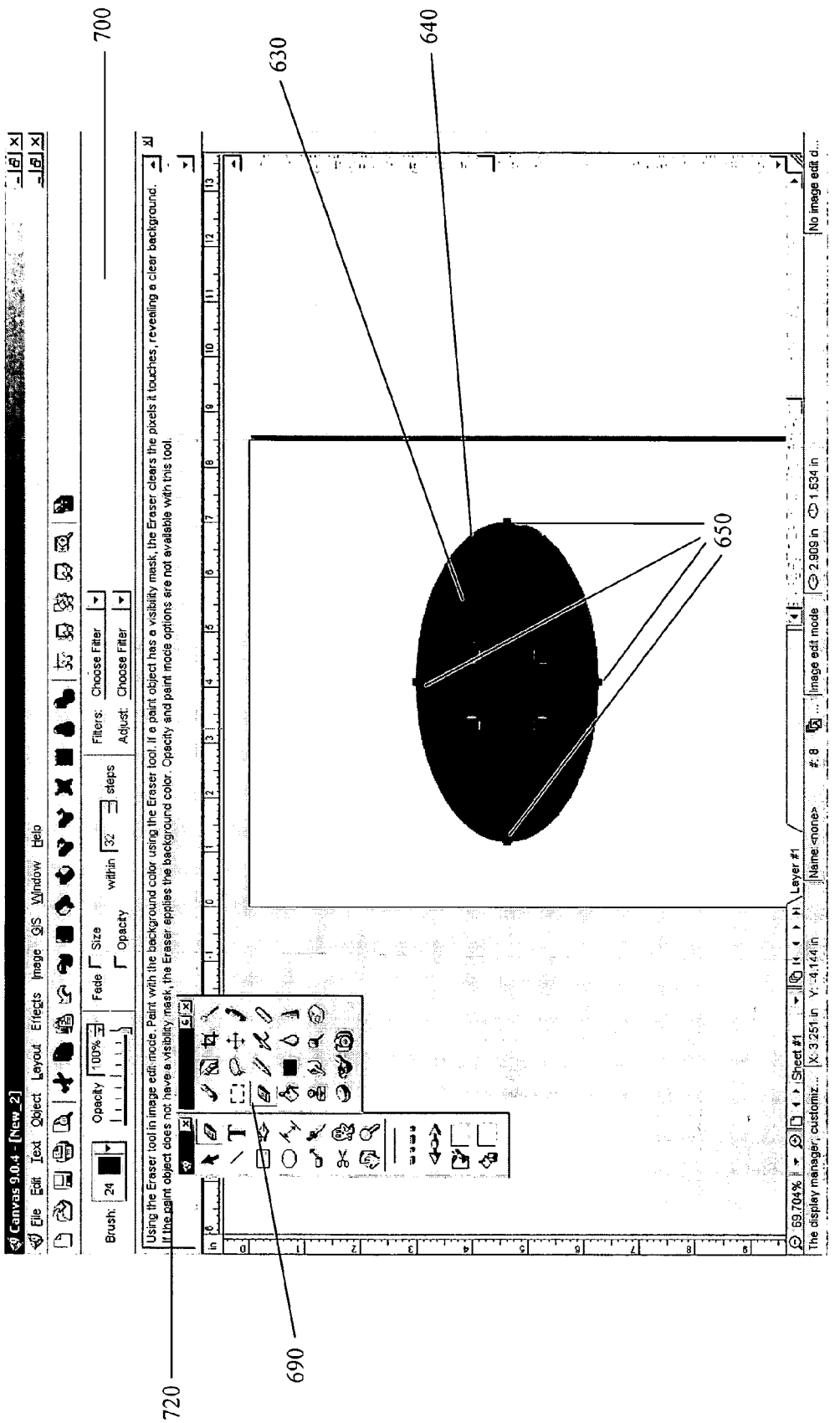
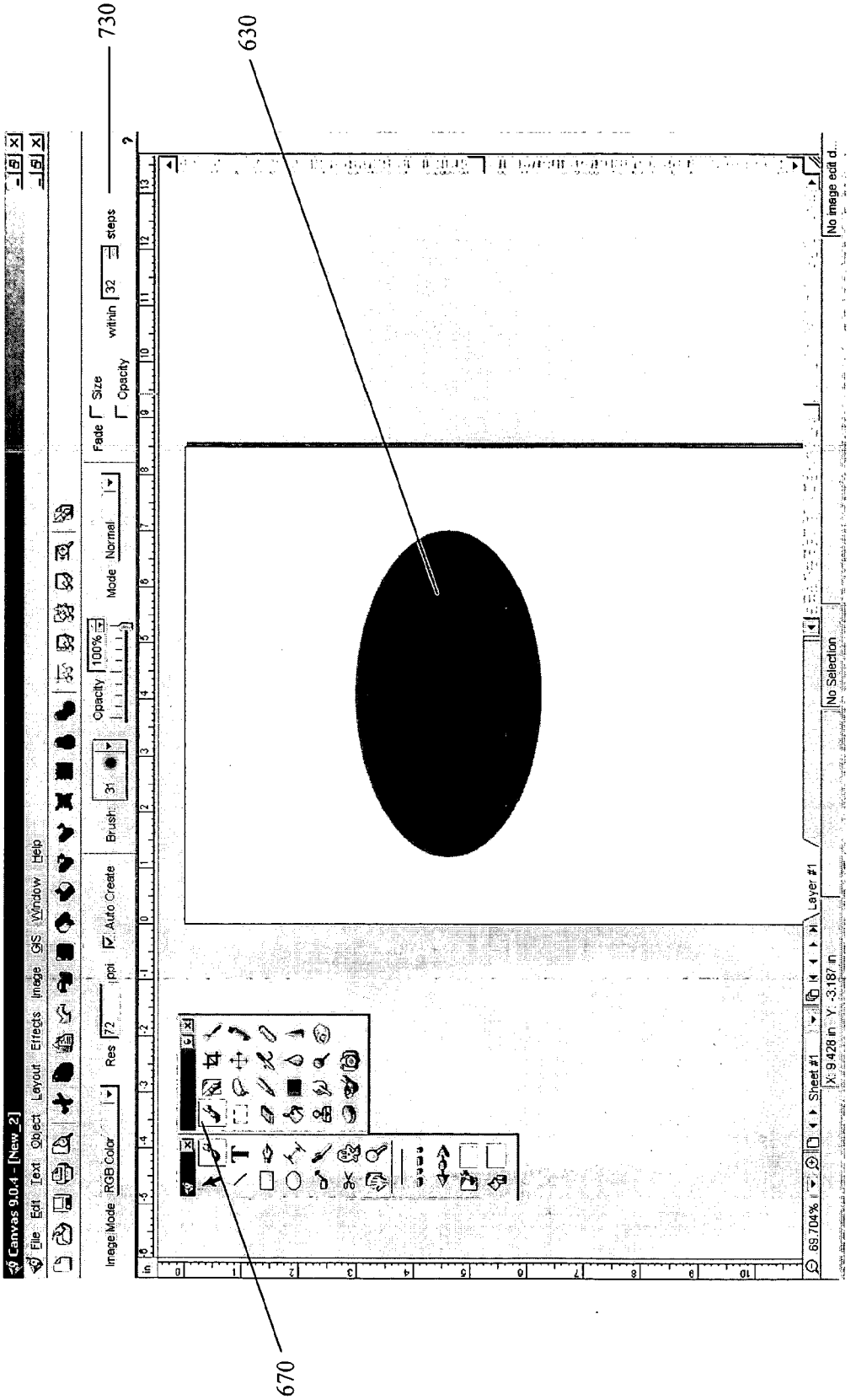


FIG. 6E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630
670
Canvas 9.0.4 - [New_2]
File Edit Text Object Layout Effects Image GIS Window Help
Image Mode RGB Color
Res 72 ppi
Auto Create
Brush 31
Opacity 100%
Mode Normal
Fade Size Opacity within 32 steps
No image edit d
Layer #1
No Selection
Sheet #1
X: 9.428 in Y: -3.187 in
68.704%

FIG. 6F

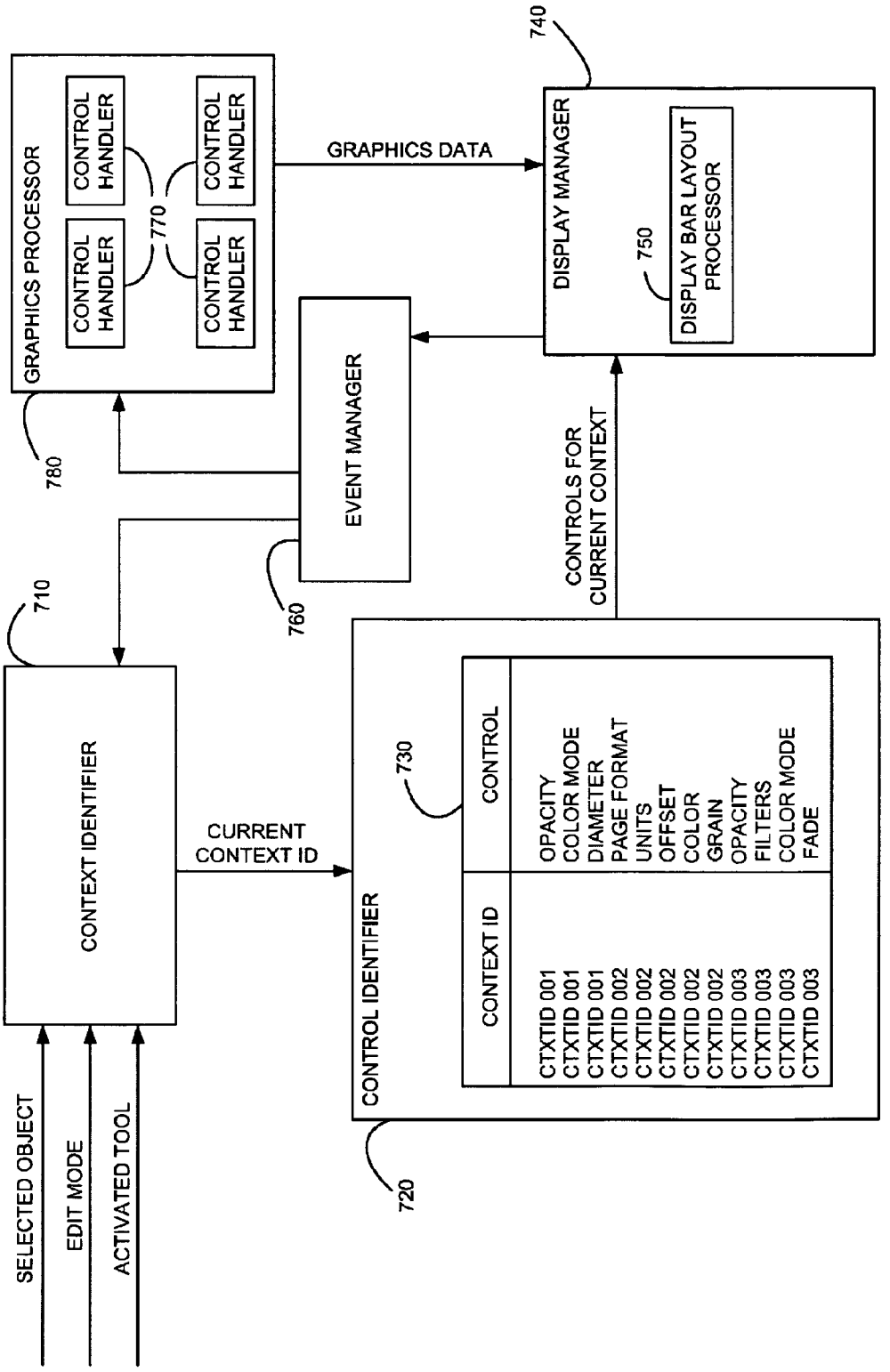
740
GRAPHICS PROCESSOR
CONTROL HANDLER
CONTROL HANDLER
CONTROL HANDLER
CONTROL HANDLER
770
GRAPHICS DATA
DISPLAY MANAGER
750
DISPLAY BAR LAYOUT PROCESSOR
780
EVENT MANAGER
760
CONTROLS FOR CURRENT CONTEXT
710
CONTEXT IDENTIFIER
CURRENT CONTEXT ID
730
CONTROL IDENTIFIER
CONTEXT ID
CONTROL
CTXTID 001 OPACITY
CTXTID 001 COLOR MODE
CTXTID 001 DIAMETER
CTXTID 002 PAGE FORMAT
CTXTID 002 UNITS
CTXTID 002 OFFSET
CTXTID 002 COLOR
CTXTID 002 GRAIN
CTXTID 003 OPACITY
CTXTID 003 FILTERS
CTXTID 003 COLOR MODE
CTXTID 003 FADE
720
SELECTED OBJECT
EDIT MODE
ACTIVATED TOOL

FIG. 7

MANAGEMENT OF MULTIPLE WINDOW PANELS WITH A GRAPHICAL USER INTERFACE

FIELD OF THE INVENTION

The present invention relates to management of window panels generated within software applications.

BACKGROUND OF THE INVENTION

Professional software applications generally offer a lot of special features. Graphics applications, for example, operate through objects and layers. Objects typically include vector primitives such as character fonts, points, lines and areas, as well as raster images. Layers include one or more objects, and are composited together in a variety of ways. User actions are applied through tools for curves, rectangles, ellipses, text, brush strokes, color fills, erasers, and much more. Tools may have many controls associated therewith, for setting and adjusting properties such as size, thickness, shape, color and opacity. Objects are generated and modified using palettes.

Users taking advantage of the many features of professional software applications quickly find themselves buried with window panels on the display screen. FIGS. **1**A and **1**B are two examples of graphic applications, illustrating an abundance of window panels for tools and palettes that are accessible. As can be seen, the window panels confine and clutter a user's working space, and the user spends a lot of time and effort in moving the window panels around.

There is therefore a need for a systematic way to manage multiple window panels for software applications so as to maintain their accessibility, while making it easy for a user to use them to perform tasks within the software applications.

Another drawback of professional software applications is that although a wide variety of controls are available, for each state that the application is in, only a subset of controls is relevant. As states dynamically change, a user often needs help in finding the appropriate subset of controls for a current state.

There is therefore also a need for a systematic way to manage controls, so that an appropriate subset of controls for a current state of the application is always readily available to the user.

SUMMARY OF THE INVENTION

Professional software applications such as graphics programs often provide a variety of features through the use of palettes and toolboxes. Palettes are used to provide alternatives for a specific type of user action. A familiar example of a palette is a color palette, used to provide a user with choices of a color for filling in an area of a graphic, or for a background, or for a border, or for other parts of an object. Another example of a palette is a combine palette, used to provide different alternative ways to combine two objects that overlap one on top of the other. Generally, each palette is displayed within its own window panel of an application program, and professional applications may provide so many different palettes, that management of the window panels can become complicated and difficult.

Toolboxes are used to provide many tools for use within an application, such as a tool for brush strokes, a tool for generating curves, a tool for generating rectangles, a tool for generating circles, a tool for erasers and a tool for text. In turn, some of the tools within a toolbox may themselves use a variety of specific sub-tools. Similar to window panels for palettes, window panels for toolboxes can also become complicated and difficult to manage.

The present invention provides a method and system for conveniently managing proliferation of rectangular window panels within software applications. In accordance with a preferred embodiment of the present invention, window panels can be fastened, or snapped, together into a cohesive union that can be moved about as a single area; namely, an area that is a union of rectangles. When one panel is brought into close proximity of another panel, the two panels snap together to form a single combined area, referred to herein as a "union". Unions of two or more panels can be generated by combining individual panels, and by combining unions of panels into larger unions.

The present invention also provides a way of breaking a union of panels apart into smaller unions. When a panel that is part of a union of panels is moved while the shift key is depressed, that panel is separated from the others and it alone moves while the other panels remain fixed. Similarly, when a panel that is part of a union of panels is moved while the control key is depressed, that panel and all other panels of the union that are positioned below and to the right of it are separated from the others, and they alone move while the other panels remain fixed. Thus by using the shift and control keys a user can easily decompose a union of panels into two or more smaller unions, as desired.

The snapping together of window panels provides a user with important advantages: (i) it is easier to move multiple window panels in unison as a single area, rather than individually; and (ii) window panels that are not fastened together either overlap and obscure one another, making it difficult to access them, or else spread out and obscure the document being worked on by the user, making it difficult to access the document.

The present invention provides a method and system for managing toolbox panels, referred to as "parent" panels, for tools which themselves require panels of sub-tools, referred to as "child" panels. For example, a transparency tool within a parent window panel may invoke sub-tools in a child panel for different transparency effects, such as radial transparency, directional transparency, rectangular transparency, elliptical transparency and a ghost tool for generating masks for an alpha channel using brush strokes. In accordance with a preferred embodiment, the present invention positions a child window panel adjacent to its parent window panel when the child panel is first generated, and fastens the parent and child panels together so that they behave cohesively as a single area. Moreover, the child panel is automatically closed when the parent panel closes. If a user desires to circumvent this feature, the child panel can be locked, so as to remain open after its parent panel closes. The present invention also manages multiple child panels, which are stacked adjacent to one another.

The present invention also provides a method and system for managing controls within a display bar when the size of the display bar cannot accommodate all of the controls. In accordance with a preferred embodiment of the present invention, the display bar is arranged in successive portions that can be interactively accessed through page forward and page backward buttons. Each portion of the display bar displays a subset of the controls, so that controls hidden on one portion of the display bar are visible on another portion, thus making it easy and convenient for a user to access any of the controls by navigating forward and backward.

The present invention also provides a method and system for managing a context-dependent display bar, based on a context in which a user is processing a graphical object within

a graphics software application. The context is determined from an object, an edit mode and a tool activated by the user. Controls associated with a current context are displayed dynamically within a display bar. When a user selects a tool or an object, or enters an edit mode, the display bar changes accordingly, to include controls that are relevant to the current context. The display bar thus includes the subset of controls that are relevant to the current context of the graphics application, ensuring that the controls that a user requires are always readily available. Furthermore, context-sensitive help is linked to the display bar, so that a user can obtain instructions for using the controls within the display bar while working in the current context.

There is thus provided in accordance with a preferred embodiment of the present invention a method for managing a plurality of window panels within a computer software application including generating a window panel that is actively controlled by a user interface of a computer software application, indicating that a plurality of window panels generated by the generating are fastened together as a single union, wherein a union comprises at least one window panel that behave together as a single geometrical area when moved by a user within a computer display screen, the indicating occurring when one of the plurality of window panels is in close proximity to another of the plurality of window panels within the computer display screen, rigidly moving a union of window panels as a single geometrical area within the computer display screen, and detecting that a second union is in close proximity to a first union within the computer display screen.

There is further provided in accordance with a preferred embodiment of the present invention a user interface for managing a plurality of window panels including a window panel generator for generating a window panel that is actively controlled by a user interface of a computer software application, a window concatenator for indicating that a plurality of window panels generated by the window panel generator are fastened together as a single union, a window mover for rigidly moving a union of fastened-together window panels as a single geometrical area within a display screen, and a window position detector for detecting that a second window panel is positioned in close proximity to a first window panel within a display screen.

There is yet further provided in accordance with a preferred embodiment of the present invention a method for managing a plurality of window panels within a computer software application including generating a window panel for a palette that is actively controlled by a user interface of a computer software application, displaying the window panel within a computer display device, detecting that a user is applying an action at a location within the display device, docking the window panel for the palette within a docking bar when the detecting detects that a user is applying a docking action to the window panel, displaying a tab within the docking bar for enabling the palette when the window panel is docked by the docking, displaying the palette within an area connected to the tab, but not within a window panel, when the detecting detects that the user is applying an activation action to the tab, and displaying the palette within a window panel when the detecting detects that the user is applying a generation action to the tab.

There is additionally provided in accordance with a preferred embodiment of the present invention a user interface for managing a plurality of window panels within a computer software application including a window panel generator for generating a window panel for a palette that is actively controlled by a user interface of a computer software application, and for displaying the window panel within a computer display device, a user input detector for detecting that a user is applying an action at a location within the display device, a window docking manager for docking the window panel for the palette within a docking bar of the user interface when the user input detector detects that a user is applying a docking action to the window panel, and a display manager (i) for displaying a tab within the docking bar for enabling the palette when the window docking manager docks the window panel, (ii) for displaying the palette within an area connected to the tab, but not within a window panel, when the user input detector detects that the user is applying an activation action to the tab, and (iii) for displaying the palette within a window panel when the user input detector detects that the user is applying a generation action to the tab.

There is moreover provided in accordance with a preferred embodiment of the present invention a method for managing a plurality of controls within a display bar, including detecting that a user is applying a page forward action to advance a display bar from a current portion to a next portion, determining at least one control from among a plurality of controls that are to be visible when the display bar is advanced to the next portion, and displaying the visible controls within the next portion of the display bar, in response to the detecting.

There is further provided in accordance with a preferred embodiment of the present invention a user interface for managing a plurality of controls within a display bar, including a user input detector for detecting that a user is applying a page forward action to advance a display bar from a current portion to a next portion, a window processor for determining at least one control from among a plurality of controls that are to be visible when the display bar is advanced to the next portion, and a display processor for displaying the visible controls within the next portion of the display bar, in response to the user input detector detecting the page forward action.

There is yet further provided in accordance with a preferred embodiment of the present invention a method for managing a context-dependent display bar, including identifying a graphical object currently selected by a user who is interactively running a graphics software application through a graphical user interface to process an image, wherein the image is a vector image or a raster image or a combination vector and raster image, identifying a current edit mode in which the user is working, identifying a tool currently activated by the user, determining a current context in which the user is working, the context depending upon the identified graphical object, the identified edit mode, and the identified tool, identifying at least one control associated with the current context, displaying the image, and displaying the associated controls for the current context within a display bar of the graphical user interface.

There is additionally provided in accordance with a preferred embodiment of the present invention a user interface for managing a context-dependent display bar, including a context processor including a state identifier for identifying (i) a graphical object being selected by a user who is interactively running a graphics software application to process a image, wherein the image is a vector image or a raster image or a combination vector and raster image, (ii) an edit mode within which the user is working, (iii) a tool activated by the user, and (iv) at least one control associated with a current context in which a user is working, and a context identifier for determining the current context, the current context depending upon the identified graphical object, the identified edit mode, and the identified tool, and a display manager operatively coupled with the context processor for displaying (i)

the image, and (ii) a display bar including the associated controls for the current context.

There is moreover provided in accordance with a preferred embodiment of the present invention a computer readable storage medium storing program code for causing a computer to perform the steps of generating a window panel that is actively controlled by a user interface of a computer software application, indicating that a plurality of window panels generated by the generating are fastened together as a single union, wherein a union comprises at least one window panel that behave together as a single geometrical area when moved by a user within a computer display screen, the indicating occurring when one of the plurality of window panels is in close proximity to another of the plurality of window panels within the computer display screen, rigidly moving a union of window panels as a single geometrical area within the computer display screen, and detecting that a second union is in close proximity to a first union within the computer display screen.

There is further provided in accordance with a preferred embodiment of the present invention a computer readable storage medium storing program code for causing a computer to perform the steps of generating a window panel for a palette that is actively controlled by a user interface of a computer software application, displaying the window panel within a computer display device, detecting that a user is applying an action at a location within the display device, docking the window panel for the palette within a docking bar when the detecting detects that a user is applying a docking action to the window panel, displaying a tab within the docking bar for enabling the palette when the window panel is docked by the docking, displaying the palette within an area connected to the tab, but not within a window panel, when the detecting detects that the user is applying an activation action to the tab, and displaying the palette within a window panel when the detecting detects that the user is applying a generation action to the tab.

There is yet further provided in accordance with a preferred embodiment of the present invention a computer readable storage medium storing program code for causing a computer to perform the steps of detecting that a user is applying a page forward action to advance a display bar from a current portion to a next portion, determining at least one control from among a plurality of controls that are to be visible when the display bar is advanced to the next portion, and displaying the visible controls within the next portion of the display bar, in response to the detecting.

There is additionally provided in accordance with a preferred embodiment of the present invention a computer readable storage medium storing program code for causing a computer to perform the steps of identifying a graphical object currently selected by a user who is interactively running a graphics software application through a graphical user interface to process an image, wherein the image is a vector image or a raster image or a combination vector and raster image, identifying a current edit mode in which the user is working, identifying a tool currently activated by the user, determining a current context in which the user is working, the context depending upon the identified graphical object, the identified edit mode, and the identified tool, identifying at least one control associated with the current context, displaying the image, and displaying the associated controls for the current context within a display bar of the graphical user interface.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood and appreciated from the following detailed description, taken in conjunction with the drawings in which:

FIGS. **1**A and **1**B are prior art illustrations of window panels displayed within a graphics software application;

FIGS. **2**A-**2**D are illustrations of docking window panels, in accordance with a preferred embodiment of the present invention;

FIGS. **3**A-**3**J are illustrations of fastening window panels together, in accordance with a preferred embodiment of the present invention;

FIGS. **4**A-**4**G are illustrations of fastening parent and child window panels together and locking the child window panels, in accordance with a preferred embodiment of the present invention;

FIGS. **5**A-**5**D are illustrations of a multi-page property bar, in accordance with a preferred embodiment of the present invention;

FIG. **5**E is a prior art illustration of a property bar displayed within a software application;

FIGS. **6**A-**6**F are illustrations of a context-dependent property bar, in accordance with a preferred embodiment of the present invention; and

FIG. **7** is a simplified block diagram of a system for managing context-dependent property bars, in accordance with a preferred embodiment of the present invention.

LIST OF APPENDICES

Appendix A is a detailed listing of computer source code written in the C++ programming language for implementing a preferred embodiment for managing window panels that can be fastened together in unions, in accordance with the present invention, and in conjunction with a Microsoft Windows operating system.

Appendix B is a detailed listing of computer source code written in the C++ programming language for implementing a preferred embodiment for managing window panels that can have parent-child relationships, in accordance with the present invention, and in conjunction with a Microsoft Windows operating system.

Appendix C is a detailed listing of computer source code written in the C++ programming language for implementing a preferred embodiment for managing context-sensitive property bars and multi-page property bars, in accordance with the present invention, and in conjunction with a Microsoft Windows operating system

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The present invention provides a method and system for managing multiple window panels within a software application. Using the present invention, a large number of window panels can be made readily accessible as a user works within the software application, without confining the user's workspace and cluttering up a display screen.

The present invention is preferably implemented within a conventional computing device including a central processing unit, memory units for storing programs and data, input devices including a mouse and keyboard, and an output display device. Preferably, the central processing unit, memory units, and device drivers for the mouse, keyboard and display are coupled communicatively together using a conventional data bus. It may be appreciated, however, from the description hereinbelow, that the present invention may also be implemented within non-conventional computing devices, as long as such devices include processing means, program and data storage means, and input and display means that inter-com-

municate. The present invention can be implemented within a standalone computer, or within one or more networked computers.

Reference is now made to FIGS. **2**A-**2**C, which are illustrations of docking window panels, in accordance with a preferred embodiment of the present invention. Shown in FIG. **2**A is a master window **200** for a software application manufactured and marketed by ACD Systems, Inc. named Canvas™. Canvas is a professional graphics program that provides a wide range of graphics capabilities, generally accessed through tools and palettes.

As shown in FIG. **2**A, a user has opened a blank document **210** and selected "Window" **220** in the menu bar. Upon clicking on "Window" **220**, a first pop up list is displayed, and the user has selected "Palettes" **230**. Upon clicking on "Palettes" a second pop up list is displayed, including a list of many palettes. The user has selected a "Combine" palette **240**.

Shown in FIG. **2**B is a window panel **250** that includes icons for the combine palette. Each icon represents a different combine operation, for combining two objects. Near the top right corner of window panel **250** is a button **260** for docking the panel.

Shown in FIG. **2**C is a tab **270** indicating that window panel **250** has been docked. Window panel **250** no longer appears in the Canvas application window, but it can be re-displayed by clicking on tab **270**. In a preferred embodiment of the present invention, when a user clicks on tab **270**, the combine palette is displayed in an area **280** adjacent and to the left of tab **270**, as shown in FIG. **2**D. If the user subsequently clicks on tab **270** again, or clicks anywhere outside of the combine palette, the palette is re-docked. If the user clicks on tab **270** and, while a mouse button is depressed, moves the mouse pointer, then window panel **250** is opened at the location where the mouse button is released, as in FIG. **2**B.

It often occurs with professional graphics applications that a user opens many palettes while working on graphics and, unless managed properly, the palettes can clutter the application window, making it difficult for the user to work. Docking of palettes is a convenient way to keep the palettes in a ready state, while not cluttering the application window.

Reference is now made to FIGS. **3**A-**3**J, which are illustrations of fastening window panels together, in accordance with a preferred embodiment of the present invention. Shown in FIG. **3**A are docked palettes, indicated by display tabs such as tab **310** for a "Blend" palette. As shown in FIG. **3**A, a user has opened two palettes; namely, an "Align" palette displayed in window panel **320**, for aligning graphic objects, and an "Attribute Styles" palette displayed in window panel **330**, for setting and changing object attribute styles. Each of the window panels **320** and **330** can be moved independently by pressing on a mouse button while the mouse pointer is positioned over a window panel, and moving the mouse pointer while the mouse button remains depressed, as is conventional with windows.

FIG. **3**B shows that the user has moved window panel **330** in close proximity to window panel **320**. In accordance with a preferred embodiment of the present invention, when window panels **320** and **330** are in close proximity of one another, they snap together as a union and behave as a single area, where a "union" denotes a combination of one or more window panels that are fastened together and move together rigidly.

Specifically, as shown in FIG. **3**C, when either window panel **320** and **330** is moved, both panels move together in unison. While the mouse button is depressed, an outline **340** is displayed as the mouse pointer is moved, indicating an area into which window panels **320** and **330** would be moved if the mouse button were released. As shown in FIG. **3**D, when the mouse button is subsequently released, window panels **320** and **330** move together rigidly into the area that corresponds to outline **340**.

Shown in FIG. **3**E are two additional window panels that are fastened together as a union. Window panel **350** includes a "Blend" palette, for blending objects, and window panel **360** includes a "Channels" palette for color channels. Window panels **350** and **360** were also in close proximity to one another, and snapped together similar to window panels **320** and **330**. Each of the two-panel unions, panels **320**/**330** and panels **350**/**360**, moves as a single area, and can be moved independently of the other union.

As shown in FIG. **3**F, the user has moved the union **350**/**360** in close proximity to the union **320**/**330**, and the two two-panel unions have fastened together to form a single four-panel union including panels **320**, **330**, **350** and **360**. Specifically, panel **350** was moved to close proximity of panel **320**, which triggered the fastening together of the two unions. The four-panel union behaves rigidly as a single area, and moving any one of the four panels causes the other three panels to move in unison.

FIG. **3**G shows what happens when a user presses the mouse button while the mouse pointer is positioned over one of the four panels **320**, **330**, **350** and **360**, and moves the mouse pointer while the mouse button remains depressed. An outline **370** of the area covered by the four panels moves along with the mouse pointer, indicating where the union will be moved if the mouse button is released. FIG. **3**H shows how the union has been moved into the position of outline **370**.

In a preferred embodiment of the present invention, the user is able to break apart a union of window panels into two smaller unions. Specifically, two actions are enabled:

Use of the shift key: If the user moves a window panel that is part of a union of panels while pressing and holding down the "shift" key of a keyboard, then that window panel alone is moved and separated from the union, and the other panels remain fixed.

Use of the control key: If the user moves a window panel that is part of a union of panels while pressing and holding down the "control" key of the keyboard, then that window panel and all other window panels of the union that are positioned below and to the right of it are moved and separated from the original union as a smaller union, while the other panels remain fixed.

Positioning of a window panel is preferably determined by the coordinates of the top left corner of the panel, although other conventions may be used, such as a different corner of the panel or the center of the panel. Coordinates are generally measured within the display screen relative to the top left corner of the screen. A first panel positioned at (x, y) within the display screen, is positioned below and to the right of a second panel positioned at (u, v) within the screen, if $u \leqq x$ and $v \leqq y$.

Referring to FIG. **3**I, window panels **330** and **360** are each positioned below and to the right of window panel **350**. As such, if panel **350** is moved while the control key is depressed, panels **330** and **360** are moved together with it, but panel **320** remains fixed. This action breaks apart the four-panel union **320**/**330**/**350**/**360** into a three-panel union **330**/**350**/**360** and a single-panel union **320**. An outline **380** in the shape of the three-panel union indicates the place where this union will be positioned if the mouse button is released. FIG. **3**J shows the three-panel union **330**/**350**/**360** having been moved to the position of outline **380**, and the single-panel union **320** having remained fixed. The original four-panel union **320**/**330**/**350**/**360** shown in FIG. **3**I has thus been decomposed into the three-panel union and the one panel union shown in FIG. **3**J.

The two actions described hereinabove; namely, moving a single panel by use of the shift key, and moving a panel with other panels positioned below and to the right of it by use of the control key, provide the user with flexibility in pulling apart a general union of panels into two or more smaller unions.

Reference is now made to FIGS. **4**A and **4**B, which are illustrations of fastening parent and child window panels together and locking the child window panels, in accordance with a preferred embodiment of the present invention. Shown in FIG. **4**A is a window panel **410** for a toolbox, containing a variety of graphics tools represented as icons. Pressing a mouse button while the mouse is pointed over an icon, such as brush icon **420**, triggers opening of a child window panel **430** for a toolbox of brush strokes. Referring back to FIG. **2**A, the parent window panel **410** for the toolbox is accessible as the second item in pop up list **230**.

When child panel **430** is opened, it is positioned adjacent to its parent panel **410**, and the two panels are fastened together to form a union, as described hereinabove with reference to FIG. **3**B. Thus if a user moves either panel **410** or **430**, the other panel automatically moves with it in coordination. If the user wishes to decompose the union of panels **410** and **430** and move one of the panels without moving the other, he can press the shift key or the control key while moving one of the panels, as described above with reference to FIG. **3**I.

In accordance with a preferred embodiment of the present invention, when a second child panel is opened, the first child panel is closed in its stead, unless the first child panel has been locked. Specifically, referring to FIG. **4**B, the user has pressed on icon **450** for a text tool, and accordingly child panel **460** with a variety of text tools is opened and positioned alongside parent panel **410**, instead of child panel **430** with the brush stroke tools, which has now been closed. However, it is possible for both child panels **430** and **460** to simultaneously be open, by use of a locking mechanism. Referring back to FIG. **4**A, child panel **430** includes a lock **440** which, if pressed by the user, ensures that child panel **430** remains open when another child panel is subsequently opened. When lock **440** is pressed, child panel **430** is said to be "locked", otherwise it is said to be "unlocked".

In distinction from FIG. **4**B in which child panel **430** was unlocked and therefore closed, FIG. **4**C shows what happens if child panel **430** was locked prior to opening the second child panel **460**. Lock **440** is shown in FIG. **4**C depressed. When the user clicks on icon **450**, child panel **430** is maintained and the new child panel **460** for text is opened and displayed alongside child panel **430**.

The process of opening successive child panels can be repeated, and preferably whenever a new child panel is opened, those previous child panels that were locked remain open, and those that were unlocked are closed. Thus, referring to FIG. **4**D, after opening child panel **430** for brush strokes and child panel **460** for text tools, a user opens yet a third child panel by clicking in an icon **480** for ellipse tools. Prior to this, child panel **430** was locked, as shown in FIG. **4**C with lock **440** depressed. However, child panel **460** was not locked, as shown in FIG. **4**C with lock **470** released. As a result, when a new child panel **490** for ellipse tools is opened in FIG. **4**D, child panel **430** remains open and child panel **460** is closed. Thus only child panels **430** and **490** appear in FIG. **4**D, and not child panel **460**, which was closed.

Alternatively, if lock **470** for child panel **460** had been pressed, then child panel **460** would also remain open, as illustrated in FIG. **4**E. As shown in FIG. **4**E, lock **440** for child panel **430** and lock **470** for child panel **460** are both depressed, and the new child panel **490** is opened alongside of child panel **460**.

In accordance with a preferred embodiment of the present invention, child panels are positioned so that the unlocked panels are to the right of the locked panels. Thus, in FIG. **4**C child panel **430** is locked and child panel **460** is unlocked, and the latter is positioned to the right of the former. If the locks are switched, by releasing lock **440** and pressing lock **470**, then the positioning of the child panels is also switched, as shown in FIG. **4**F. That is, in FIG. **4**F, lock **440** is released and lock **470** is pressed, and accordingly child panel **430** is now positioned to the right of child panel **460**.

In accordance with a preferred embodiment of the present invention, when a parent window panel is closed, the unlocked child window panels automatically close as well, but the locked child panels remain open. Referring back to FIG. **4**E, child panels **430** and **460** are locked, and child panel **490** is unlocked. Referring to FIG. **4**G, if the parent panel **410** is closed, then child panels **430** and **460** remain open, and child panel **490** is automatically closed.

The present invention provides a method and system for managing a context-dependent display bar, also referred to herein as a "property bar," that includes controls relevant for a current context in which a user is working; and for generating the display bar as a multi-page bar for drawing the relevant controls.

Reference is now made to FIGS. **5**A-**5**D, which are illustrations of a multi-page display bar, in accordance with a preferred embodiment of the present invention. Shown in FIG. **5**A is a property bar **510** with controls for text and artistic properties. The Canvas application window **200** is large enough for all of the necessary controls to fit within property bar **510**.

As shown in FIG. **5**B, a user has resized application window **200** to reduce its width, and property bar **510** is no longer wide enough to display all of the necessary controls. Only a subset of the controls is visible in property bar **510**, and the rest of the controls are hidden. In accordance with a preferred embodiment of the present invention, in order to enable a user to access the hidden controls, a paging button **520** is provided. Button **520** enables the user to page through the controls, one page at a time. When the user presses on button **520**, the next page of controls is displayed in property bar **510**, as illustrated in FIG. **5**C. A portion of the controls that were hidden in FIG. **5**B, are now displayed in property bar **510** in FIG. **5**C, and the controls that were visible in FIG. **5**B are now hidden in FIG. **5**C.

FIG. **5**C includes button **520** for advancing to the next page of icons, and also button **530** for going back to the previous page of icons. Since three pages are necessary to display all of the controls, both buttons **520** and **530** appear in FIG. **5**C, which displays the second page of controls in property bar **510**. If the user clicks on button **530** to go back one page, then the first page of controls is displayed in property bar **510**, as in FIG. **5**B. If the user clicks on button **520** to go forward one page, then the third page of controls are displayed in property bar **510**, as illustrated in FIG. **5**D. FIG. **5**D does not include button **520**, since the last page of controls is being displayed in property bar **510**, and there is no fourth page to advance to. However, FIG. **5**D does include button **530** for going back to the second page of controls, as in FIG. **5**C.

If application window **200** is further reduced in width, then additional pages may be required to accommodate all of the necessary controls, and if application window **200** is enlarged in width, then fewer pages may be required.

Thus it may be appreciated that the present invention provides a paging mechanism to enable a user to access controls that are not visible within a property bar.

In distinction to the present invention, prior art methods and systems provide a different approach to enable a user to access hidden controls. Referring to FIG. **5**E, a property bar **540** is not wide enough to accommodate all of the necessary controls. Some of the controls are visible within property bar **540**, and others are hidden. To access the hidden controls, a button **550** is provided. When a user presses on button **550**, the hidden controls are displayed within an area **560** adjacent to button **550**. Area **560** is removed if the user clicks anywhere outside of area **560**, or presses on an Alt or Esc key of a keyboard connected to his computer.

The present invention has several advantages over prior art approaches, when there are many hidden controls, and when a user requires frequent access to hidden icons.

In accordance with a preferred embodiment of the present invention, the property bar shown in FIGS. **5**A-**5**D, which contains the various controls, is itself context-dependent. I.e., the set of controls included within property bar **510** can change, and depends on the context in which a user is working. Reference is now made to FIGS. **6**A-**6**E, which are illustrations of a context-dependent property bar, in accordance with a preferred embodiment of the present invention. Property bar **610** in FIG. **6**A corresponds to a context where a selection tool **620** is activated. FIG. **6**A also shows an elliptical vector object **630**, which is not currently selected. Thus, the context of FIG. **6**A is one where a user is not currently editing his document. Accordingly, property bar **610** includes controls for document properties such as page size, units and drawing scale.

In FIG. **6**B, the user has selected object **630** for editing, by double clicking on the object while the selection tool is active. Selection of vector object **630** is indicated by a frame **640** surrounding it, frame **640** having handles **650**. In this current context, the user wishes to geometrically change object **630** and, accordingly, property bar **610** changes to property bar **660**, which includes controls for changing the shape of object **630**, such as handles and cusps.

In FIG. **6**C, the user has activated brush tool **670** for editing the selected object **630**. Object **630** is still selected for editing, as evidenced by frame **640** surrounding it. In this context, the user wishes to edit object **630** by use of a paint brush and, accordingly, property bar **660** changes to property bar **680**, which includes paint brush tools such as brush shape, brush thickness, brush mode and opacity.

In FIG. **6**D, the user has activated an eraser tool **690** for editing the selected object **630**, instead of the previously selected brush tool **670**. In this context, the user wishes to apply erasure strokes and, accordingly, property bar **680** further changes to property bar **700** which includes eraser tools such as eraser shape, eraser thickness and opacity. Observe that property bar **700** is different than property bar **680**, since the brush mode control is not included in property bar **700**.

In accordance with a preferred embodiment of the present invention, property bars include a button **710** for context-sensitive help. When this button is pressed, instructions **720** specific to the current property bar are displayed, as shown in FIG. **6**E.

FIG. **6**F shows property bar **730** corresponding to paint brush tool **670** being activated when object **630** is not selected. Although the same paint brush tool is activated in FIG. **6**C and FIG. **6**F, their contexts are different. Whereas FIG. **6**C has an object selected in edit mode, FIG. **6**F does not. It can be seen that property bar **730** is different than property bar **670**, and includes an image mode control and does not include a filters control.

The following TABLE I summarizes the contexts of FIGS. **6**A-**6**F and the contents of the corresponding property bars.

TABLE I

Context-Dependent Property Bars

FIG.	Context	Contents of Property Bar
6A	Selection tool activated Non-edit mode	Page size, units and drawing scale Grids, guides and rulers Layer selector
6B	Selection tool activated Edit mode	Linear position Alignment Offset Handles and cusps
6C	Paint brush tool activated Edit mode	Brush shape, opacity and mode Fade Filters
6D, 6E	Erase tool activated Edit more	Brush shape, opacity Fade Filters
6F	Paint brush tool activated Non-edit mode	Image mode and resolution Brush shape, opacity and mode Fade

It may thus be appreciated that in accordance with a preferred embodiment of the present invention, a context is determined by an object, an edit mode and an activated tool. With each context is associated zero, one or more controls and, for each identified context, the property bar displays such associated controls.

Implementation Details

The present invention is preferably implemented through a data structure that keeps track of which window panels are fastened together as a union. As window panels become fastened together into unions, or separated from unions, the data structure is updated accordingly so as to reflect the current composition of unions of window panels.

Preferably, when a positioning operation is applied to a window panel, the same operation is applied simultaneously to all other window panels fastened together therewith. Thus, for example, if a window panel is moved 50 pixels to the right and 40 pixels downwards, then all other window panels fastened together with it are also simultaneously moved 50 pixels to the right and 40 pixels downwards. The effect of the simultaneous movement is to give an appearance that all of these window panels move cohesively together as a single area.

Reference is now made to Appendix A, which includes a detailed listing of computer source code written in the C++ programming language for managing window panels that can be fastened together in unions, in accordance with the present invention, and in conjunction with a Microsoft Windows operating system. As seen in Appendix A, a window panel is represented by a structure, WindowItemInfo, which includes a handle for the window panel and a Boolean flag indicating whether or not the window panel is snapped to another panel. A union of window panels is represented by a list, fwListPtr, of a number, fwCount, of WindowItemInfo structures.

A list of all floating window panels is generated in a method CreateFloatWindowList ( ), which steps through the panels using window handles provided by methods GetFirstFloatWindow ( ) and GetNextFloatWindow ( ). A list of window panels is sorted to arrange the window panels in the list from top-left of the display screen to bottom-right, using a method FWCompareProc ( ) to compare two WindowItem-

Info structures, and a method SortFloatWindowList ( ) to apply a quicksort to the list relative to the order induced by FWCompareProc ( ).

A method AreWindowRectsGlued ( ) determines whether two window panels are fastened together adjacently. A recursive method TagAllWindowsForGluedWindowResize ( ) steps through window panels using GetFirstFloatWindow ( ) and GetNextFloatWindow ( ) to identify window panels that are part of a union.

A method MoveFloatWindowAndGluedWindows ( ) moves window panels that are part of a union by looping through a list fwListPtr[i] and moving all window panels that have a flag fwListPrt[i] .flag set, indicating that such window panels are to be offset. The setting of the flags occurs in a method TagAllWindowsThatNeedOffset ( ).

A method SnapFloatWindowRect ( ) generates a union of areas by successive unions of rectangles, testRect.

It may be appreciated by those skilled in the art that the specific implementation described in Appendix A is but one of many alternative ways of programming the present invention.

Identification of child window panels and their locked or unlocked states is preferably implemented using a stack. The stack is popped when unlocked child panels are closed, and the stack is pushed when new child panels are opened.

Reference is now made to Appendix B, which includes a detailed listing of computer source code written in the C++ programming language for implementing a preferred embodiment for managing window panels that can have parent-child relationships, in accordance with the present invention, and in conjunction with a Microsoft Windows operating system. As seen in Appendix B, a toolbox palette is represented by a structure, PalData, and a stack of such palettes is represented by a linked list traversed by methods GetPrevWnd ( ) and GetNextWnd ( ). The locked or unlocked status of a child window panel is represented by the Boolean member isLocked of PalData.

It may be appreciated by those skilled in the art that the specific implementation described in Appendix B is but one of many alternative ways of programming the present invention.

Implementation of multi-page property bars, as shown in FIGS. **5**A-**5**D, is preferably performed by determining a total screen width required to display all of the necessary controls, and allocating the controls to portions of the property bar, the width of each portion being determined by the width of the application window. For example, if 20 identically sized controls are to be displayed in a property bar, and if the width of the application window can only accommodate 6 such controls, then the property bar is rendered in 4 portions; namely, portion #1 with controls 1-6, portion #2 with controls 7-12, portion #3 with controls 13-18, and portion #4 with controls 19 and 20. Page forward and page backward buttons are preferably used to move from one portion of the property bar to the portion following or preceding it, respectively.

Implementation of context-dependent display bars is preferably performed by a modular software architecture, in which a master module is responsible for displaying a user interface including controls, and receiving events triggered when a user activates one of the displayed controls using a mouse or keyboard or combination of both. The master module's functionality includes:

- identifying a current context based upon a tool activated by a user, an edit mode and an object;
- identifying controls associated with the current context;
- displaying a property bar including the associated controls, using page forward and page backwards buttons as necessary, if the associated controls cannot all fit together within the width of the application screen;
- displaying an image being worked on, the image being a raster image or a vector image or a combined raster+vector image;
- receiving messages from the operating system concerning user events, including inter alia mouse and keyboard events; and
- sending notification of the events to appropriate handlers for the controls.

Preferably, each of the available controls has an associated handler, which processes image data in response to user activation of a control.

Reference is now made to FIG. **7**, which is a simplified block diagram of a system for managing context-dependent property bars in conjunction with a graphics software application, and in accordance with a preferred embodiment of the present invention. As shown in FIG. **7**, a context identifier **710** receives a current state in which a user is working on a graphics object, the state including a currently selected object, a current edit mode and a currently activated tool, and determines a current context therefrom. Preferably, a unique ID is associated with each context.

A control identifier **720** receives the context ID from context identifier **710** and, preferably by accessing a look-up table **730** keyed on context IDs, determines a set of controls that are associated with the current context. The set of controls may be empty, or contain one or more controls. For example, look-up table **730** shows that a context ID CTXTID 001 is associated with three controls; namely, an opacity control, a color mode control and a diameter control.

A display manager **740** receives the set of controls associated with the current context and displays them within a dynamically changing display bar, or property bar, as part of a graphical use interface. Display manager **740** includes a display bar layout processor **750**, which preferably determines how the associated controls are to be displayed within the display bar. In particular, layout processor **750** may split the associated controls among portions of the display bar, in accordance with a preferred embodiment of the present invention as described above with reference to FIGS. **5**A-**5**D. As a user pages back and forth through the portions of the display bar, different subsets of the associated controls become visible.

An event manager **760** listens for events intercepted by the operating system, such as user activation of a mouse or keyboard and combination thereof, while interacting with the graphical user interface. Specifically, event manager **760** detects when a control within the display bar is activated by a user.

Preferably, controls have handlers **770** associated therewith, which operate within an overall graphics processor **780**. A handler generally processes a graphics object in a specific way, such as, for example, by modifying an edit path for a Bezier curve, or by adding paint brush strokes, or by modifying an opacity mask, or by filtering a raster image. When event manager **760** detects that a control is activated, it sends a notification to the control's handler **770**, which then processes the graphics being worked on by the user accordingly. Preferably, event manager **760** also notifies context identifier **710** if the user changes the currently selected object, edit mode or tool, so that context identifier can change the current context accordingly.

Reference is now made to Appendix C, which includes a detailed listing of computer source code written in the C++ programming language for implementing a preferred embodiment for managing context-sensitive property bars

and multi-page property bars, in accordance with the present invention, and in conjunction with a Microsoft Windows operating system. As seen in Appendix C, a context is modeled by a structure ContexMode that includes three private members, pvDrawToolID, pvEditSessionType and pvObjType, respectively representing (i) a current draw tool activated by a user, (ii) a current edit session if the user is working in an edit mode, and (iii) a current object type if an object is currently selected. Contexts are associated with values of these three members. Thus, for example, a context may be associated with (i) a draw tool for circles, (ii) a Bezier edit session and (iii) a selected object type. These three members are accessed by public methods GetContextDrawTool ( ), SetContextToDrawTool ( ), GetContextEditSession ( ), SetContextToEditSession ( ), GetContextObjectType ( ) and SetContextToObjectType ( ). Contexts register themselves with control handlers by methods CXRegisterStandardContextItem ( ) for standard handlers, and CXRegister ContextItem ( ) for custom handlers.

It may be appreciated by those skilled in the art that the specific implementation described in Appendix C is but one of many alternative ways of programming the present invention.

In reading the above description, persons skilled in the art will realize that there are many apparent variations that can be applied to the methods and systems described. Thus, inter alia:

- although FIG. **3**I illustrates window panels below and to the right of panel **350** being pulled away from a union, together with panel **350**, other subsets of panels can be pulled away with panel **350** instead, such as panels above panel **350**, or panels to the left of panel **350**, or panels above and to the left of panel **350**;
- child window panels can be fastened underneath or to the left of their parent window panels, instead of to the right of their window panels as illustrated in FIG. **4**C; and
- buttons can be used to advance from one portion of a display bar directly to the last portion, or to go back directly to the first position, in addition to buttons **520** and **530** illustrated in FIG. **5**C that move one portion at a time.

In the foregoing specification, the invention has been described with reference to specific exemplary embodiments thereof. It will, however, be evident that various modifications and changes may be made to the specific exemplary embodiments without departing from the broader spirit and scope of the invention as set forth in the appended claims. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

What is claimed is:

1. A method for managing a plurality of palettes within a computer software application comprising:

presenting a palette that is actively controlled by a user interface of a computer software application on a computer display screen, by (i) displaying the palette within a window, or (ii) docking the palette within a docking bar and displaying a docking tab for enabling the palette;

detecting that a user is applying (a) a docking action, (b) a generation action or (c) a detaching action, at a location within the display screen;

docking the palette within the docking bar when said detecting detects that the user is applying the docking action to a window within which the palette is displayed; and

displaying the palette within a window when said detecting detects that the user is applying the generation action to the docking tab, comprising:

fastening the palette to at least one other already displayed palette if the generation action positions the palette in proximity to the at least one other already displayed palette, wherein palettes fastened together subsequently move together rigidly as a single geometrical area when one of the fastened palettes is moved; and

moving one palette together with those and only those of the palettes of a plurality of fastened-together palettes that are below and to the right of the one palette, to separate them from the plurality of fastened-together palettes, when said detecting detects that the user is applying the detaching action to the one palette.

2. The method of claim **1** wherein the docking action is pressing on a mouse button when a mouse pointer is positioned within an area of the window within which the palette is displayed.

3. The method of claim **1** wherein the generation action is pressing on a mouse button when a mouse pointer is positioned within an area of the docking tab, and moving the mouse pointer while the mouse button is depressed.

4. The method of claim **1** wherein said displaying the docking tab for enabling the palette displays the docking tab when the palette is first activated within the computer software application.

5. The method of claim **1** wherein said displaying the docking tab for enabling the palette displays the docking tab when the palette is first activated within the computer software application after having been previously closed.

6. The method of claim **1** wherein the detaching action is moving a palette while pressing a control key.

7. A system for managing a plurality of palettes within a computer software application comprising:

a processor; and

a computer display screen for displaying a user interface, the user interface comprising:

a window generator for generating a window for a palette that is actively controlled by a user interface of a computer software application, and for displaying the window on the computer display screen;

a user input detector for detecting that a user is applying (a) a docking action, (b) a generation action or (c) a detaching action, at a location within the display screen;

a docking manager for docking the window for the palette within a docking bar of the user interface when said user input detector detects that the user is applying the docking action to the window; and

a display manager (i) for displaying a docking tab within the docking bar for enabling the palette when said docking manager docks the window, (ii) for displaying the palette within a window when said user input detector detects that the user is applying the generation action to the docking tab, (iii) for fastening the palette to at least one other already displayed palette if the generation action positions the palette in proximity to the at least one other already displayed palette, wherein palettes fastened together subsequently move together rigidly as a single geometrical area when one of the fastened palettes is moved, and (iv) for moving one palette together with those and only those of the palettes of a plurality of fastened-together palettes that are below and to the right of the one palette, to separate them from the plurality of fastened-together palettes, when said user input detector detects that the user is applying the detaching action to the one palette.

8. The system of claim 7 wherein the docking action is pressing on a mouse button when a mouse pointer is positioned within an area of the window within which the palette is displayed.

9. The system of claim 7 wherein the generation action is pressing on a mouse button when a mouse pointer is positioned within an area of the docking tab on the display device, and moving the mouse pointer while the mouse button is depressed.

10. The system of claim 7 wherein said display manager displays the docking tab for enabling the palette when the palette is first activated within the computer software application.

11. The system of claim 7 wherein said display manager displays the docking tab for enabling the palette when the palette is first activated within the computer software application after having been previously closed.

12. The system of claim 7 wherein the detaching action is moving a palette while pressing a control key.

13. A computer readable storage medium storing program code for causing a computer to perform a method comprising:

presenting a palette that is actively controlled by a user interface of a computer software application on a computer display screen, by (i) docking the palette within a docking bar and displaying a docking tab for enabling the palette, or (ii) displaying the palette within a window;

detecting that a user is applying (a) a docking action, (b) a detaching action or (c) a generation action, at a location within the display screen;

docking the palette within the docking bar when the detecting detects that the user is applying the docking action to a window within which the palette is displayed; and

displaying the palette within a window when the detecting detects that the user is applying the generation action to the docking tab, comprising:

fastening the palette to at least one other already displayed palette if the generation action positions the palette in proximity to the at least one other already displayed palette, wherein palettes fastened together subsequently move together rigidly as a single geometrical area when one of the fastened palettes is moved; and

moving one palette together with those and only those of the palettes of a plurality of fastened-together palettes that are below and to the right of the one palette, to separate them from the plurality of fastened-together palettes, when said detecting detects that the user is applying the detaching action to the anyone palette.

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