EXHIBIT 1.05

lected flow velocity and the selected flow direction being selected in a one of a tentative set mode and a fixed set mode, in the tentative set mode the selected flow velocity and the selected flow direction being continuously variable according to the selected position of the control icon image while the button is in a one of two button states, in the fixed set mode the selected flow velocity and the selected flow direction being independent of control icon image position, said tentative set mode an said fixed set mode being alternatively selectable through operation of said control device; and

means for detecting the presence of said control icon image at said selected position and for generating said control signals corresponding to said selected flow direction and said selected flow velocity for use in regulating the flow of said sequential information.

2. A controller as recited in claim 1, wherein said slide indicator includes at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and includes at least one interactive control button for indicating a predetermined flow velocity for said sequential information in said predetermined flow direction, wherein said control icon image is operative to be moved to said selected position in response to said control dial being selected by said control device, and wherein said control icon image is operative to be moved to said selected position in response to said control button being selected by said control device.

3. A controller as recited in claim 2, wherein said slide indicator includes a plurality of said control buttons, and wherein said control buttons are radio buttons.

4. A controller as recited in claim 1, wherein said slide indicator image has a first region for indicating a zero flow velocity for said sequential information, and a second region contiguous to said first region for indicating a forward flow velocity of said sequential information.

5. A controller as recited in claim 4, and further including a third region contiguous to said first region for indicating a backward flow velocity of said sequential information.

6. A controller as recited in claim 5, wherein said slide indicator includes at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and includes at least one interactive control button for indicating a predetermined flow velocity for said sequential information in said predetermined flow direction, wherein said control icon image is operative to be moved to said selected position in response to said control dial being selected by said control device, and wherein said control icon image is operative to be moved to said selected position in response to said control button being selected by said control device.

7. A controller as recited in claim 6, wherein said first region includes one of said interactive control buttons, wherein said second region includes one of said control dials, and wherein said third region includes one of said control dials.

8. A controller as recited in claim 7, wherein said control buttons are radio buttons, wherein said second region further includes a plurality of said radio buttons, and wherein said third region further includes a plurality of said radio buttons.

9. A controller as recited in claim 1, wherein said control icon image includes a first image when said control icon is operating in said tentative set mode and wherein said control icon image includes a second image when said control icon is operating in said fixed set mode.

10. A controller as recited in claim 9, wherein said slide indicator includes at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and includes at least one interactive control button for indicating a predetermined flow velocity for said sequential information in said predetermined flow direction, wherein said control icon image is operative to be moved to said selected position in response to said control dial being selected by said control device, and wherein said control icon image is operative to be moved to said selected position in response to said control button being selected by said control device.

11. A controller as recited in claim 10, wherein said slide indicator image has a first region for indicating a zero flow velocity for said sequential information, and a second region contiguous to said first region for indicating a forward flow velocity of said sequential information.

12. A controller as recited in claim 11, and further including a third region contiguous to said first region for indicating a backward flow velocity of said sequential information.

13. A controller as recited in claim 12, wherein said first region includes one of said interactive control buttons, wherein said second region includes one of said control dials, and wherein said third region includes one of said control dials.

14. A controller for producing control signals for use in regulating the flow of sequential information, comprising:

a first means for indicating a range of selectable flow directions and flow velocities for said sequential information;

a second means responsive to a user for choosing a selection position from said range of selectable flow directions and flow velocities, said selection position corresponding to a selected flow direction and a selected means for operating in a first mode for tentatively maintaining said selection position, means for operating in a second mode for fixedly maintaining said selection position, and means for switching between said first and second modes while maintaining said selection position; and

a third means responsive to said second means for detecting said selection position and producing said control signals for regulating the flow of said sequential information as selected by said second means in said selected flow direction and at said selected flow velocity.

15. A controller as recited in claim 14, wherein said first means includes a slide indicator having at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and having at least one interactive control button for indicating a predetermined flow velocity for said sequential information in said predetermined flow direction.

16. A controller as recited in claim 15, wherein said slide indicator includes a plurality of said control buttons, and wherein said control buttons are radio buttons.

17. A controller as recited in claim 14, wherein said first means includes a slide indicator having a first region for indicating a zero flow velocity for said sequential information, and a second region contiguous to said first region for indicating a forward flow velocity for said sequential information.

18. A controller as recited in claim 17, and further including a third region contiguous to said first region for indicating a backward flow velocity of said sequential information.

19. A controller as recited in claim 18, wherein said slide indicator includes at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and includes at least one interactive control button for indicating said predetermined flow velocity for said sequential information in a predetermined flow direction.

20. A controller as recited in claim 19, wherein said first region includes one of said interactive control buttons, wherein said second region includes one of said control dials and a plurality of said control buttons, and wherein said third region includes one of said control dials and a plurality of said control buttons.

21. A controller as recited in claim 17, wherein said control buttons are radio buttons.

22. A controller as recited in claim 14, wherein said controller is used in combination with a display system and a user operable control device including means for selecting and manipulating images on a display of said display system, wherein said first means includes means for generating an interactive slide indicator image portraying said range on said display, and wherein said second means further includes means for generating an interactive control icon image on said display visually proximate to said slide indicator image, said control icon image being operative to be moved by said control device to said selected position along said slide indicator image, said third means being operative to detect the position of said control icon image along said slide indicator image as said selection position and to generate said control signals corresponding to said selected flow direction and said selected flow velocity for use in regulating the flow of said sequential information.

23. A controller as recited in claim 22, wherein said control icon image has a first image when said second means is operating in said first mode and wherein said control icon image has a second image when said second means is operating in said second mode.

24. A controller as recited in claim 22, wherein said first means includes at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and includes at least one interactive control button for indicating a predetermined flow velocity for said sequential information in said predetermined flow direction.

25. A controller as recited in claim 22, wherein said slide indicator image has a first region for indicating a zero flow velocity for said sequential information, and a second region contiguous to said first region for indicating a forward flow velocity for said sequential information.

26. A controller as recited in claim 25, and further including a third region contiguous to said first region for indicating a backward flow velocity of said sequential information.

27. A controller as recited in claim 26, wherein said first means includes at least one interactive control dial for indicating a range of gradational flow velocities for said sequential information in a predetermined flow direction and includes one or more interactive control buttons for indicating a predetermined flow velocity for said sequential information in said predetermined flow direction.

28. A controller as recited in claim 27, wherein said first region includes one of said interactive control buttons, wherein said second region includes one of said control dials, and wherein said third region includes one of said control dials.

29. A controller for use in combination with a display system and a user operable control device for producing control signals for regulating the flow direction and the flow velocity of sequential information, said control device including means for selecting and manipulating images on a display of said display system, comprising:

a first means for generating an interactive controller image for display on said display, said controller image including a plurality of selectable markers and a slide indicator, each said marker corresponding to a predetermined flow velocity for said sequential information in a predetermined flow direction, said slide indicator corresponding to a range of gradational flow velocities for said sequential information in one or more predetermined flow directions;

a second means responsive to a user for selecting a selection position along said controller image corresponding to a selected flow direction and a selected flow velocity for said sequential information; and

a third means responsive to said second means for detecting said selection position and generating said control signals for regulating the flow of said sequential information as selected by said second means in said selected flow direction and at said selected flow velocity, said second means having a first operating mode, a second operating mode, and a third operating mode, said third means being operative to tentatively generate said control signals in response to said first operating mode, said third means being operative to fixedly generate said control signals in response to said second operating mode, said third operating mode being operative to switch between said first operating mode and said second operating mode while said third means continues to generate said control signals.

30. A controller as recited in claim 29, wherein said slide indicator includes at least one interactive control dial representing said range of gradational flow velocities, and wherein each of said markers includes at least one interactive control button representing a predetermined flow velocity and a predetermined flow direction.

31. A controller as recited in claim 30, wherein said slide indicator includes a first region corresponding to a zero flow velocity for said sequential information, and a second region contiguous to said first region corresponding to a forward range of gradational flow velocities for said sequential information.

32. A controller as recited in claim 31, and further including a third region contiguous to said first region corresponding to a backward range of gradational flow velocities for said sequential information.

33. A controller as recited in claim 32, wherein said first region includes one of said interactive control buttons, wherein said second region includes one of said control dials and a plurality of said control buttons, and wherein said third region includes one of said control dials and a plurality of said control buttons.

34. A controller as recited in claim 33, wherein said control buttons are radio buttons.

35. A controller as recited in claim 29, wherein said second means further includes means for generating an interactive control icon for display on said display visually proximate to said slide indicator, said control icon being operative to be moved by said control device to said selection position along said slide indicator, said third means being operative to detect the position of said control icon along said slide indicator as said selection position and to generate said control signals corresponding to said selected flow direction and said selected flow velocity for use in regulating the flow of said sequential information.

36. A controller as recited in claim 35, wherein said control icon has a first image when said second means is operating in said first mode and wherein said control icon has a second image when said second means is operating in said second mode.

37. A controller as recited in claim 35, wherein said slide indicator includes at least one interactive control dial representing said range of gradational flow velocities for said sequential information in one of said predetermined flow directions and includes at least one interactive control button representing said predetermined flow velocity for said sequential information in one of said predetermined flow directions.

38. A controller as recited in claim 35, wherein said slide indicator includes a first region corresponding to a zero flow velocity for said sequential information, and a second region contiguous to said first region corresponding to a forward range of gradational flow velocities for said sequential information.

39. A controller as recited in claim 38, and further including a third region contiguous to said first region corresponding to a backward range of gradational flow velocities for said sequential information.

40. A controller as recited in claim 38, wherein said slide indicator includes at least one interactive control dial representing said range of gradational flow velocities for said sequential information in one of said predetermined flow directions and includes one or more interactive control buttons representing said predetermined flow velocity for said sequential information in one of said predetermined flow directions.

41. A controller as recited in claim 40, wherein said first region includes one of said interactive control buttons, wherein said second region includes one of said control dials, and wherein said third region includes one of said control dials.

42. A method for producing control signals for controlling the flow of sequential information, comprising the steps of:

selecting a flow operation mode for the flow of the sequential information, said flow operation mode including a tentative flow operation mode for controlling the flow of said sequential information according to a position of a control icon image while a selecting means of a control device is in a one of two states, on a temporary basis and a fixed flow operation mode for maintaining a fixed flow of said sequential information;

selecting a selected flow direction and a selected flow velocity for the sequential information; and

producing control signals for regulating the flow of the sequential information in accordance with the selected flow direction and the selected flow velocity.

43. The method of claim 42, and further including the steps of

displaying a controller image on a display of a display system, said controller image having a slider bar denoting selectable flow directions and selectable flow velocities for said sequential information, and having a control icon for use in selecting said flow operation mode, said flow direction and said flow velocity.

44. The method of claim 43, wherein said control icon has a first image when said tentative flow operation mode is selected and a second image when said fixed flow operation mode is selected, and wherein said step of selecting said flow operation mode includes the step of selecting said first image to select said tentative flow operation mode and selecting said second image to select said fixed flow operation mode.

45. The method of claim 44, wherein said step of selecting said flow direction and said flow velocity includes the step of moving said control icon to a selected position of said slider bar corresponding to said flow direction and said flow velocity and regulating the flow of the sequential information accordingly.

* * * * *

US005428730A

United States Patent [19]

Baker et al.

[11] Patent Number: 5,428,730

[45] Date of Patent: Jun. 27, 1995

[54] MULTIMEDIA SYSTEM HAVING SOFTWARE MECHANISM PROVIDING STANDARDIZED INTERFACES AND CONTROLS FOR THE OPERATION OF MULTIMEDIA DEVICES

[75] Inventors: **Randolph S. Baker**, Atlanta, Ga.; **Richard E. DuLaney**, Lighthouse Point; **Patricia A. Esack**, Boca Raton, both of Fla.; **Stephen R. Henson**, Atlanta, Ga.; **Scott R. Swix**, Half Moon Bay, Calif.; **George E. Wagener**, Marietta; **Frank D. Warinner**, Woodstock, both of Ga.; **Scott J. Broussard**, Boca Raton, Fla.

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

[21] Appl. No.: **991,034**

[22] Filed: **Dec. 15, 1992**

[51] **Int. Cl.**[6] **G06F 15/00**

[52] **U.S. Cl.** **395/154**; 395/161

[58] **Field of Search** 395/154, 155, 157, 159, 395/161

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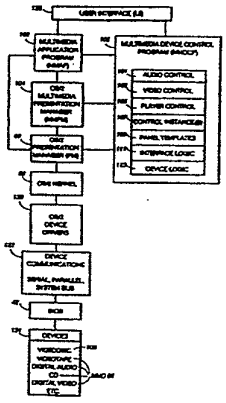
Primary Examiner—Heather R. Herndon
Assistant Examiner—Joseph R. Burwell
Attorney, Agent, or Firm—Bernard D. Bogdon; Stephen A. Becker

[57] **ABSTRACT**

A multimedia system includes a multimedia device control program having a plurality of application program selectable controls for controlling operation of a like plurality of different classes of multimedia devices. Each class has a different set of controllable device functions or attributes. In response to selection of a class by an application program, a unique control panel is created in a user interface for controlling operation of a device. The selected control performs all of the processing actions necessary to control the device in response to user selections on the interface, without involvement of the application program in such actions. The multimedia control program includes a plurality of panel templates from which control panels are created in a control screen. Each panel has a plurality of controllers that can manipulated by a user to control a corresponding function of a multimedia device. The templates provide a consistent interfaces having a common look and feel. The multimedia control program also includes a plurality of class control programs one or more of which are selected by an application program to be attached to a like number of multimedia devices for controlling operation of the devices in response to user selections on the user interface, thereby relieving the application program of performing the necessary control functions.

20 Claims, 7 Drawing Sheets



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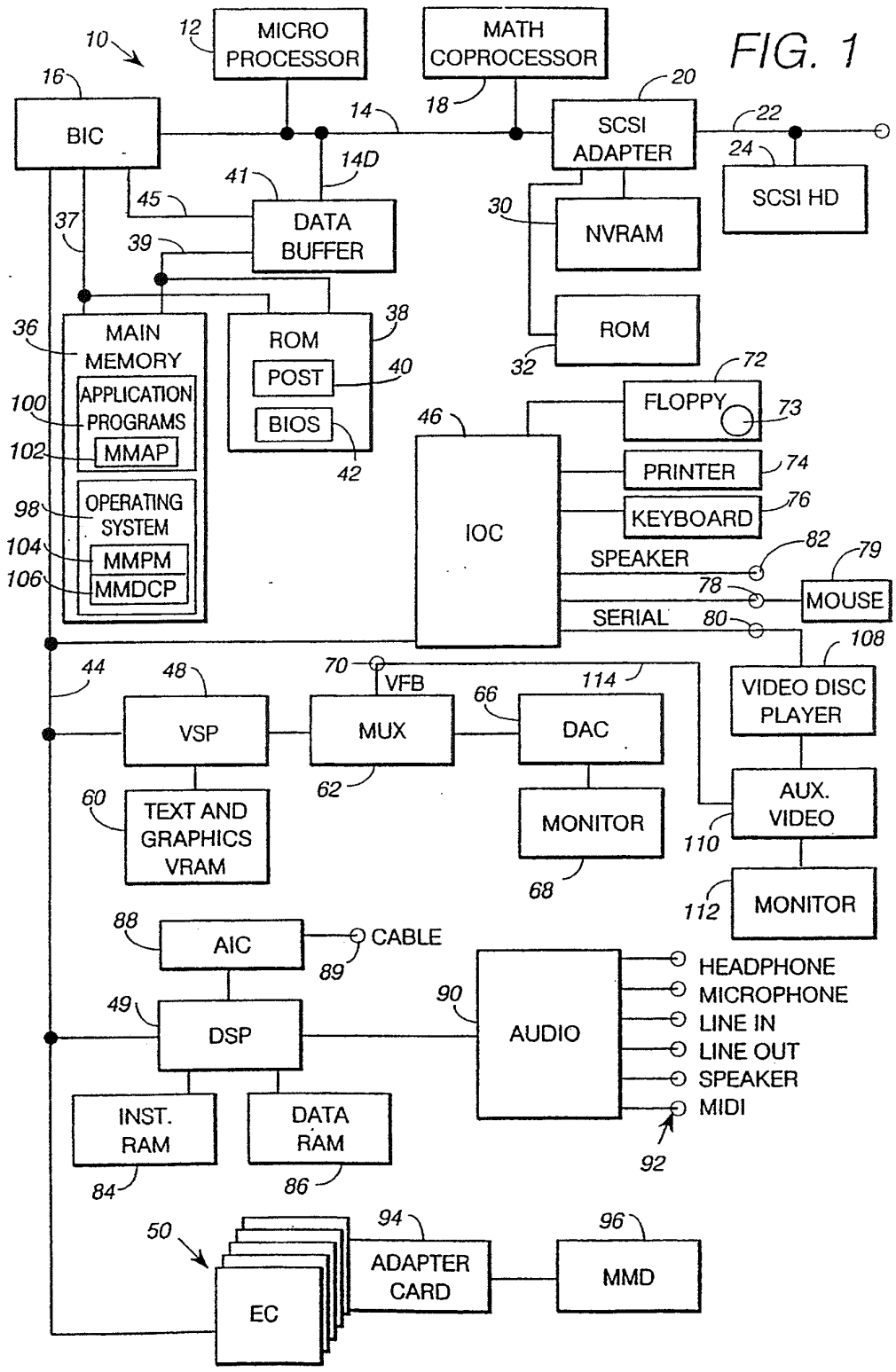

10
12
MICRO PROCESSOR
MATH COPROCESSOR
16
BIC
14
18
20
SCSI ADAPTER
22
24
SCSI HD
41
14D
45
DATA BUFFER
37
39
30
NVRAM
36
MAIN MEMORY
APPLICATION PROGRAMS
100
MMAP
102
OPERATING SYSTEM
98
104
MMPM
106
MMDCP
ROM
POST
BIOS
38
40
42
ROM
32
72
FLOPPY
73
46
IOC
PRINTER
74
KEYBOARD
76
SPEAKER
82
79
MOUSE
78
SERIAL
80
108
44
48
70
VFB
114
VIDEO DISC PLAYER
VSP
MUX
66
DAC
62
60
TEXT AND GRAPHICS VRAM
MONITOR
AUX. VIDEO
110
68
MONITOR
112
88
AIC
CABLE
89
HEADPHONE
MICROPHONE
LINE IN
LINE OUT
SPEAKER
MIDI
90
AUDIO
49
DSP
INST. RAM
DATA RAM
84
86
92
50
94
ADAPTER CARD
96
MMD
EC

FIG. 1

FIG. 2

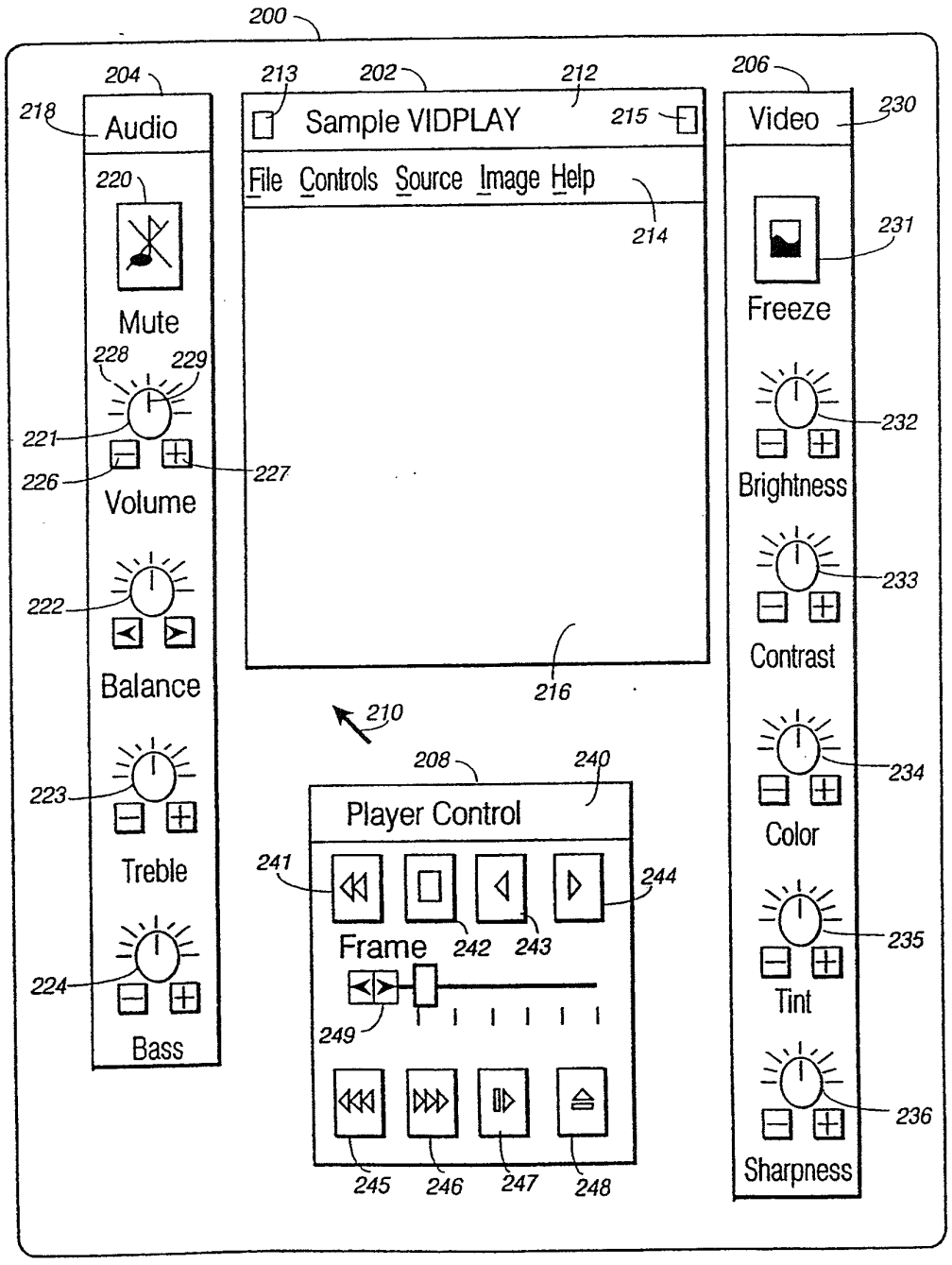


FIG.3

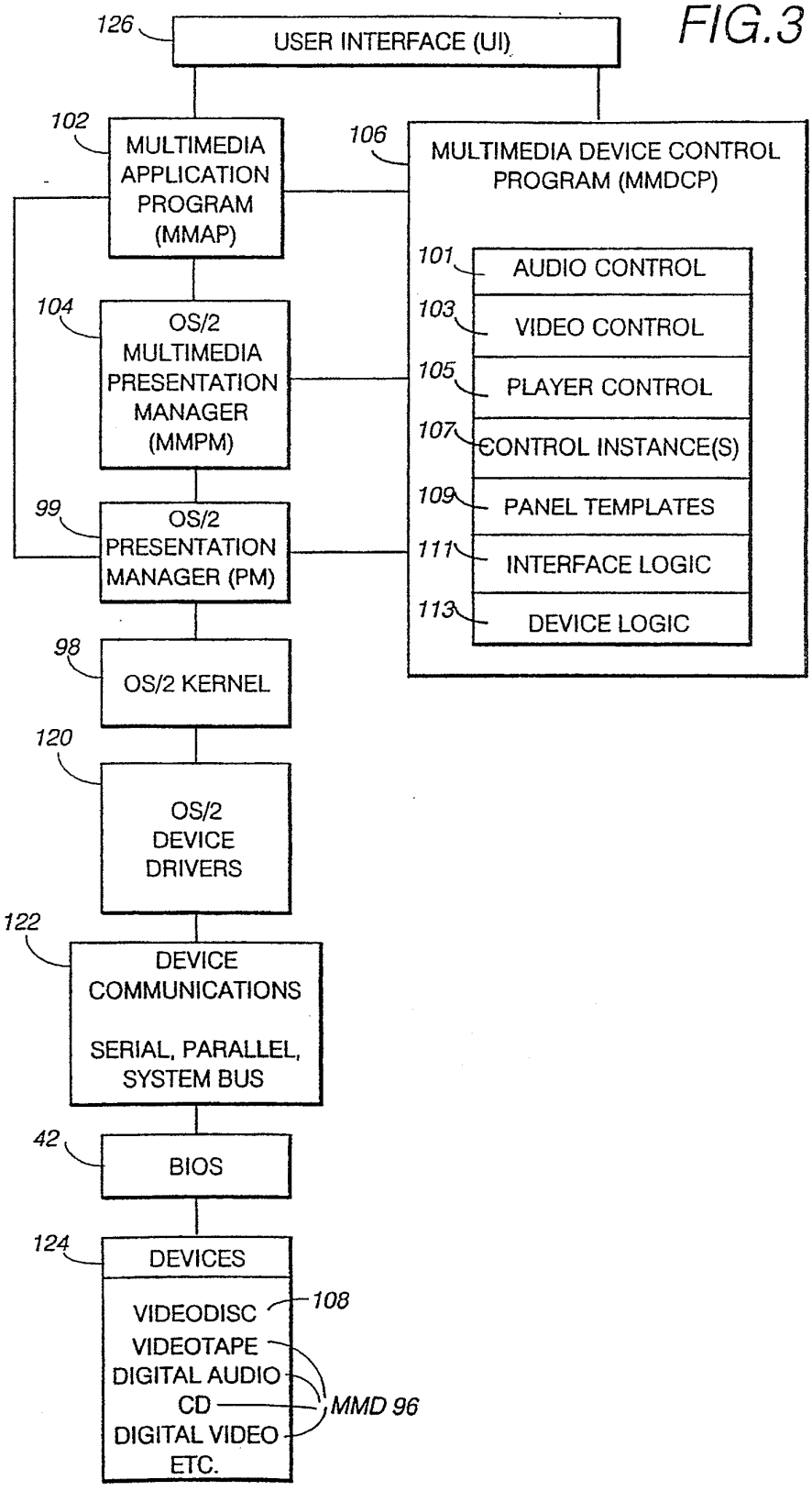

126
USER INTERFACE (UI)
102
MULTIMEDIA APPLICATION PROGRAM (MMAP)
106
MULTIMEDIA DEVICE CONTROL PROGRAM (MMDCP)
101
AUDIO CONTROL
103
VIDEO CONTROL
105
PLAYER CONTROL
107
CONTROL INSTANCE(S)
109
PANEL TEMPLATES
111
INTERFACE LOGIC
113
DEVICE LOGIC
104
OS/2 MULTIMEDIA PRESENTATION MANAGER (MMPM)
99
OS/2 PRESENTATION MANAGER (PM)
98
OS/2 KERNEL
120
OS/2 DEVICE DRIVERS
122
DEVICE COMMUNICATIONS
SERIAL, PARALLEL, SYSTEM BUS
42
BIOS
124
DEVICES
VIDEODISC
VIDEOTAPE
DIGITAL AUDIO
CD
DIGITAL VIDEO
ETC.
108
MMD 96

FIG. 4 (PRIOR ART)

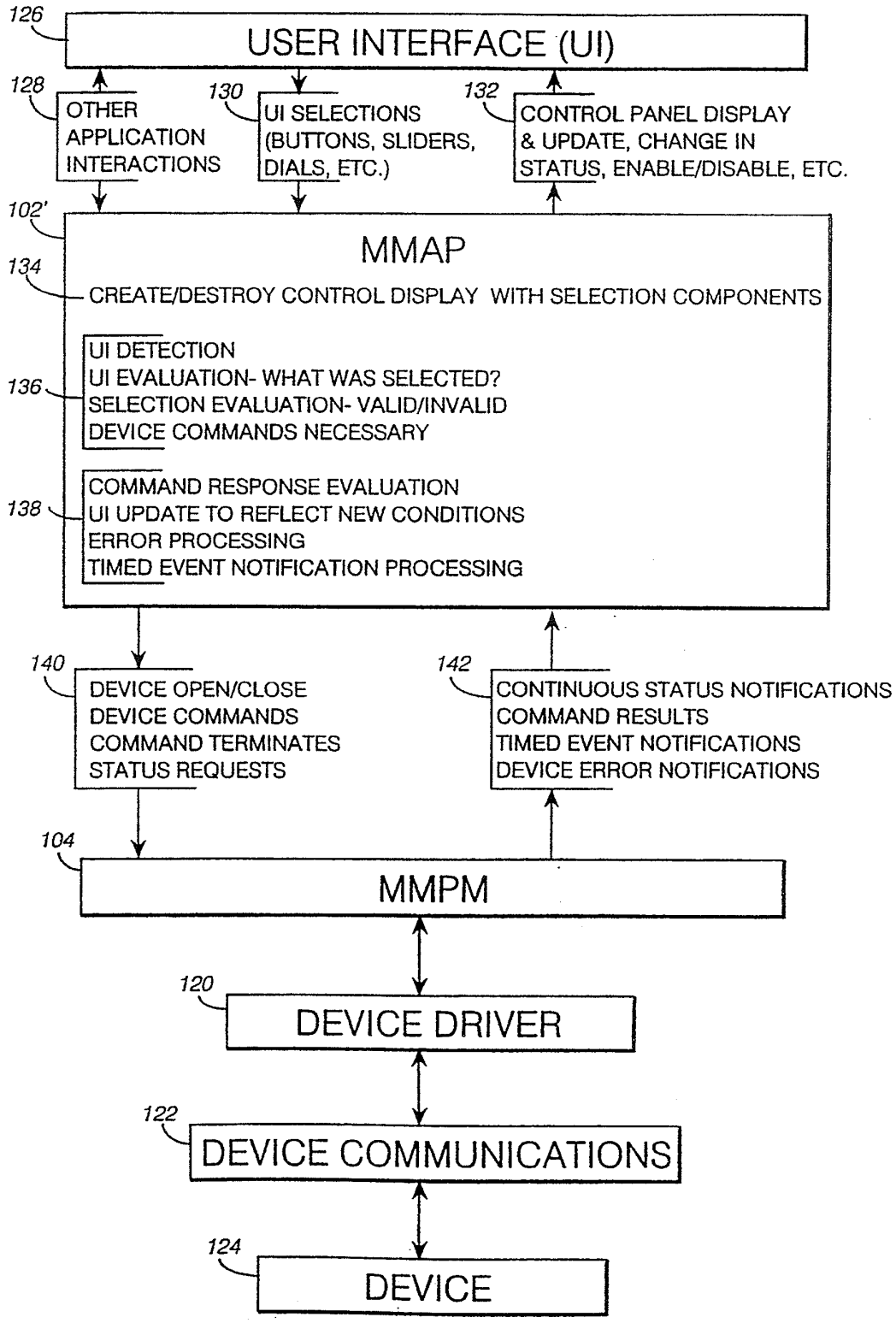


FIG. 5

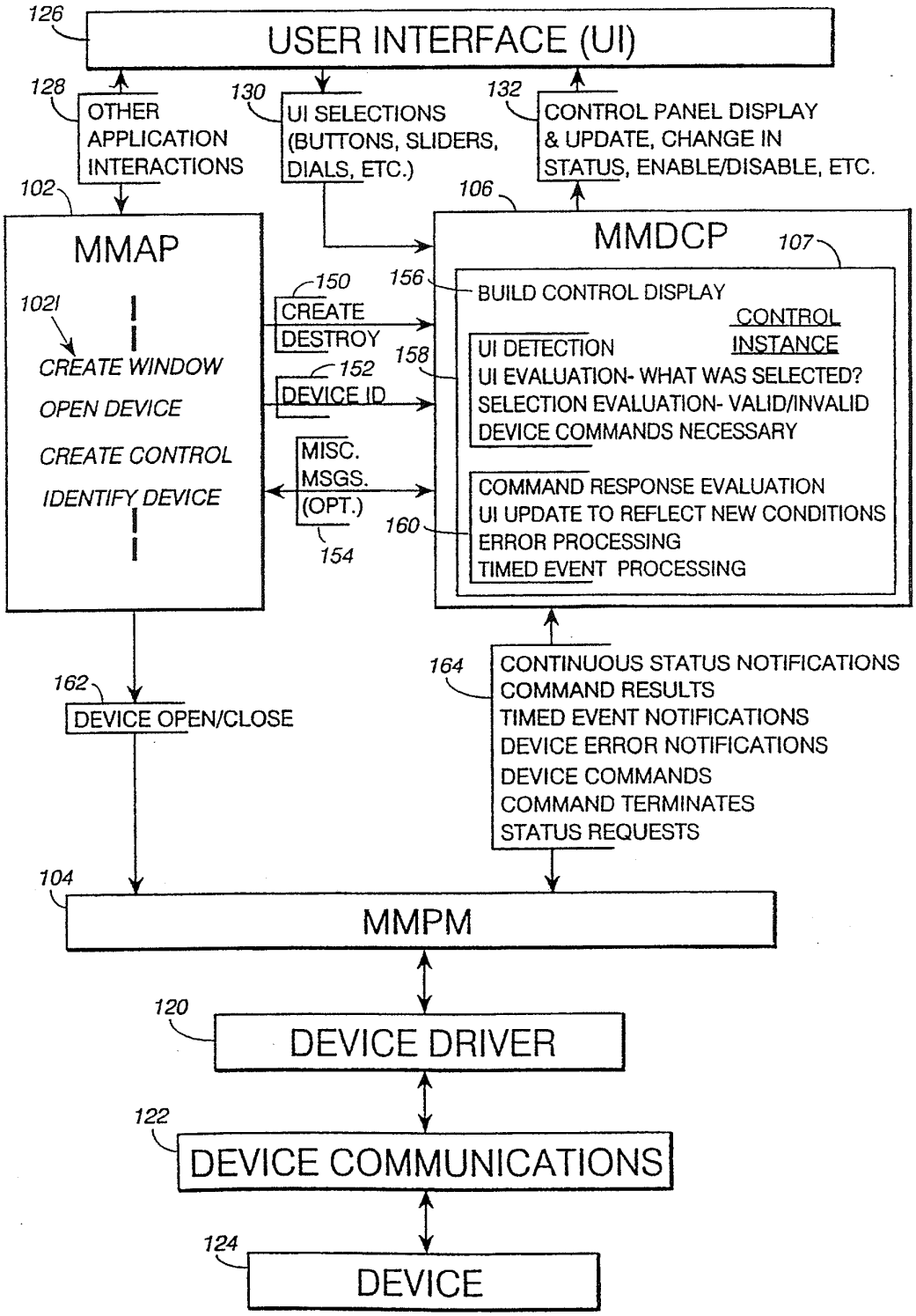

126
USER INTERFACE (UI)
128
OTHER APPLICATION INTERACTIONS
130
UI SELECTIONS (BUTTONS, SLIDERS, DIALS, ETC.)
132
CONTROL PANEL DISPLAY & UPDATE, CHANGE IN STATUS, ENABLE/DISABLE, ETC.
102
MMAP
102I
CREATE WINDOW
OPEN DEVICE
CREATE CONTROL
IDENTIFY DEVICE
106
MMDCP
107
150
CREATE
DESTROY
152
DEVICE ID
MISC. MSGS. (OPT.)
154
156
BUILD CONTROL DISPLAY
CONTROL INSTANCE
158
UI DETECTION
UI EVALUATION- WHAT WAS SELECTED?
SELECTION EVALUATION- VALID/INVALID
DEVICE COMMANDS NECESSARY
160
COMMAND RESPONSE EVALUATION
UI UPDATE TO REFLECT NEW CONDITIONS
ERROR PROCESSING
TIMED EVENT PROCESSING
162
DEVICE OPEN/CLOSE
164
CONTINUOUS STATUS NOTIFICATIONS
COMMAND RESULTS
TIMED EVENT NOTIFICATIONS
DEVICE ERROR NOTIFICATIONS
DEVICE COMMANDS
COMMAND TERMINATES
STATUS REQUESTS
104
MMPM
120
DEVICE DRIVER
122
DEVICE COMMUNICATIONS
124
DEVICE

FIG. 6

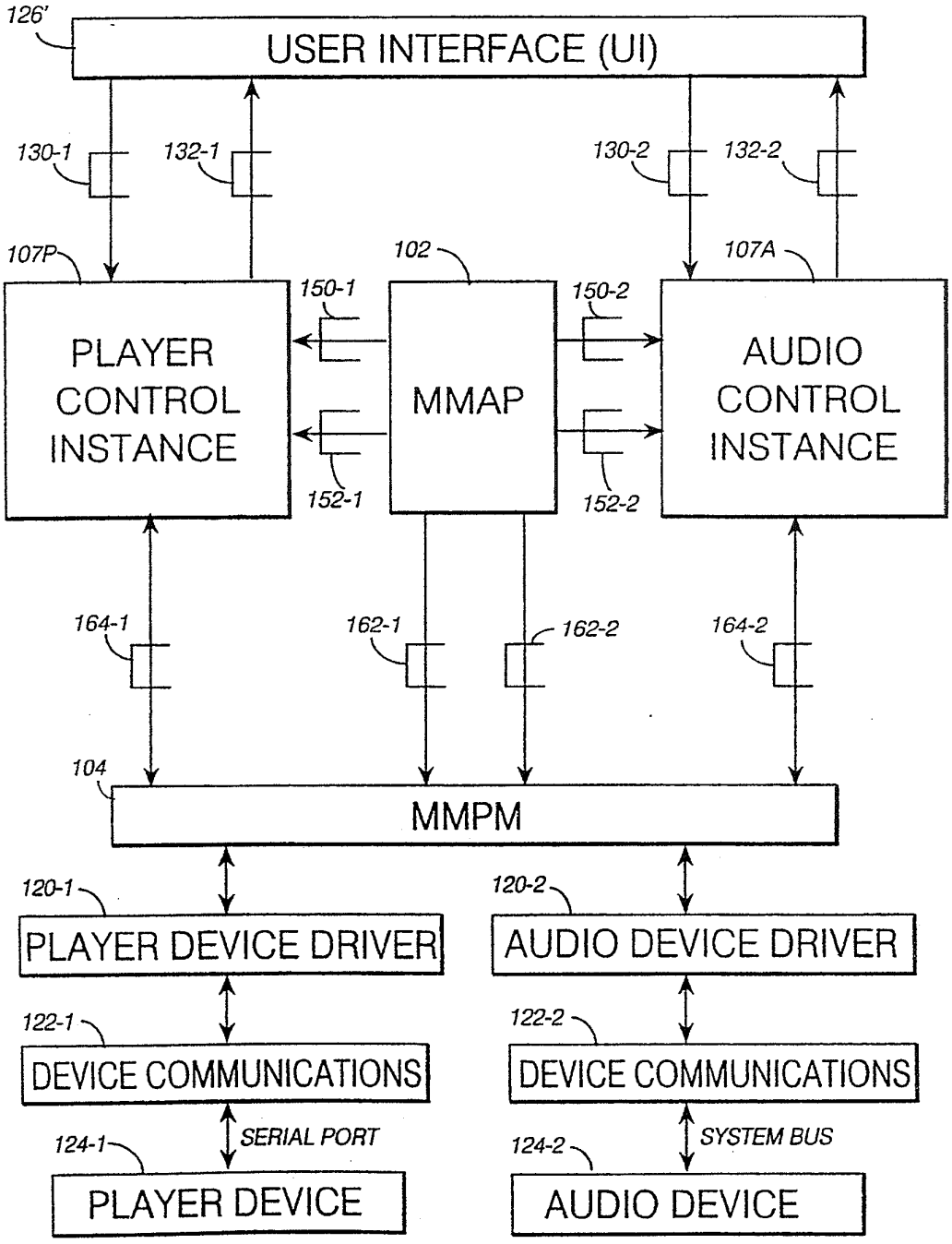
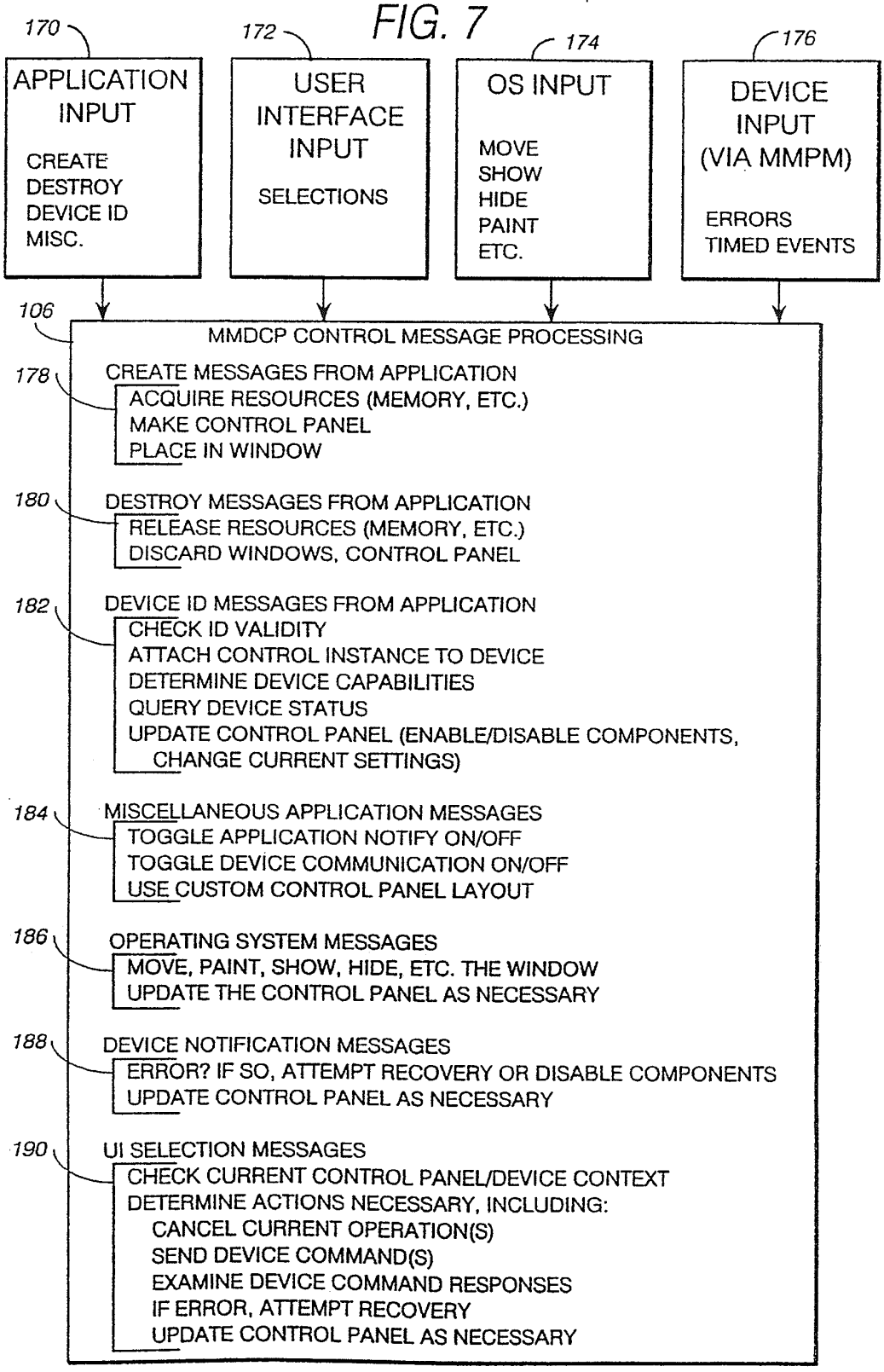


FIG. 7



MULTIMEDIA SYSTEM HAVING SOFTWARE MECHANISM PROVIDING STANDARDIZED INTERFACES AND CONTROLS FOR THE OPERATION OF MULTIMEDIA DEVICES

BACKGROUND OF THE INVENTION

This invention relates to the field of data processing, and, more particularly, to an improved multimedia system having a software mechanism that provides standardized interfaces and controls for the operation of multimedia devices.

A multimedia system is designed to present various multimedia materials in various combinations of text, graphics, video, image, animation, sound, etc. Such a system is a combination of hardware and software. The hardware may include a personal computer to which various multimedia devices can be attached. The hardware runs under the control of an operating system and multimedia application programs. Recent commercially available multimedia systems provide multimedia application developers the capability to control the multimedia devices via software. In turn, application developers create programs that allow end users to control a device by manipulating simulated controls, such as buttons, dials, and other elements, on a computer display screen. The application programmers have been required to create their own custom designed device control screens as well as handle all user interactions, device communications, and screen changes. Such custom development has resulted in inconsistent user interfaces, requires knowledge of the device and device control methods, and duplicates effort for multiple applications. These problems reduce useability and increase development expense.

SUMMARY OF THE INVENTION

One of the objects of the invention is to solve the problems noted above by providing a multimedia system with a set of standardized multimedia controls by which a consistent user interface is presented from different application programs.

Another object of the invention is to provide a multimedia control program that interacts with a multimedia application program to control a multimedia device without requiring the application program developer to have an in-depth knowledge of the multimedia device to be controlled.

A further object of the invention is to provide a multimedia control program which provides common functions available for use by multimedia application programs, so as to relieve application programmers of duplicate development effort and to thereby increase multimedia programmer productivity.

Still another object of the invention is to provide a multimedia control program which creates user interfaces comprising display screens having a common look and feel, the screens containing graphic controllers that can be manipulated by users to control multimedia devices.

A still further object of the invention is to provide a multimedia device control program which creates a control panel with minimum involvement of an application program and which thereafter controls operation of the device without intervention of the application program.

Briefly, in accordance with the invention, a multimedia system includes a multimedia device control program having a plurality of application program selectable controls for a like plurality of different classes of multimedia devices. Each class has a different set of controllable device functions or attributes. In response to selection of a control by an application program, a unique control panel is created in a user interface for controlling operation of a device. The selected control performs all of the processing actions necessary to control the device in response to user selections on the interface, without involvement of the application program in such actions.

In accordance with another aspect of the invention, the multimedia application program includes a plurality of predetermined templates defining different control panels which contain user manipulable controllers. The application program sends a message to the control program indicating its selection and the control program creates the desired control screen from the selected template.

DRAWINGS

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

FIG. **1** is a schematic diagram of a multimedia data processing system embodying the invention;

FIG. **2** is a schematic diagram of an exemplary control screen on a display;

FIG. **3** is a schematic diagram of the major components of the software mechanism included in the system shown in FIG. **1**;

FIG. **4** is a schematic diagram illustrating communications between the major components of a prior art system which the present invention improves;

FIG. **5** is a diagram similar to FIG. **4** but showing the improved processing in accordance with the invention for multimedia device control and user interface interaction;

FIG. **6** is a simplified diagram similar to FIG. **5** but showing processing for controlling a plurality of different multimedia devices; and

FIG. **7** is a block diagram illustrating different inputs into the MMDCP, and the actions responsive to the inputs.

DETAILED DESCRIPTION

Referring now to the drawings, and first to FIG. **1**, there is shown an exemplary multimedia data processing system comprising a personal computer **10** operable under a multitasking operating system such as OS/2 Version 2.0, to execute application programs. Computer **10** comprises a microprocessor **12** connected to a local bus **14** which, in turn, is connected to a bus interface controller (BIC) **16**, a math coprocessor **18**, and a small computer system interface (SCSI) adapter **20**. Microprocessor **12** is preferably one of the family of 80xxx microprocessors, such as an 80386 microprocessor, and local bus **14** includes conventional data, address, and control lines conforming to the architecture of such processor. Adapter **20** is also connected to a SCSI bus **22** which is connected to a SCSI hard drive (HD) **24** designated as the C:drive, the bus also being connectable to other SCSI devices (not shown). Adapter **20** is also connected to a NVRAM **30** and to a read only memory (ROM) **32**.

BIC **16** performs two primary functions, one being that of a memory controller for accessing a main mem-

ory 36 and a ROM 38. Main memory 16 is a dynamic random access memory (RAM) that comprises stores data and programs for execution by microprocessor 12 and math coprocessor 18. ROM 38 stores a POST program 40 and a BIOS 42. POST program 40 performs a standard power-on, self-test of the system when computer 10 is started by turning the power on or by a keyboard reset. An address and control bus 37 connects BIC 16 with memory 36 and ROM 38. A data bus 39 connects memory 36 and ROM 38 with a data buffer 41 that is further connected to data bus 14D of bus 14. Control lines 45 interconnect BIC 16 and data buffer 41.

The other primary function of BIC 16 is to interface between bus 14 and an I/O bus 44 designed in conformance with Micro Channel (MC) architecture. Bus 44 is further connected to an input/output controller (IOC) 46, a video signal processor (VSP) 48, a digital signal processor (DSP) 49, and a plurality of expansion connectors (EC) or slots 50. VSP 48 is further connected to a video RAM (VRAM) 60 and a multiplexor (MUX) 62. VRAM 60 stores text and graphic information for controlling what appears on the screen of a monitor 68. MUX 62 is further connected to a digital to analog converter (DAC) 66 and to a connector or terminal 70 that is connectable to a video feature bus (VFB). DAC 66 is connected to monitor 68 that provides a conventional output screen or display for viewing by a user.

IOC 46 controls operation of plurality of I/O devices including a floppy disc drive 72 designated as the A:-drive, a printer 74, and a keyboard 76. Drive 72 comprises a controller (not shown) and a removable floppy disc or diskette 73. IOC 46 also is connected to a mouse connector 78, a serial port connector 80, and a speaker connector 82, which allow various optional devices to be connected into the system. A mouse 79 is connected to connector 78.

DSP 49 is further connected to an instruction RAM 84, a data RAM 96, an analog interface controller (AIC) 88, and an audio controller (90). RAMS 84 and 86 respectively hold instructions and data used by DSP 49 for processing signals. Audio controller 90 controls various audio inputs and outputs and is connected to a plurality of connectors 92 by which various devices can be connected to the system. Such devices include a headphone, a microphone, a speaker, a musical instrument digitizing interface (MIDI), and devices requiring an audio line-in and line-out functions. Various other multimedia devices (MMD) 96 can be also attached to the system through an EC 50 and adapter card 94.

For purposes of illustrating the invention, system 10 further includes a video disc player 108 having a control line connected to connector 80 of the serial port for receiving start/stop signals through the serial port. Player 108 is also connected to and transmits video signals to an auxiliary video card 110 that has a connection to a monitor 112 and another connection 108 to VFB connector 70.

Memory 36 stores various programs for execution in the system, which programs include application programs 100, including multimedia application programs (MMAP) 102, and an operating system 98 which includes OS/2 multimedia presentation manager (MMPM) 104 and a multimedia device control program (MMDCP) 106. It is to be noted that while FIG. 1 illustrates an exemplary multimedia system, the operating system is general purpose and is designed to run or control data processing systems having configurations that are different from the one shown in FIG. 1. The invention is embodied primarily in MMDCP 106 and its interaction with operating system 100 and the hardware. The combination and interaction of hardware and software is referred to herein as a "software mechanism".

FIG. 2 illustrates an exemplary control screen 200 in which a plurality of windows or panels are displayed on a monitor in response to execution of a sample program named "VIDPLAY". This program creates a display of a control screen 200 that includes a video window 202, an audio control panel 204, a video control panel 206, and a player control panel 208. Also presented in the screen is a standard cursor 210 that is manipulated through use of mouse 79. Window 202 contains a title bar 212 bearing the title "Sample VIDPLAY", a window control button 213, a sizing button 215, a menu bar 214, and a video viewing area 216. The window itself is conventional and can be manipulated by means of cursor 210 to change the position and size of the window.

Audio control panel 204 contains a title bar 218 identifying the panel as an "Audio" control panel, and a control area containing various simulated controllers or controls 220–224. Control 220 is a mute button, and controls 221–224 are dials for respectively controlling volume, balance, treble, and bass. With reference to control 221, each dial includes reference marks 228 around the periphery of a circular knob, a movable pointer 229, a decrease button 226, and an increase button 227. Buttons 226 and 227 respectively display graphic symbols "—" and "+" which generally denote the button function. Also included in control 221 is a legend "Volume" signifying the function of the device being controlled. When the cursor 210 is placed on one of buttons and the mouse is clicked, the pointer appears to move until the mouse button is released. Such movement would be accompanied by signals being sent to the physical device whose controls are being simulated to cause the corresponding action to occur. For example, if the cursor is clicked on button 227, pointer 229 rotates clockwise and the actual volume of the audio device would increase.

Video control panel 206 has a title bar 230 displaying the legend "Video", a freeze button 231, and dial controls 232–236 for controlling the brightness, contrast, color, tint, and sharpness, of the video device, e.g., monitor 112 (FIG. 1). Player control panel 208 displays the legend "Player Control" in title bar 240, push buttons 241–248, and a slider control 249. Buttons 241–248 include different symbols symbolic of different player functions controlled thereby. Such buttons provide, for video disc player 108, controls of eject, pause, play, play backward, record, repeat, rewind, scan forward, scan backward, step backward (frame backward), step forward (frame advance), and stop. Slider control 249 displays the current device position in time or frame based units.

Preferably, each button presents a visual differentiation between actuated and non-actuated conditions. This can be accomplished by shadowing the buttons to give appearances of being pushed in or sticking out from the plane of the display. Some of the buttons may also be animated. For example, scan forward and scan backward buttons may have a series of arrows that are successively highlighted to simulate the direction of movement.

It is to be noted that the above discussion of FIG. 2 provides nomenclature facilitating an understanding of the invention as described below. The contents of con-

trol screen **200** as shown in FIG. **2** is intended to primarily show what samples of different control panels look like. Quite obviously, in any given system, the type and number of panels is dependent upon what multimedia devices are connected to the system, and what controls are selected to be shown. Further variations in such control panels and how they are created are described hereinafter.

FIG. **3** illustrates the layered structure of the software mechanism and the primary programs that are executed concurrently in a multitasking mode, in accordance with the invention. At the top, a user interface **126** communicates with MMAP **102** and MMDCP **106**, both of which are above MMPM **104**. The latter program interacts with the IBM OS/2 Presentation Manager (PM) program **99** which is above the operating system kernel **98**, which sits on top of device drivers **120**. PM **99** also communicates with MMAP **102** and MMDCP **106**. A device communications program **122** is between drivers **120** and BIOS **42** which is the lowest software layer and provides device specific processing for operating multimedia devices **124**. These devices include video disc player **118**, and any MMD **96** such as video tape, digital audio, compact disc (CD), and digital video devices.

MMAP **102** is a user oriented application program providing access to services of multimedia devices appropriate to the application, e.g., a video disc browsing program. MMAP **102** interacts with MMDCP **106** for the purpose of providing a user interface for the appropriate device, and with MMPM **104** for opening and closing the device and accessing specific features or performing custom processing not available via the more generic MMDCP **106**. MMPM **104** implements a high level, device independent interface to multimedia devices for application use and includes support for device context switching, data streaming, and management of device contention. PM **99** is used for its screen management functions and capability of creating windows on a display screen. OS/2 kernel **98** represents the services provided by the IBM OS/2 operating system. These services generally include functions for process and resource management. Kernel **98** and PM **99** are omitted from later drawing figures for simplicity of illustration. OS/2 device drivers **120** are device specific control programs providing a software interface for controlling individual devices. A device driver at this level generally provides services for a device of a specific type and manufacturer. Device communications **122** indicates a communication mechanism by which a device driver accesses an attached device. Some devices are card type adapters installed in the system for access by the system bus. External devices are generally attached to the computer by a cable plugged into the parallel port or the serial port.

MMDCP **106** comprises an audio control **101**, a video control **103**, a player control **105**, one or more control instances **107**, panel templates **109**, interface logic **111**, and device logic **113**. Controls **101**, **103**, and **105** are separate generic routines or programs for controlling multimedia devices having audio, video, and player attributes. In general, an application program first opens a device, and then sends a message to MMDCP to create a control screen which is done by making an instance or copy of the appropriate control and then attaching the control instance to the device. That is, once the instance has been made, it is necessary to inform it of the identity of the device it will be controlling so that the commands can be sent to the proper device. After attachment, the control instance performs its primary function of controlling the particular device, as described in more detail hereinafter.

FIG. **4** illustrates various functions **134**, **136**, and **138** as performed in the prior art by a typical application program **102'** and the interfaces between such program and user interface (UI) **126'** and MMPM **104**. The illustration is for a system having a single multimedia device **124**. The graphics on the screen display together with the means for manipulating the graphics and making selections, form the user interface **126'** through which the user interacts with the system to control operation of the multimedia devices. Input messages **130** from the user into the application program **102'** include UI selections made by the user actuating the various buttons, sliders, dials, etc. Output communications or messages **132** from the application to the user interface include controlling and updating the panel display, indicating changes in status of the multimedia devices, enabling and disabling buttons or controls which are or are not appropriate for the current device state. For example,if a device is not playing, then the pause button is disabled because its use is not applicable. Other application interactions **128**, such as those not pertinent to the control of a MMD, may also occur with the user interface.

Various input/output messages **140** and **142** also communicate between the application and MMPM **104**. Application **102'** may receive as input messages **142** continuous notifications on the status of the multimedia devices, the results of commands, timed event notifications and device error notifications. The application output messages **140** include device open/close and other commands, command terminates, and status requests.

In response to the application program being run or executed, the program is initially operative to create, by function or step **134**, a control screen on a monitor which screen includes one or more controllers. The size, appearance, location, contents, etc. of the control screen are the full responsibility of the application. Once the controllers are displayed, the user can thereafter manipulate the controls and make selections to control operation of a MMD. When the application is being ended, a destroy message **134** destroys the control screen initially created. Functions **136** are performed in response to the application program receiving messages **130** and include detecting UI actions, evaluating the selection as to what action was selected, determining if the selection is valid or invalid, and generating various output messages **140**. In response to the application program receiving messages **142**, application **102'** evaluates responses to commands, updates the UI to reflect new conditions, and processes the notifications of timed events and device errors. The application also sends messages **132** as appropriate in response to such processing. In summary, the messages and interactions explained with reference to FIG. **4** indicate what an application program would have to do in the absence of the invention. It is to be appreciated that application programs normally perform functions in addition to those related to MMD control but inasmuch as the invention is concerned with MMD control, the additional functions have been omitted for simplicity.

With reference to FIG. **5**, in accordance with the invention, MMAP **102** is greatly simplified and reduced relative to the equivalent prior art application program **102'** because MMDCP **106** performs most of the func-

tions for generating and receiving communications with the user interface and with MMPM **104**. When MMAP **102** is run, a series of instructions **102I** are executed. The first instruction is to create a window and this is done by PM **99**. The second instruction is to open the device to be controlled and this is done by sending by sending a DEVICE OPEN command **162**. The third instruction is to create a control and this is done by sending a CREATE message **150**. The fourth instruction IDENTIFY DEVICE sends a DEVICE ID message **152** identifying the particular device to be controlled to MMDCP. In response to messages **150** and **152**, MMDCP **106** creates a control instance **107** and attaches it to open device **124**. After that, control processing including generating and receiving communications from the UI and the MMPM, is done by control instance **107** thereby relieving the application from doing similar functions and being concerned with knowledge of individual devices. Control instance **107** receives input messages **130** from UI **126**, transmits messages **132** to the UI, and communicates with MMPM **104** via two way communications **164**. Control instance **107**, in response to receiving various inputs, performs the functions described below with reference to FIG. 7. The control screen presents a control interface to the end user, and control instance **107** translates actions and selections on the interface into appropriate media control and system commands.

MMDCP **106** can create three different types of control panels: a video control panel for a device, such as a graphics/video overlay adapter, having video attributes; an audio control panel for a device, such as an amp/mixer device, having audio attributes; and a player control panel for a device, such as a videodisc player, having player attributes. A video control panel typically includes a freeze push button, and circular sliders or dials to control brightness, contrast, saturation, hue, and sharpness. An audio control panel typically includes a mute push button and a series of circular sliders to control volume, balance, treble, and bass. A player control panel typically includes push buttons for combinations of the following player actions: eject, pause, play backward,play forward, play reverse, record, repeat, rewind, scan backward, scan forward, scan reverse, step backward, step forward, and stop. A player control panel might also include a linear slider for position display. It should be obvious that the individual controls depend on the capabilities of the attached multimedia device(s) and the configuration of the player control screen.

FIG. **6** illustrates the manner in which MMDCP **106** controls two multimedia operations for a MMAP that runs two multimedia devices. The devices might be , e.g., a player device **124-1** such as videodisc player **108** connected to the serial port, and an audio device **124-2** connected to one of the expansion connectors **50** and accessible over the system bus. For such a configuration, MMAP **102** needs to send a first DEVICE OPEN message **162-1**, a first DEVICE ID message **152-1**, and a first CREATE message **150-1** to create a player control instance **107P**, and to then send a second DEVICE OPEN message **162-2**, a second DEVICE ID message **152-2**, and a second CREATE message **150-2** to create an audio control instance **107A**. Also, respective player and audio device drivers **120-1** and **120-2** and respective device communications **122-1** and **122-2** have to have been loaded into the system, for establishing communications with the respective multimedia devices. With two devices, the control screen **200** in FIG. **2** could display player control panel **208** and audio control panel **204**. Once the control instances are attached, each control instance manages its attached device and configures itself according to the device capabilities. During operation, player control instance **107P** receives communications **130-1** for the UI and sends messages **132-1** to the UI, while audio control instance **107A** receives messages **130-2** from the UI and sends messages **132-2** to the UI. In the prior art, the application program has to implement and manage the additional functionality to address and handle the functional differences between player and audio devices.

FIG. 7 shows further details of control message processing that is done in response to receiving messages or inputs **170**, **172**, **174**, and **176** from four sources, namely, MMAP **102**, UI **126**, the operating system, and multimedia device **124** inputs through MMPM **104**. In response to receiving a CREATE control screen command, MMDCP is operative to perform the functions **178** and acquire the resources (e.g., memory) for the display, make the desired control panels, and place them on the screen. In response to receiving a DESTROY message from the application, actions **180** release the resources, and discard the window and any control panels on the screen. In response to receipt of a DEVICE ID message from the application, actions **182** comprise checking the validity of the device ID, making a control instance by copying the control and then attaching the control instance to the open device, determining device capabilities, querying the device status, and updating the control panels, e.g., by enabling or disabling components and changing current settings. The attaching is simply notifying the control instance of the ID of device to be controlled. Actions **184** are functions or actions performed in response to miscellaneous messages from the application and include enabling or disabling the sending of notification messages to the application, toggling application notify on/off, toggling device communication on/off, and using custom control panel layout.

Action **186** updates control panels as necessary in response to receiving messages from the operating system. Such messages include hide, show, move, paint, etc. In response to receiving device notification messages, actions **188** include updating the control panel as necessary. If an error has occurred, a recovery attempt is made or the component is disabled. Timed events are events which occur at a device asynchronously with respect to a command issued to the device. For example, if the device is instructed to play for a certain amount of time, the completion of the play command is a timed event which results in a notification being sent to MMDCP **106**. At this point, MMDCP **106** stops animating the play button and changes the appearance of the play button to be consistent with a "stop" state. Other timed events might include position notifications and cuepoints. When an input **172** is received, actions **190** are performed to check the current control panel/device context, and determine what actions are necessary. If for example, a device is already playing and the play button is selected, the context indicates no action is necessary and the selection of the play button is ignored. The actions to be done include cancelling current operations, sending device commands, examining device command responses, attempting error recovery, and updating the control panel as necessary. The specific details of the actions described relative to FIG. 7 should be obvious to those skilled in the art and have

been omitted to shorten description particularly since the details are not claimed.

A typical sequence of actions that occur can be illustrated by the example of audio control panel **204** and volume controller **221** (FIG. 2). Suppose the user desires a volume increase. To accomplish this using the mouse, the mouse is manipulated to position cursor **210** on button **227** and then clicked and held until the volume increases to the desired level. In response to the mouse being clicked, the following sequence of actions occur. First, presentation manager **99** (FIG. 3) determines which application, the cursor is currently being operated under, which window the cursor is being operated in, and which object in the window has been selected. In this example, the object is the audio controller volume increase button. PM **99** then sends a user interface message **172** (FIG. 7) to the audio control instance which message identifies the object and the control action desired. In response to receiving the message, the audio control instance then performs the functions **190** and determines what actions are necessary. The first is to decide whether to cancel any current operation. If the mute button is on, it would be cancelled to allow audio to be produced by the device. Next, a volume increase device command is sent to the audio device to increase the volume by an increment. At this point the device responds and if the response indicates such action has been done without error, the next action is to update the pointer of the volume dial and this is done by sending a message through PM **99** and user interface which thereupon redraws the volume dial pointer to a new position representing an increment of volume increase. The sequence of actions repeat until the mouse button is released, or until the maximum volume is reached. An optional action (not shown) could be performed before communicating with the device, to give the application program the opportunity to handle the user selection. This is useful in situations where operational customization is done by the application, instead of operating by the control instance. With this option, the application would send a return code indicating it will or will not handle the message.

As indicated above, MMDCP **106** includes a variety of panel templates **109** that are used in making a control panel in **178**. MMDCP provides the application programmer with the options of accepting a default panel, a minimal panel, a complete panel, or a custom panel. A complete panel includes all the supported dials, buttons, sliders, etc. for controlling a particular device. A minimal panel includes only those controllers generally considered absolutely necessary. Naturally, the minimal panel occupies less screen area than a complete panel. A custom panel could be defined by the application and use any subset of the components of a complete panel, change relative positions, include other functions, etc. The templates also include vertically oriented panels, such as the audio and video panels shown in FIG. 2, and horizontally oriented panels, for both complete and minimal panels. Additional options include animated buttons (such as movement of arrows on a Play button when a device is playing), and the ability for an application to request that the control only present a user interface but not communicate with the device. This option may be useful if the application desires to control other devices while taking advantage of the user interface standards and processing. The designs of the panels provide a uniform appearance and common look and feel between different applications.

The following application code is written for OS/2 operating system with OS/2 multimedia extensions, and provides an example of the code simplicity of an application program useable with the invention:

```
******** BEGIN EXAMPLE CODE ********
//Open a videodisc device with an alias name and obtain a
//device ID
OpenDevice ((LPSTR)szVdiscDevName, (LPSTR)szVdiscAlias,
&wVdiscDevID);
//Create a window to hold the Player Control Panel on the
//screen
hwndVPCDlg = WinLoadDlg(HWND_DESKTOP,
                        hwndClient,
                        pVPCDlgProc,
                        0,
                        ID_DLG_VPC,
                        NULL);
//Create the Player Control Panel using MINIMAL
//configuration. "hwndVPC" is the handle uses for any further
//communication with the player control
hwndVPC = WinCreateWindow
(hwndVPCDig,                    //Use the window above
WC_PLAYERCTL,                   //Create Player Control
"",                             //Misc OS/2 item
WS_VISIBLE | MCS_MINIMAL        //Select panel style
X_MMCTL, Y_MMCTL                //Starting screen location
200,100                         //Size
hwndVPCDig,                     //Misc OS/2 item
HWND_TOP                        //Misc OS/2 item
ID_VPC_WND,                     //Misc OS/2 item
NULL,                           //Misc OS/2 item
NULL);                          //Misc OS/2 item
//Inform the Player Control to use the videodisc player that
//was opened earlier
    WinSendMsg (hwndVPC, MCM_SETDEVICEALIAS,
    szVdiscAlias,
0)
********END SAMPLE CODE ********
```

In response to successful execution of the above code, a device ID is obtained, a window is created, a player control instance is created, and the device is set. The player control instance will display the control screen including the player control panel, handle all user interface actions, communicate with the videodisc player, etc. No other code in the application program is needed to perform or process selections from the control panel.

As indicated previously, an application program must first create an instance of a control and second, attach the instance to an open device before the control instance can assume responsibility for managing the user interface with the attached device. The first action involves creating a window of the proper window class. There is a window class for each type of supported device to be controlled: audio attributes, video attributes, and player attributes. There are also separate control programs (which may share a function) for each window class. In presentation manager (PM), an application program creates a window using the PM call WinCreateWindow. WinCreateWindow has several parameters including the window class and window style.

The window style of the MMDCP specifies, among other things, the orientation of the control panel (vertical or horizontal) and the degree of desired device control (minimal, complete). The control program uses the style to select one of four layouts for the initial appearance. For example, audio control **204** in FIG. 2 is a vertical, complete control. The result thus promotes a consistent user interface.

The panel templates **109** each specify the type of components and their positions using a dialog template

of PM. By way of example, the dialog template corresponding to the layout of audio control panel **204** is:

```
DGLTEMPLATE ID_DLG_AACCOMPLETE_V LOADONCALL MOVEABLE
DISCARDABLE
BEGIN
    DIALOG "", ID_DLG_AACCOMPLETE_V, 0, 0, 42, 174, NOT
      FS_DLGBORDER | FS_NOBYTEALIGN
      PRESPARAMS PP_FONTNAMESIZE, "8.Helv"
    BEGIN
      PUSHBUTTON "",      ID_MUTE, 1, 153, 40, 20, WS_TABSTOP
      CTEXT      "Mute", ID_TEXT_MUTE 1,145,40,8
        PRESPARAMS PP_FOREGROUNDCOLORINDEX, SYSCLR_WINDOWTEXT
      PUSHBUTTON "Volume" ID_VOLUME 1,109,40,36,WS_TABSTOP
      PUSHBUTTON "Balance", ID_BALANCE 1,73,40,36, WS_TABSTOP
      PUSHBUTTON "Treble", ID_TREBLE, 1,37,40,36, WS_TABSTOP
      PUSHBUTTON "Bass", ID_BASS 1,1,40,36, WS_TABSTOP
    END
END
```

For the purpose of defining the layout of a control panel, the window class specified in the dialog template is ignored for each of the predefined components such as the mute button or the volume dial. To create the control panel display, the MMDCP uses the information in the template to create each of the desired components. The subset of components present influences the subsequent operation of the MMDCP. For example, a minimal audio control includes only a volume dial and a mute button. A request to update the control panel would query the device only for the applicable information, i.e., the volume and mute status. A complete audio control would cause a query of the device for all of the components, i.e., the mute, volume, bass, and treble status.

The template mechanism also allows the MMAP to specify an alternative layout for a control panel. This is done through an optional miscellaneous application message **184** to USE CUSTOM CONTROL PANEL LAYOUT. In this case, the MMAP provides the desired template to the MMDCP after the panel is created. The custom template supersedes any layout selected at MMDCP creation time. If neither minimal nor complete is specified in the style, then the MMDCP assumes that the MMAP will subsequently provide a layout and no components are created until this is done.

While the invention has been described in connection with a specific operating system, it should be obvious that other operating systems could also be used. Further, it should also be obvious that additional classes of control programs can be added or substituted for the audio, video and player control programs. It should be further apparent to those skilled in the art that many changes can be made in the details and arrangements of steps and parts without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. In a multimedia data processing system (MMDPS) comprising a processor, a storage system including a memory for storing at least one multimedia application program (MMAP) and a multitasking operating system for execution by said processor, a monitor for displaying screens of information, and connector means for connecting one or more multimedia devices into said MMDPS, each device having a plurality of controllable functions, each device being in one class of a plurality of different classes of multimedia devices, the improvement comprising:

first means responsive to a DEVICE OPEN command from said application program for opening a multimedia device (hereinafter referred to as open MMD) and for thereafter transmitting signals to said open MMD in response to said first means receiving device commands, said signals being operative to control said controllable functions of said open MMD;

second means comprising a user interface including user manipulable objects on a display screen of said monitor;

and multimedia device control means (MMDCM) layered between said first means and said second means, said MMDCM comprising a plurality of application-program-selectable class-specific controls, each control being for a different one of said classes of multimedia devices;

said MMDCM being responsive to a CREATE message from the application program to select one of said controls (hereinafter referred to as selected control) having the same class as said open MMD;

said selected control comprising third means for creating a control screen on said monitor in said user interface, said control screen having a control panel comprising a plurality of user actuated controllers for controlling different functions of said open MMD;

said user interface being operative to send a user selection message in response to a user manipulating one of said controllers;

and, said MMDCM further comprising processing means operative, in response to receiving said user selection message, to send a device command to said first means for changing a function of said open MMD and to send a message to said user interface to update the one of said controllers manipulated by the user to reflect the changed function of said open MMD.

2. A MMDPS in accordance with claim **1** wherein:

said selected control is a copy of one of said controls (which copy is referred to hereinafter as a control instance);

and said MMDCM is operative to attach said control instance to said open MMD in response to receiving an identification of said MMD.

3. A MMDPS in accordance with claim **2** wherein said control instance is made in response to said CREATE message and said identification is done by a DEVICE ID message from the application program.

4. A MMDPS in accordance with claim **3** wherein:

said MMDCM further comprises a plurality of predefined control panels for each class of said controls, said MMDCM being further operative in response to said CREATE message to select one of said

predefined control panels for display in said control screen;

and said processing means is further operative in response to receiving said DEVICE ID message to determine device capabilities and device status, and send messages to said user interface for updating said control panel in accordance with said device capabilities and said device status.

5. A MMDPS in accordance with claim 4 wherein said processing means is operative to selectively enable and disable said controllers in said control screen according to whether or not said MMD has a controllable function corresponding to the control function of each controller.

6. A MMDPS in accordance with claim 4 wherein:

said MMDCM is further operative in response to receiving a second CREATE message to create a second control instance and a second control panel for a second MMD.

7. A MMDPS in accordance with claim 1 wherein said MMDCM further comprises a plurality of predefined control panels for each class of said controls, said MMDCM being further operative in response to said CREATE message to select one of said predefined control panels for display in said control screen.

8. A MMDPS in accordance with claim 7 wherein said predefined control panels for each class include a minimal control panel and a complete control panel, said minimal control panel having a minimum number of controllers for controlling a minimum number of functions, and said complete control panel having a plurality of controllers for controlling a maximum number of functions of each class.

9. A MMDPS in accordance with claim 8 wherein:

said predefined control panels further comprise control panels of horizontal and vertical orientations.

10. A MMDPS in accordance with claim 1 wherein:

said first means is operative to send to said control instance notification messages notifying said control instance of errors occurring in said MMD and timed events occurring in said MMD;

and said processing means is further operative to process said notification messages.

11. In a multimedia data processing system (MMDPS) comprising a processor, a storage system including a memory for storing at least one multimedia application program (MMAP) and a multitasking operating system for execution by said processor, a monitor for displaying screens of information, and connector means for connecting one or more multimedia devices into said MMDPS, each device having a plurality of controllable functions, each device being in one class of a plurality of different classes of multimedia devices, the improvement comprising:

first means responsive to a DEVICE OPEN command from said application program for opening a multimedia device (hereinafter referred to as open MMD) and for thereafter transmitting signals to said open MMD in response to said first means receiving device commands, said signals being operative to control said controllable functions of said open MMD;

second means comprising a user interface including a display screen on said monitor;

and multimedia device control means (MMDCM) layered between said first means and said second means, said MMDCM comprising a plurality of control panel templates for each class of said controls, said templates for each class include a minimal control panel template and a complete control panel template, said minimal control panel template defining a minimum number of controllers for controlling a minimum number of functions, and said complete control panel template defining a plurality of controllers for controlling a maximum number of functions of each class;

said MMDCM being responsive to a CREATE message from the application program to select one of said templates and send a message to said user interface to create a control panel in said control screen in accordance with the definition in the template so selected;

said control panel in said control screen comprising a plurality of user actuated controllers for controlling different functions of said open MMD;

said user interface being operative to send a user selection message to said MMDCM in response to a user manipulating one of said controllers;

and, said MMDCM further comprising processing means operative, in response to receiving said user selection message, to send a device command to said first means for changing a function of said open MMD and to send a message to said user interface to update the one of said controllers manipulated by the user to reflect the changed function of said open MMD.

12. A MMDPS in accordance with claim 11 wherein said minimal control panel templates and said complete control panel templates further define control panels of horizontal and vertical orientations.

13. A MMDPS in accordance with claim 12 wherein said controllers include buttons, dials, and sliders.

14. The method of operating a multimedia data processing system (MMDPS) comprising a processor, a storage system including a memory for storing at least one multimedia application program (MMAP) and a multitasking operating system for execution by said processor, a monitor for displaying screens of information, and connector means for connecting one or more multimedia devices into said MMDPS, each device having a plurality of controllable functions, each device being in one class of a plurality of different classes of multimedia devices, said method comprising:

(a) opening a multimedia device (hereinafter referred to as open MMD);

(b) storing in said storage system a plurality of application-program-selectable class-specific controls, each control being for a different one of said classes of multimedia devices;

(c) creating, in response to a CREATE message from the application program, a control instance from the one of said controls (hereinafter referred to as selected control) having the same class as said open MMD and attaching said control instance to said open MMD;

(d) creating a control screen on said monitor in said user interface, said control screen including a control panel comprising a plurality of user actuated controllers for controlling different functions of said open MMD;

(e) sending a user selection message from said user interface to said control instance in response to a user manipulating one of said controllers;

(f) generating, in response to said control instance receiving said user selection message, at least one device command for changing a function of said

open MMD, based upon said user selection message and current operational state of said open MMD;

(g) transmitting signals to said open MMD in response to said device commands, said signals being operative to change one of said controllable functions of said open MMD;

and (h) sending a message to said user interface to update the one of said controllers manipulated by the user, to reflect the changed function of said open MMD.

15. The method according to claim **14** further comprising:

storing in said storage system a plurality of control panel templates for each class of said controls, said templates for each class include a minimal control panel template and a complete control panel template, said minimal control panel template defining a minimum number of controllers for controlling a minimum number of functions, and said complete control panel template defining a plurality of controllers for controlling a maximum number of functions of each class;

and selecting one of said templates;

said step (d) being performed by creating said control panel in said control screen in accordance with the definition in the one template so selected.

16. The method according to claim **15** comprising:

selectively enabling and disabling said controllers in said control screen according to whether or not said MMD has a controllable function corresponding to the control function of each controller.

17. The method according to claim **15** comprising:

determining device capabilities and device status, and sending a message from said control instance to said user interface to update said control panel in accordance with said device capabilities and said device status.

18. The method according to claim **15** comprising:

sending to said control instance notification messages notifying said control instance of errors occurring in said MMD and timed events occurring in said MMD;

and processing said notification messages.

19. The method according to claim **14** further comprising:

storing in said storage system a plurality of control panel templates for each class of said controls, said templates for each class include a minimal control panel template and a complete control panel template, said minimal control panel template defining a minimum number of controllers for controlling a minimum number of functions, and said complete control panel template defining a plurality of controllers for controlling a maximum number of functions of each class;

including in said application program a template defining a custom control panel;

specifying in said CREATE message which template is to be used in step (d)

said step (d) creates a custom control panel in said control screen when said custom control panel template is specified in said CREATE message.

20. The method according to claim **14** comprising:

sending a message to said application program in response to receiving said user selection message in step (e), which message requires a response from said application program indicating whether or not said application program will process said user selection message.

* * * * *

380/116 #6/Ext(2) GP 9-11-96 2415

04860.P1365

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Steven W. Christensen

Serial No. 08/316,237

Filing Date: September 30, 1994

For: METHOD AND APPARATUS FOR DISPLAYING AND ACCESSING CONTROL AND STATUS INFORMATION IN A COMPUTER SYSTEM

Examiner: Dela Torre, C.

Art Unit: 2415

Commissioner of
Patents and Trademarks
Washington, D.C. 20231

PETITION FOR EXTENSION OF TIME (37 C.F.R. § 1.136(a)

Sir:

Pursuant to Rule 1.136(a) Applicant hereby petitions for an extension of time to respond to the outstanding Office Action dated March 20, 1996. Our check in the amount of $380.00, the extension fee required for a response filed within the second month (37 C.F.R. § 1.17(b)), is submitted concurrently herewith.

Please charge any debits and credit any overages to our Deposit Account Number 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Dated: 8/20, 1996

Michael J. Mallie
Reg. No. 36,591

12400 Wilshire Blvd.
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8598

FIRST CLASS CERTIFICATE OF MAILING
(37 C.F.R. § 1.8(a))

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231

on August 20, 1996.
Date of Deposit

Angela M. Quinn
Name of Person Mailing Correspondence

Angela M. Quinn
Signature

8-20-96
Date

Attorney's Docket No. 004860.P1365

PATENT

In re the Application of: Steven W. Christensen

Application No.: 08/316,237

Filed: 9/30/94

For: METHOD AND APPARATUS FOR DISPLAYING AND ACCESSING CONTROL AND STATUS INFORMATION IN A COMPUTER SYSTEM

(title)

THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SIR: Transmitted herewith is an **Amendment** for the above application.

☐ Small entity status of this application under 37 C.F.R. §§ 1.9 and 1.27 has been established by a verified statement previously submitted.

☐ A verified statement to establish small entity status under 37 C.F.R. §§ 1.9 and 1.27 is enclosed.

____ No additional fee is required.

☐ _____

The fee has been calculated as shown below:

	(Col. 1)		(Col. 2)	(Col. 3)	Small Entity		Other than a Small Entity	
	Claims remaining after amendment		Highest no. previously paid for	Present extra	Rate	Additional fee	Rate	Additional fee
Total Claims:	24	minus	20	4 *	x $11.00=		x $22.00=	$88.00
Indep. Claims:	3	minus	3	0 *	x $39.00=		x $78.00=	$0.00
☐ First presentation of Multiple Dependent Claim(s)					+ $125.00		+ $250.00	
*If the difference in Col. 3 is less than zero, enter "0" in Col. 3					Total Add. Fee:		Total Add. Fee:	$88.00

XXX A check in the amount of $88.00 is attached for presentation of additional claim(s).

XXX Applicant(s) hereby Petition(s) for an Extension of Time of two (2) month(s) pursuant to 37 C.F.R. § 1.136(a).

XXX A check for $380.00 is attached for processing fees under 37 C.F.R. § 1.17.

☐ Please charge my Deposit Account No. 02-2666 the amount of _____. **A duplicate copy of this sheet is enclosed.**

XXX The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 02-2666 **(a duplicate copy of this sheet is enclosed)**:

XXX Any additional filing fees required under 37 C.F.R. § 1.16 for presentation of extra claims.

XXX Any extension or petition fees under 37 C.F.R. § 1.17.

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 8/20/96

Michael J. Mallie
Reg. No. 36,591

12400 Wilshire Blvd., 7th Floor
Los Angeles, California 90025
(408) 720-8598

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to: Commissioner of Patents & Trademarks, Washington, D.C. 20231 on:

August 20, 1996

Angela M. Quinn — 8-20-96

Angela M. Quinn — Date

LJV/ccm (1/31/96)

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: JAMES C. SCHELLER
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD, 7TH FLOOR
LOS ANGELES, CA 90025-1026

RECEIVED
OCT 11 1996

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN
LOS ANGELES

PCT

WRITTEN OPINION

(PCT Rule 66)

pcv

Applicant's or agent's file reference 04860.P1365	Date of Mailing *(day/month/year)* 04 OCT 1996 **REPLY DUE** within **TWO** months from the above date of mailing

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US95/11025	29 AUGUST 1995	30 SEPTEMBER 1994

International Patent Classification (IPC) or both national classification and IPC
IPC(6): G06F 9/44; and US Cl.: 395/161

Applicant
APPLE COMPUTER, INC.

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

I	[X]	Basis of the opinion
II	[ ]	Priority
III	[ ]	Non-establishment of opinion with regard to novelty, inventive step or industrial applicability
IV	[ ]	Lack of unity of invention
V	[X]	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	[X]	Certain documents cited
VII	[ ]	Certain defects in the international application
VIII	[ ]	Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension., see Rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 *bis*.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 30 JANUARY 1997.

Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer MARK R. POWELL Telephone No. (703) 305-9703

Form PCT/IPEA/408 (cover sheet) (January 1994)*

WRITTEN OPINION

International application No.
PCT/US95/11025

I. Basis of the opinion

1. This opinion has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".)*:

[X] the international application as originally filed.

[X] the description, pages 1-54 , as originally filed.
pages NONE , filed with the demand.
pages NONE , filed with the letter of _____.

[X] the claims, Nos. 1-18 , as originally filed.
Nos. NONE , as amended under Article 19.
Nos. NONE , filed with the demand.
Nos. NONE , filed with the letter of _____.

[X] the drawings, sheets/~~fig~~ 1-13 , as originally filed.
sheets/~~fig~~ NONE , filed with the demand.
sheets/~~fig~~ NONE , filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

[X] the description, pages NONE

[X] the claims, Nos. NONE

[X] the drawings, sheets/~~fig~~ NONE

3. [ ] This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

4. Additional observations, if necessary:
NONE

WRITTEN OPINION

International application No.
PCT/US95/11025

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims	NONE	YES
	Claims	1-18	NO
Inventive Step (IS)	Claims	NONE	YES
	Claims	1-18	NO
Industrial Applicability (IA)	Claims	1-18	YES
	Claims	NONE	NO

2. CITATIONS AND EXPLANATIONS

(See Supplemental Sheet.)

WRITTEN OPINION

International application No.
PCT/US95/11025

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication Date *(day/month/year)*	Filing Date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
US, A, 5,416,895	16 MAY 1995	8 APRIL 1992	NONE
US, A, 5,428,730	27 JUNE 1995	15 DECEMBER 1992	NONE

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

TIME LIMIT:

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):

Claims 1-18 lack novelty under PCT Article 33(2) as being anticipated by the patent to Mills. As to claim 1, see Fig. 1, which shows a processor 14, display screen 18, and cursor control device 19. Mills also teaches 'window generation logic' to 'generate and display a first window region' with view window 20, at Fig. 2, and at col. 3, line 68; and 'indicia generation logic' to 'generate data for display in at least one display area in the first window' such as windows 22,24 at Fig. 2, such that the 'indicia generation logic use message-based communications to exchange information to coordinate activities' at col. 3, lines 22-26.

Mills also teaches a 'control strip' [claim 2] with controller 36, at Fig. 2, and at col. 4, lines 32-40; wherein at least one display area is variably sized [claim 3] using size boxes, at Fig. 2, and at col. 4, lines 8-9; and that the size of the first window region is variable [claim 4] also at col. 4, lines 8-9.

In addition, Mills teaches sizing the first window region so that none of the display areas are visible [claim 5] with close box 28, at Fig. 2, and at col. 4, lines 7-8, or all [claim 6] or a portion [claim 7] of the display areas are visible, both at col. 4, lines 8-9.

Mills also teaches that one of the display areas displays only information [claim 8] with video window 22, at Fig. 2, or provides access to control information [claim 9] with video window 24, at Fig. 2, or displays an additional display element [claim 10] with video window 22, at Fig. 2.

As to claim 11, it corresponds to claim 1, and also includes the following: using the 'indicia generation logic' to 'generate user sensitive graphics for display' at col. 4, lines 32-40; wherein the 'window generation logic' determines when a data display area has been selected, signals the indicia generation logic, which then initiates a response, at col. 2, lines 9-13. Claims 12-14 correspond respectively to claims 6,2,3.

Regarding claim 15, Mills teaches the following: 'generating a first window' with view window 22, at Fig. 2, to accommodate one display area, as with control window 24, for 'indicia' with control buttons 42-54, at Fig. 2, and col. 4, lines 37-40, by 'executing a first programming module' at col. 3, line 66; 'displaying an indicia' at col. 4, lines 32-40; 'selecting one of the indicia' at col. 4, lines 48-55, and sending a message for generating the display at col. 3, lines 22-26; with the programming module performing a function, at col. 4, lines 38-40.

Mills also teaches 'status information' [claim 16] such as tentative-set state at col. 5, lines 10-14, or fixed-set state at col. 5, lines 23-35, and describes the operating state or mode of the controller at col. 6, lines 21-32.

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

In addition, Mills teaches 'control information' [claim 17] in control window 24, at Fig. 2, and at col. 4, lines 32-40. As to claim 18, Mills teaches that the first programming module requests a set of features at col. 4, lines 20-25, sends a message to the programming module indicative of features, and the programming module returns a message; such that the programming modules interact with each other in response to user interaction with the first programming module, all at col. 4, lines 25-40.

Claims 1-18 lack an inventive step under PCT Article 33(3) for the reasons given forth above.

Claims 1-18 have industrial applicability as defined by PCT Article 33(4) because the subject matter claimed can be made or used in industry.

---------- NEW CITATIONS ----------

US, A, 4,896,291 (Gest et al) 23 JANUARY 1990, see Fig. 1, which shows graphical user interface tools, such as slide bars 12, dials 11, and menus 14.

US, A, 5,202,961 (Mills et al) 13 APRIL 1993, see Figs. 2,3, which show a slider bar 36, with velocity and direction indicators, and a control icon 40.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	
	)	
Steven W. Christensen	)	Examiner: Dela Torre, C.
	)	
Serial No. 08/316,237	)	Art Unit: 2415
	)	
Filing Date: September 30, 1994	)	
	)	
For: METHOD AND APPARATUS FOR DISPLAYING AND ACCESSING CONTROL AND STATUS INFORMATION IN A COMPUTER SYSTEM	)	

AMENDMENT

Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

In response to the Office Action mailed March 20, 1996, Applicant respectfully requests the Examiner to enter the following amendments and consider the following remarks:

IN THE SPECIFICATION

At page 2, line 11, please replace "it" with --It--.

At page 4, line 10, please replace "individiual" with --individual--.

At page 21, line 23, please insert --not-- after "has".

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At page 28, lines 11-12, please delete "If the cursor location is determined to be within the control strip."

AT page 28, line 15, please insert --within the control strip-- after "occurs".

IN THE CLAIMS

1. (Amended) An interactive computer-controlled display system comprising:

a processor;

a data display screen coupled to the processor;

a cursor control device coupled to said processor for positioning a cursor on said data display screen;

a window generation and control logic coupled to the processor and data display screen to create an operating environment for a plurality of individual programming modules that provide status and control functions, wherein the window generation and control logic generates and displays a first window region having a plurality of display areas on said data display screen, wherein each of the plurality of display areas is associated with one of the plurality of individual programming modules;

an indicia generation logic coupled to the data display screen to execute at least one of the plurality of programming modules to generate information [data] for display in [at least] one of the plurality of display areas in the first window region, wherein [a] at least one of the plurality of display areas and its associated programming module is sensitive to user input, and further wherein the window generation and control logic and the indicia generation logic use message-based communication to exchange information to

coordinate activities of the indicia generation logic to enable interactive display activity.

5. (Amended) The display system defined in Claim 4 wherein the first window region[s] is sized such that none of the plurality of display areas is [are] visible.

A2

6. (Amended) The display system defined in Claim 4 wherein the first window region[s] is sized such that all of the plurality of display areas are visible.

7. (Amended) The display system defined in Claim 4 wherein the first window region[s] is sized such that a portion of the plurality of display areas is [are] visible.

8. (Amended) The display system defined in Claim 1 wherein at least one of the plurality of the display [data] areas only displays information.

9. (Amended) The display system defined in Claim 1 wherein at least one of the display [data] areas acts to provide access to control information when selected.

10. (Amended) The display system defined in Claim 9 wherein said at least one of the plurality of display [data] areas displays an additional display element.

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11. (Amended) An interactive computer-controlled display system comprising:

a processor;

a data display screen coupled to the processor;

a cursor control device coupled to said processor for positioning a cursor on said data display screen;

window generation and control logic coupled to the processor and data display screen to create an operating environment for a plurality of individual programming modules that provide status and control functions, wherein the window generation and control logic generates and displays a first window region having a plurality of display areas on said data display screen, wherein each of the plurality of display areas is associated with one of the plurality of individual programming modules [, wherein the first window region comprises at least one data display area];

at least one indicia graphics generation logic coupled to the processor and the window generation logic, wherein said at least one indicia graphics generation logic generates user sensitive graphics for display in said at least one data display area by executing at least one of the plurality of programming modules;

wherein the window generation and control logic determines when said at least one data display area has been selected by the user and signals said at least one indicia graphics generation logic in response to user selection, and further wherein said at least one indicia graphics generation logic initiates a response from said at least one of the plurality of programming modules.

12. (Amended) The display system defined in Claim 11 wherein the first window region is always visible to the user.

15. (Amended) A method for generating control information comprising the steps of:

create an operating environment for a plurality of individual programming modules that provide status and control functions;

generating a first window sized to accommodate a plurality of [at least one] display areas for indicia resulting from [, wherein the step of generating the first window comprises] executing [a first] at least one of the plurality of individual programming modules, wherein each of the plurality of display areas is associated with one of the plurality of individual programming modules;

displaying an indicia in each of said at least one display area by executing one of a plurality of programming modules corresponding to each indicia;

selecting one of the indicia, wherein the step of selecting comprises the first programming module determining which of said at least one display area is selected and sending a message to the programming module of said plurality of programming modules responsible for generating the display of the selected indicia;

said programming module performing a function in response to the selection.

Please add the following new claims:

19. (New) The display system defined in Claim 1 wherein each of the plurality of display areas is individually and variably sized.

12
20. (New) The display system defined in Claim 1 wherein the first window region always appears in front of application windows.

13
21. (New) The display system defined in Claim 1 wherein the first window region is implemented in a private window layer that appears in front of windows for all applications layers.

18 14
22. (New) The display system defined in Claim 11 wherein each of the plurality of display areas is individually and variably sized.

19 14
23. (New) The display system defined in Claim 11 wherein the first window region always appears in front of application windows.

20 14
24. (New) The display system defined in Claim 11 wherein the first window region is implemented in a private window layer that appears in front of windows for all applications layers.

REMARKS

Applicant respectfully requests reconsideration of this application as amended. Claims 1-18 remain in the application. Claim 1, 5-12, and have been amended. Claims 19-24 have been added. No claims have been canceled.

The Examiner has listed a number of informalities and errors in the application. The Applicant has corrected these informalities and errors, as well as others, to put the application in correct form for allowance.

The Examiner has rejected Claims 1-18 under 35 U.S.C. § 102(b) as being unpatentable over Mills et al. Mills teaches the use of a slider control bar for

controlling the rate of display of sequential information. Specifically, Mills teaches the use of such a control window to control the playback rate of video. This control window is defined as having certain components such as standard playback direction/velocity indicators, reverse, stop and fast forward. Mills uses control icon to select one of these rates of display.

Claim 1 of the present invention as amended states, in part:

> . . .
>
> a window generation and control logic coupled to the processor and data display screen to create an operating environment for a plurality of individual programming modules that provide status and control functions, wherein the window generation and control logic generates and displays a first window region having a plurality of display areas on said data display screen, wherein each of the plurality of display areas is associated with one of the plurality of individual programming modules;
>
> . . .

Thus, the present invention provides logic that creates an operating environment like a shell for other programming modules to provide status and control functions. Mills does not provide such an environment. In Mills, the control window is used for controlling video generated by an application.

Claim 1 of the present invention also includes that "window generation and control logic and the indicia generation logic use message-based communication to exchange information to coordinate activities of the indicia generation logic to enable interactive display activity" Contrary to the Examiner's assertion, Mills does not teach the use of message based communication for information exchange, particularly between control logic that creates an environment for the plurality of programming modules

which control the indicia generation logic. In one described embodiment, the message based communication comprises the control strip of the present invention passing messages to a module to either tell it what to do or to obtain information about the module and its capabilities (e.g., See Specification, pg. 32, lines 5-7). There is no indication in Mills that such message based communication is used. In view of the above discussion, Applicant respectfully submits that Mills does not anticipate the present invention as claimed in Claim 1, nor any of its dependent claims.

Independent Claims 11 and 15 also include a similar limitation regarding the creation of the operating environment. Therefore, based on the same rationale given above, Applicant respectfully submits Claims 11 and 15 and their dependent claims are not anticipated by Mills.

Applicant has added Claims 19-24. Claims 19-21 are dependent on Claim 1, and Claims 22-24 are dependent on Claim 11. Claims 19 and 22 provide that each of the plurality of display areas is individually and variably sized. Mills does not disclose such sizing. Claims 20 and 23 provide that the first window region always appears in front of application windows. Similarly, Claims 21 and 24 provide that the first window region is implemented in a private window layer that appears in front of windows for all applications layers. Mills clearly does not show this. In fact, as soon as another application is used in Mills, the control window will be overlapped and at least partially non-visible. Therefore, based on this, Applicant respectfully submits that Claims 19-24 are allowable over the art of record.

Accordingly, Applicant respectfully submits that the rejection under 35 U.S.C. § 102(b) has been overcome by the amendments and the remarks and withdrawal of these rejections is respectfully requested. Applicant submits

that Claims 1-18 as amended and Claims 19-24 as added are now in condition for allowance and such action is earnestly solicited.

Please charge any shortages and credit any overcharges to our Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Dated: 8/20, 1996

Michael J. Mallie
Attorney for Applicant
Registration No. 36,591

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8598

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231 on August 20, 1996

Angela Quinn — August 20, 1996 (Date)

A

2306

Attorney's Docket No. 04860.P1365 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)
)
Steven W. Christensen) Examiner: C. Dela Torre
)
Application No.: 08/316,237) Art Unit: 2306
)
Filed: September 30, 1994)
)
For: METHOD AND APPARATUS FOR DISPLAYING AND STATUS INFORMATION IN A COMUTER SYSTEM)

#8

Assistant Commissioner for Patents
Washington, D.C. 20231

INFORMATION DISCLOSURE STATEMENT

Sir:

Enclosed is a copy of Information Disclosure Citation Form PTO-1449 together with copies of the documents cited on that form. It is respectfully requested that the cited documents be considered and that the enclosed copy of Information Disclosure Citation Form PTO-1449 be initialed by the Examiner to indicate such consideration and a copy thereof returned to applicant(s).

Pursuant to 37 C.F.R. § 1.97, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made and is not to be construed as an admission that the information cited in this statement is material to patentability.

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If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: 10/16, 1996

James C. Scheller, Jr.
Reg. No. 31,195

12400 Wilshire Blvd.
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8598

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(Signature of person mailing correspondence)

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ATTY. DOCKET NO.	SERIAL NO.
04860.P1365	08/~~316,237~~ 821004

APPLICANT: Steven W. Christensen

FILING DATE	GROUP
9/30/94	~~2306~~ 2415

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
Cnd		5,416,895	5/16/95	Anderson, et al.	707 ~~395~~	503 ~~148~~	4/8/92

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

Cnd		"PCT Written Opinion", October 4, 1996

EXAMINER	DATE CONSIDERED
C. DELA TORRE	11/12/96

*EXAMINER: Initial if citation 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.

US005416895A

United States Patent [19]

Anderson et al.

[11] Patent Number: 5,416,895

[45] Date of Patent: May 16, 1995

[54] **SYSTEM AND METHODS FOR IMPROVED SPREADSHEET INTERFACE WITH USER-FAMILIAR OBJECTS**

[75] Inventors: **Charles R. Anderson**, Santa Cruz; **Robert W. Warfield**, Aptos; **Istvan Cseri**, Scotts Valley; **Murray K. Low**, Santa Cruz; **Weikuo Liaw**, Scotts Valley; **Alan M. Bush**, Palo Alto, all of Calif.

[73] Assignee: **Borland International, Inc.**, Scotts Valley, Calif.

[21] Appl. No.: **866,658**

[22] Filed: **Apr. 8, 1992**

[51] **Int. Cl.**[6] **G06F 17/30**; G06F 17/40

[52] **U.S. Cl.** **395/148**; 395/159; 395/161; 395/158; 395/155

[58] **Field of Search** 395/155, 148, 158, 149, 395/159, 160, 161; 340/747, 748; 364/401; 345/24, 25

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Primary Examiner—Mark K. Zimmerman

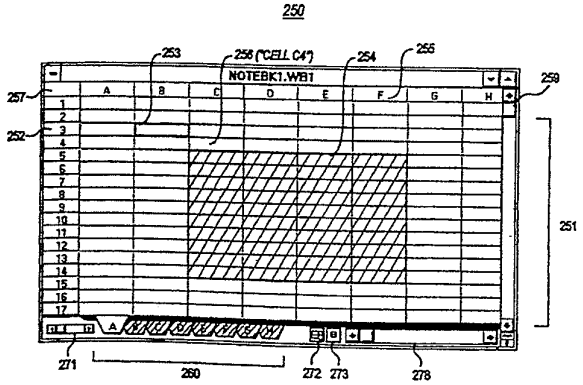
Assistant Examiner—J. Feild

Attorney, Agent, or Firm—John A. Smart; David N. Slone; Vernon A. Norviel

[57] **ABSTRACT**

An electronic spreadsheet system of the present invention includes a notebook interface having a plurality of notebook pages, each of which may contain a spread of information cells, or other desired page type (e.g., Graphs page). Methods are provided for rapidly accessing and processing information on the different pages, including displaying a plurality of page identifiers for selecting individual pages, and further including a preferred syntax for referencing information. Additional methods are provided for editing cells and blocks of cells.

17 Claims, 35 Drawing Sheets



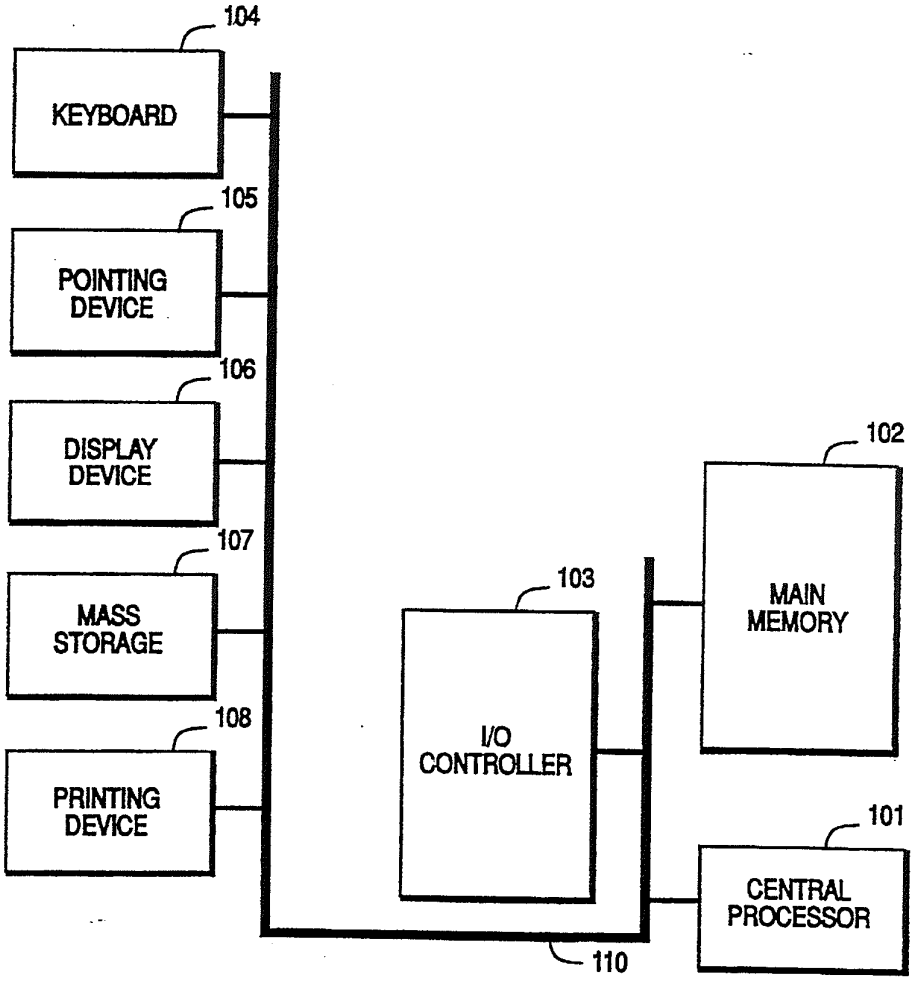


FIG. 1A

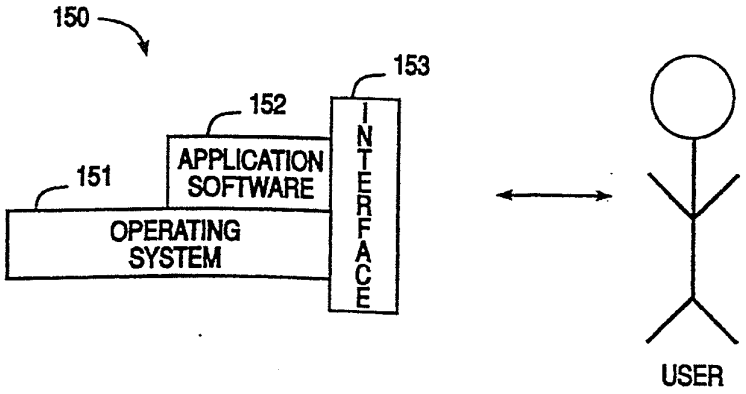
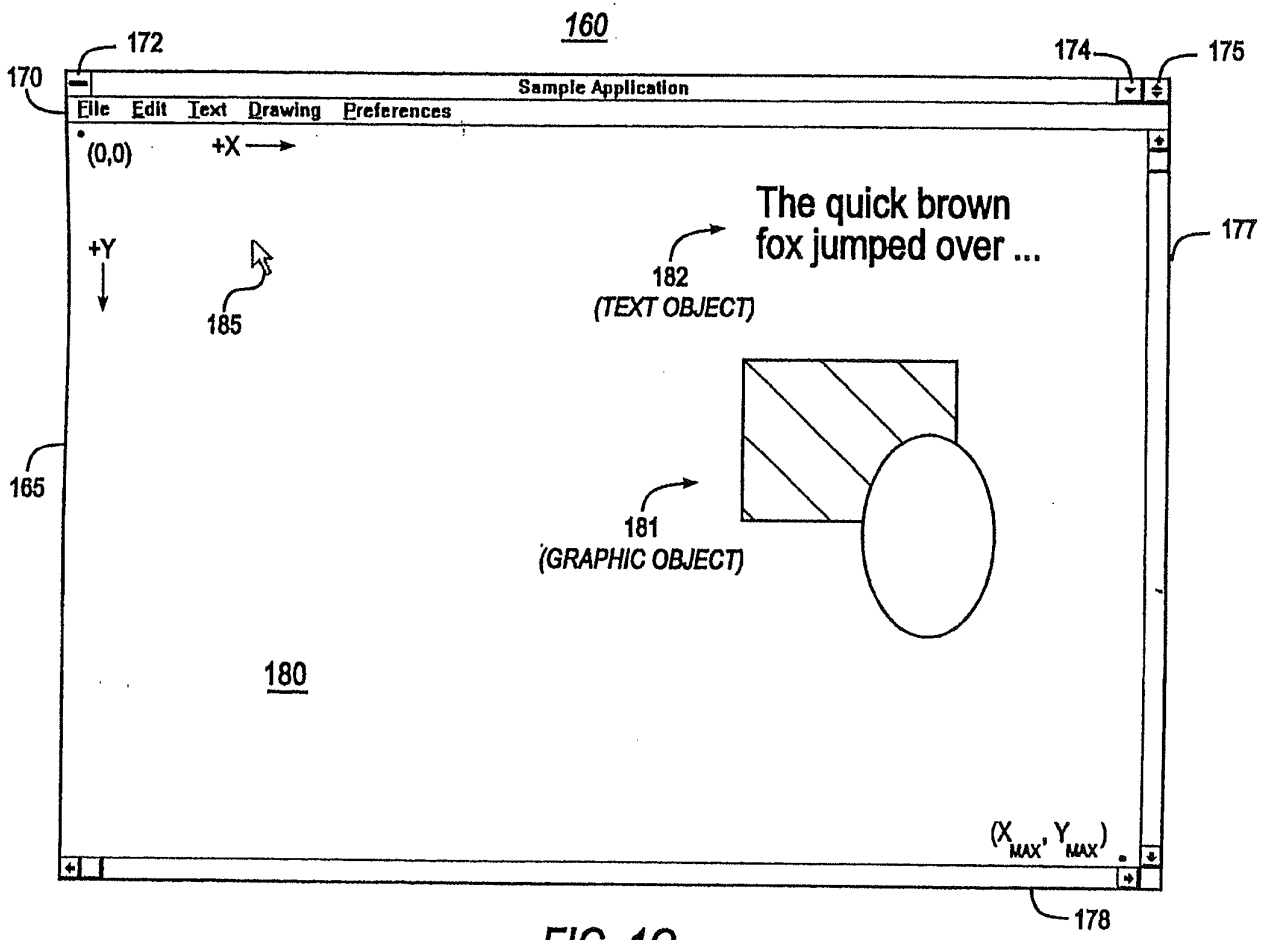


FIG. 1B


160
172
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Sample Application
File Edit Text Drawing Preferences
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+Y
The quick brown
fox jumped over ...
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182
(TEXT OBJECT)
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165
181
(GRAPHIC OBJECT)
180
(X_MAX, Y_MAX)
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FIG. 1C

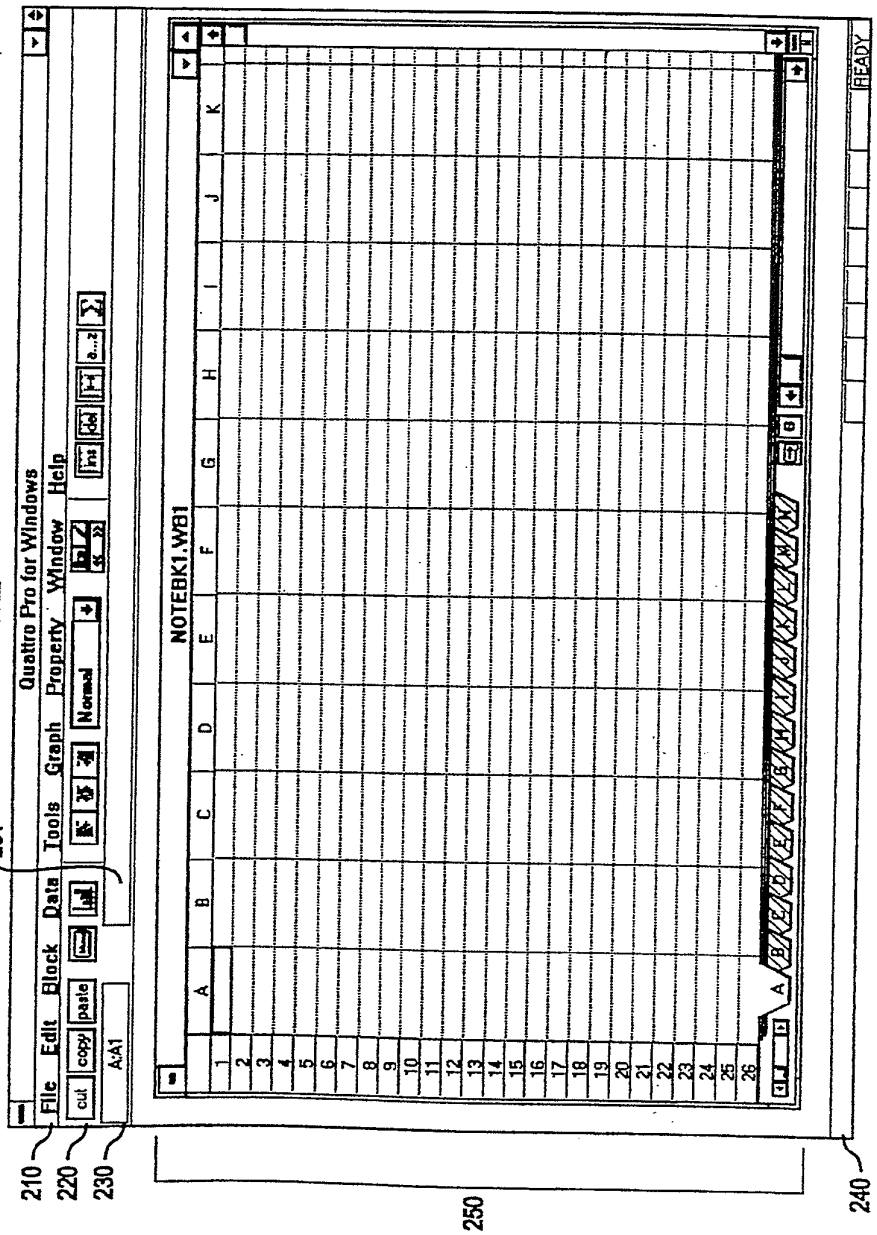
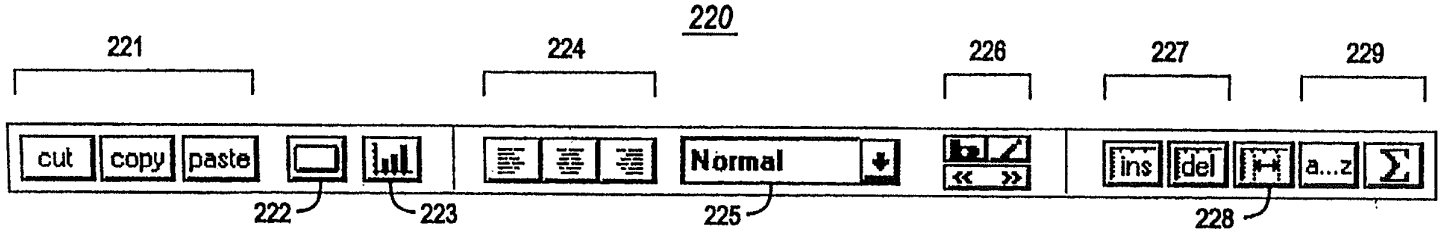


FIG. 2A



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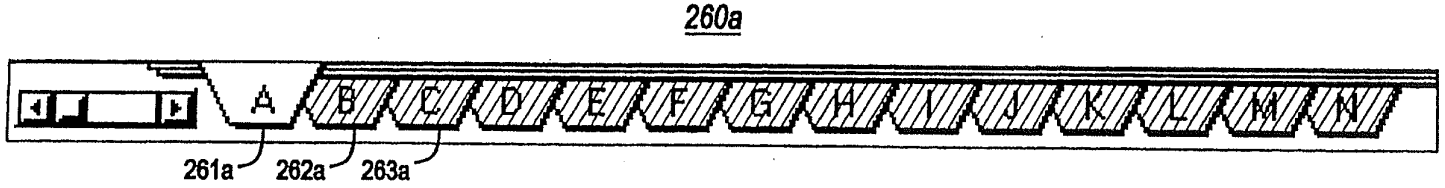

FIG. 2D

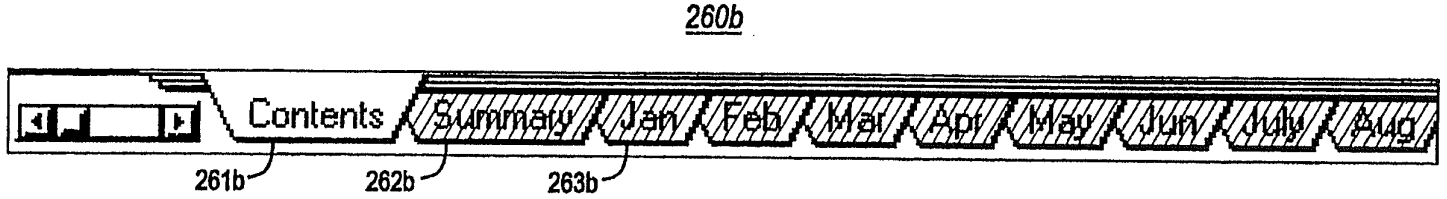

FIG. 2E

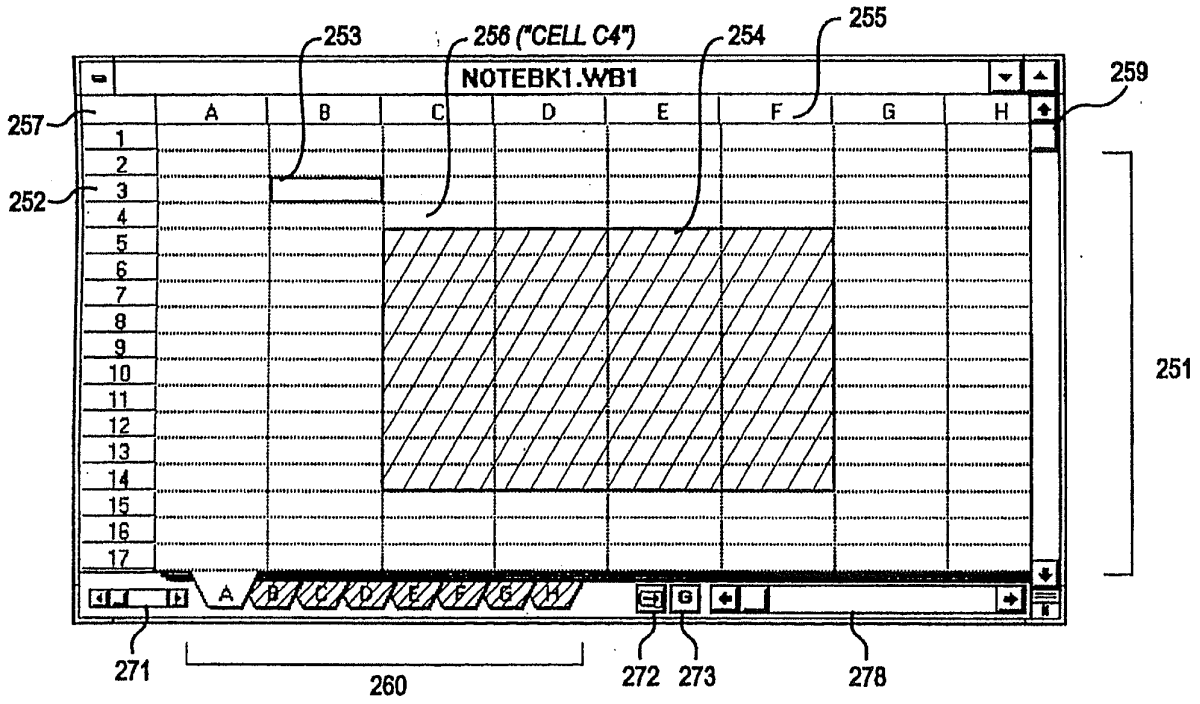
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FIG. 2C

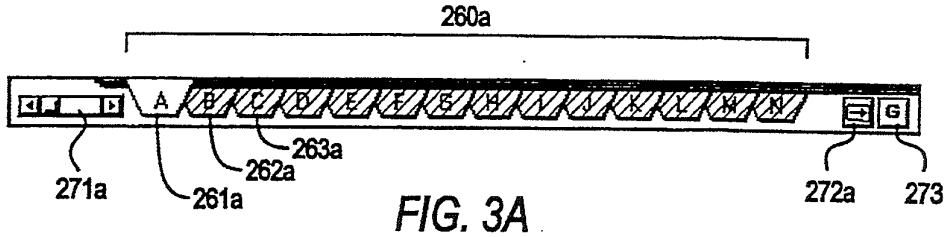


FIG. 3A

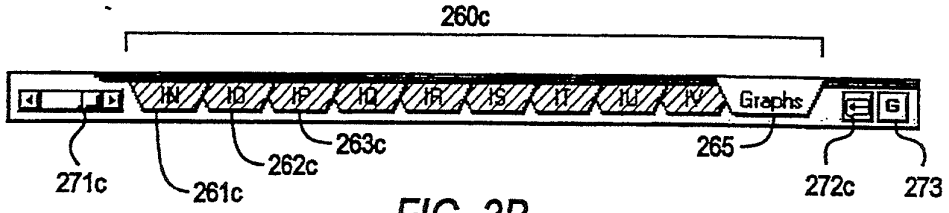


FIG. 3B

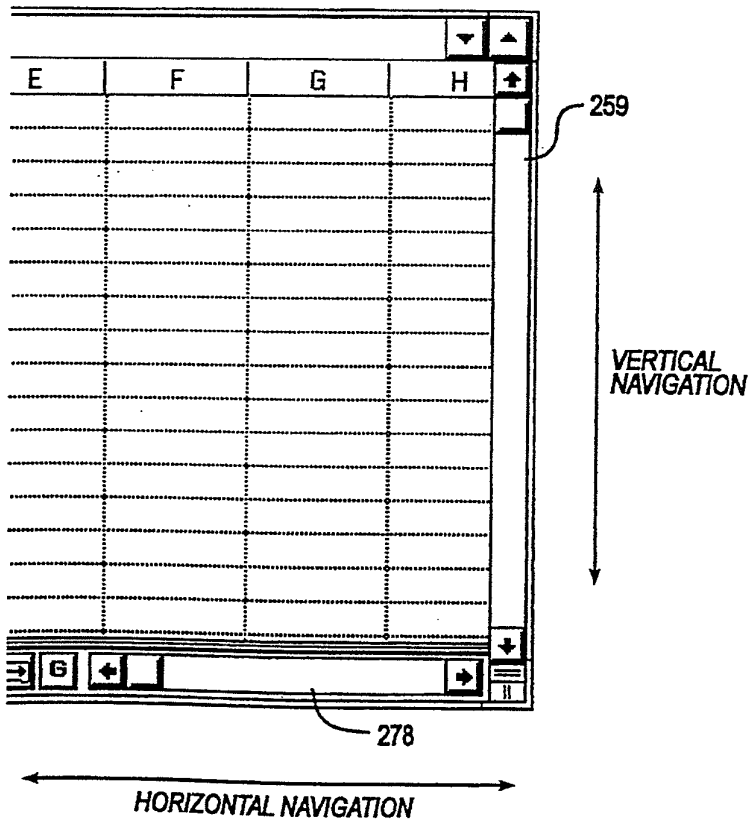


FIG. 3C

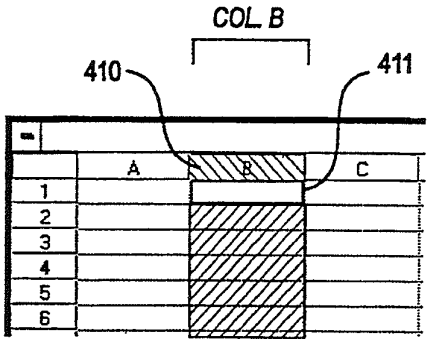


FIG. 4A

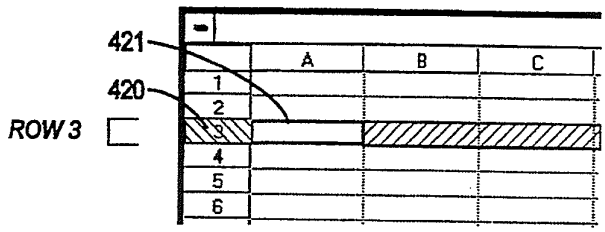


FIG. 4B

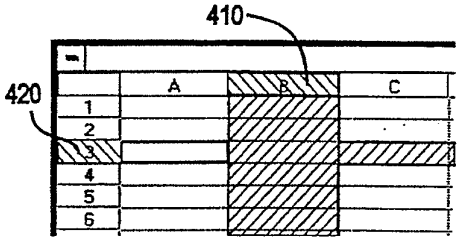


FIG. 4C

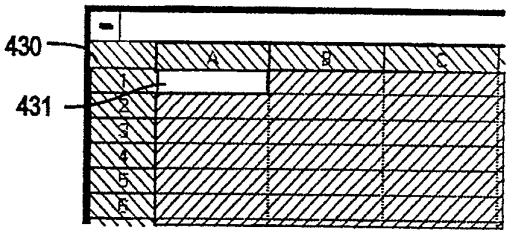
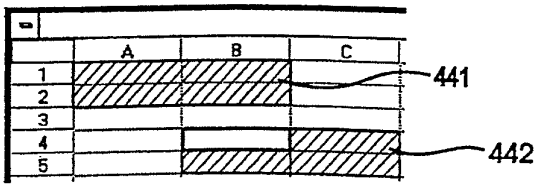


FIG. 4D



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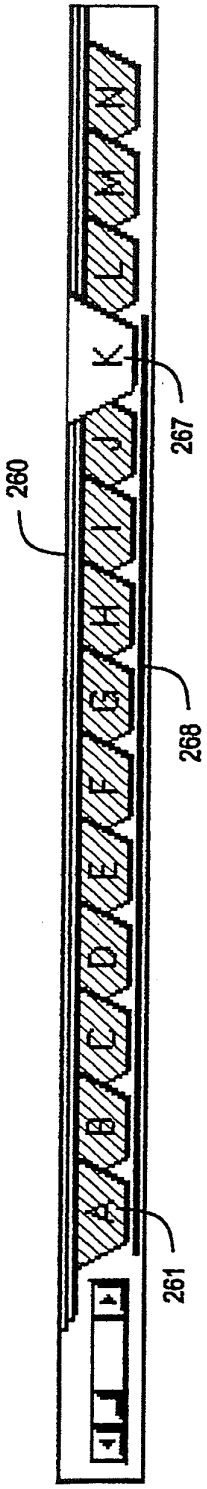
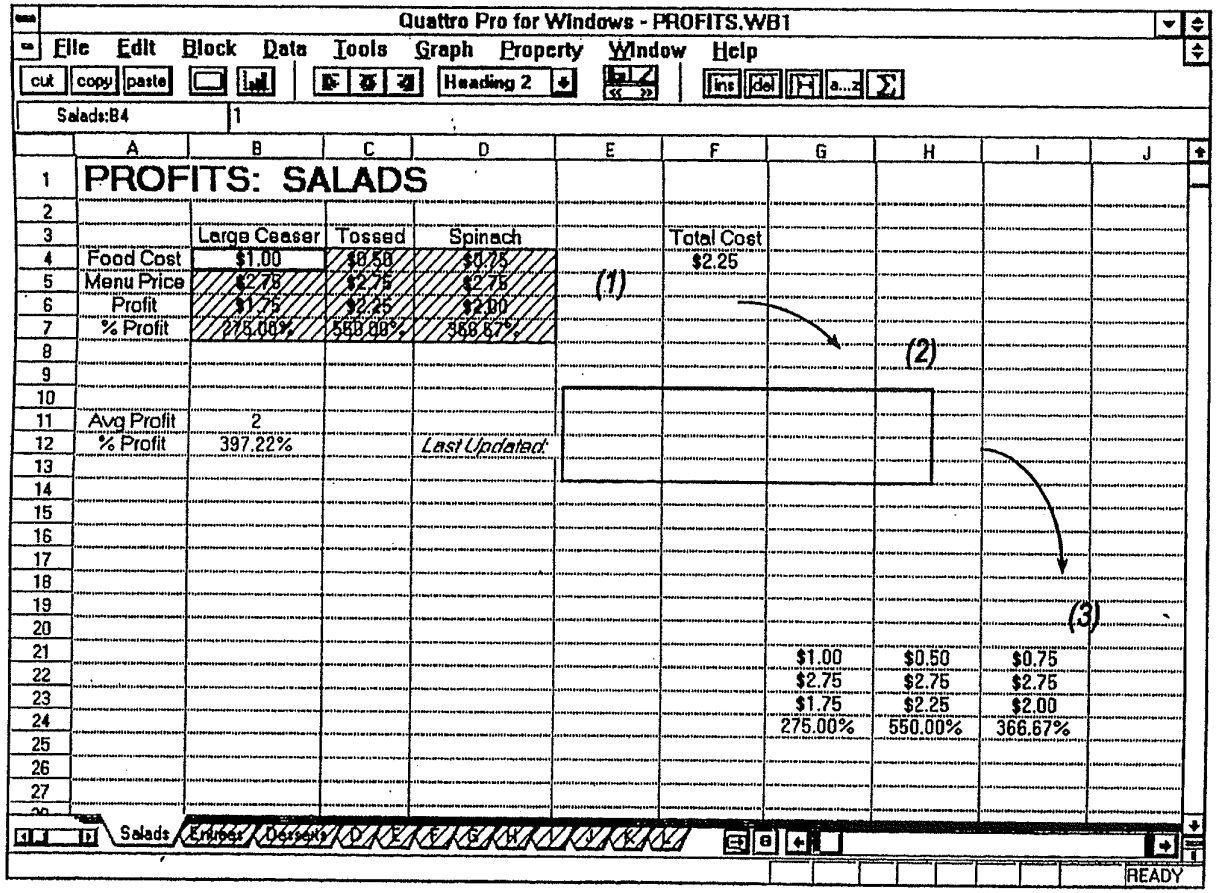


FIG. 4F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Heading 2
Salads:B4
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Large Ceaser
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Food Cost
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Profit
% Profit
$1.00
$0.50
$0.75
$2.25
$2.75
$2.75
$2.75
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550.00%
366.67%
(1)
(2)
(3)
Avg Profit
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% Profit
397.22%
Last Updated:
Salads
Entrees
Desserts
READY

FIG. 4G